Technical Report No. 12-10

Aquatic Studies at Kensington Gold Mine, 2012

by

Jackie Timothy and Katrina M. Kanouse

with Southeast Region Habitat Staff

February 2013

Alaska Department of Fish and Game **Division of Habitat**

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_{2,}$ etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

TECHNICAL REPORT NO. 12-10

AQUATIC STUDIES AT KENSINGTON GOLD MINE, 2012

by
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February 2013

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Cover: Clockwise from bottom left hand corner: periphyton sample; benthic macroinvertebrates from the Orders Plecoptera (stonefly), Ephemeroptera (mayfly) and Trichoptera (caddisfly); juvenile Dolly Varden char, and; anadromous fish barrier at Johnson Creek.

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  MS 5230, Washington DC 20240.

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TABLE OF CONTENTS

Page

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (Continued)

LIST OF APPENDICES

ACKNOWLEDGEMENTS

The Alaska Department of Fish and Game thanks Coeur Alaska Inc. Kensington Gold Mine for financially supporting the aquatic studies program. Kevin Eppers, Pete Strow, and staff provided logistical support and water quality information.

Alaska Department of Fish and Game Division of Habitat biologists assisted with this year's effort, including Greg Albrecht, Benjamin Brewster, Matt Kern, Tally Teal, Tess Quinn, Gordon Willson-Naranjo, and Johnny Zutz. John Hudson provided macroinvertebrate quality assurance and control. Division of Sport Fish biometrician Dan Reed provided biometric review and Dr. Al Ott provided technical review. Habitat biologist Nicole Legere edited the draft report and Amy Carroll of the Commercial Fisheries Division prepared the report for publication. Thank you all so very much.

EXECUTIVE SUMMARY

The Alaska Department of Fish and Game (ADF&G) Division of Habitat (Habitat) completes the aquatic resource monitoring the U.S. Forest Service (USFS) and the Alaska Department of Environmental Conservation (DEC) require for Coeur Alaska Inc.'s (Coeur) Kensington Gold Mine. This partnership provides Habitat the opportunity to gather and review aquatic information and identify, assess, and resolve issues at the Kensington Gold Mine as they arise.

During 2011, the first year we completed aquatic studies, we observed the physiochemical habitat characteristics of each sample site are distinct and saw less value in comparisons amongst drainages and more value in comparisons at each sampling location between years. In 2012, we focused on evaluating stream health by assessing biotic assemblages in relation to the physical and chemical constituents within a drainage section. This process will continue over the long term. These are complex relationships with inherent high variability.

Weather is a factor we consider when we analyze the aquatic study data. The National Weather Service reports that November 2012 was the seventh consecutive month that Juneau experienced air temperatures below normal. The cooler temperatures contributed to a decrease in algal biomass in our annual July samples at all sample sites except in Upper Slate Creek where we observed a slightly greater density. The cooler temperatures and above normal precipitation in 2012 also effectively controlled the algae growing in the tailing treatment facility (TTF) so the filters in the TTF wastewater treatment plant did not clog.

Coeur's environmental staff agreed we could continue sampling periphyton quarterly in Lower, East Fork and Upper Slate Creek during 2012 and beyond. Should warmer temperatures and decreased precipitation in future years result in an algal bloom in the TTF as happened in 2011, we will have periphyton community composition and biomass data across seasons and drainage sections to compare. These data will be useful should Coeur need to treat the TTF with an algaecide. Of interest is there are no significant differences between the mean ranks of July 2011 and July 2012 chlorophyll *a* densities in samples collected in East Fork Slate Creek, meaning algal biomass is about the same both years downstream of the TTF.

The Lower Slate Creek benthic macroinvertebrate sample site is a shallow, wide riffle with no defined thalweg. We find it difficult to select suitable sampling locations and we record more chironomids (midges) in Lower Slate Creek than any other Kensington Gold Mine sampling site. Though we tried to replicate the 2005–2010 sampling reach of the previous contractor (Flory 2011), we are not confident we sampled the exact reach in 2011 and 2012. In 2013, we will collect six additional benthic macroinvertebrate samples at riffle habitats upstream where it appears there are better opportunities for sampling. If we find the EPT taxa in previously documented proportions, we will establish a new long-term benthic macroinvertebrate sampling site in Lower Slate Creek.

The concentrations of the metallic elements cadmium, copper, lead, mercury, nickel, silver, and zinc, and the semimetallic element arsenic, are higher in East Fork Slate Creek stream sediments than in those of Upper Slate or Lower Slate Creeks. Cadmium and zinc concentrations are about an order of magnitude higher and unlike the aforementioned metals, do not naturally occur above NOAA sediment recommendations[a] for freshwater ecosystems (Buchman 2008; MacDonald et al.

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[a] These are guidelines, not federal or state standards.

2000) at Upper Slate Creek, suggesting input somewhere between the sampling stations in Upper Slate Creek and East Fork Slate Creek, which includes the TTF, dam and plunge pool.

That said, there are no significant differences in growth or survival of *Chironomus dilutes* or *Hyalella azteca* between the laboratory control sediments and the individual sediment samples in our short-term chronic sediment toxicity tests at any sampling location. We will sample stream sediments in West Fork Slate Creek and Upper Sherman Creek in 2013 and test for metals concentrations to improve our understanding of naturally occurring background conditions.

The phosphorous concentrations measured in the TTF last year are consistent with those found in eutrophic lakes, and this year are consistent with those found in mesotrophic lakes, despite the TTF being situated in the formerly oligotrophic Lower Slate Lake. We theorize a source of phosphorous in the mine tailings is causing algal blooms in the TTF.

We may be starting to see a correlation between phosphorus spikes in the TTF and total dissolved solids[b] (TDS) spikes downstream in East Fork Slate Creek. In 2013, we will review these data with a 2012 schedule of TTF discharge to see if there is a correlation between phosphorus dips when the mill is not operating or when the tailings are directed to the underground paste plant. We have not ruled out natural seeps or the graphitic phyllite seeps at the dam and plunge pool as a metals contributor to East Fork Slate Creek.

In 2013, we will sample Dolly Varden char *Salvelinus malma* in West Fork Slate Creek for whole body metals concentrations for comparison with other Slate Creek drainage sampling locations. These data will help improve our understanding of natural metals concentrations and variability.

In our 2011 report, we stated we would investigate overwintering habitat possibilities in East Fork Slate Creek in 2012, as previous contractors suggested the East Fork Slate Creek Dolly Varden char population might be dependent on Upper Slate Lake migrants. We did not complete the investigation in 2012 as we planned, and have scheduled visits in February 2013.

We attempted, and did not document adult coho salmon returning to Lower Slate Creek, though it makes sense they spawn there given the number of age-0 and 1-year-old juveniles we observe. We viewed adult coho salmon returning to Lower Johnson Creek during snorkel surveys, and will continue to survey Lower Slate Creek by foot and snorkeling in 2013 as we work to document adult coho salmon spawning in the system. We will continue to investigate the presence of age-0 and 1-year-old juvenile coho salmon in Lower Slate Creek during spring 2013.

We reviewed the 2011 data with the 2012 data to ensure accuracy. We found errors in the 2011 periphyton, benthic macroinvertebrate, resident fish, and spawning substrate datasets. We corrected the errors and note corrections that change results in this report. We will continue the practice of revisiting the long-term dataset annually, noting errors and corrections in the subsequent report. Since we provide the report to Coeur by the end of February each year, readers can ensure they are reviewing the most recent issue by checking the February [year] date near the bottom of the cover page.

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[b] TDS is a measure of minerals, salts, metals, cations or anions dissolved in water.

INTRODUCTION

The Kensington Gold Mine is located near Berners Bay in Southeast Alaska; about 72.5 km north of Juneau by air and about 56 km south of Haines by air (Figure 1). The site, where mining began near the end of the 19th century, is within the City and Borough of Juneau and the Tongass National Forest (Tetra Tech Inc. et al. 2004a,b). The mine is owned and operated by Coeur Alaska, Inc. under the Coeur d'Alene Corporation out of Coeur d'Alene, Idaho.

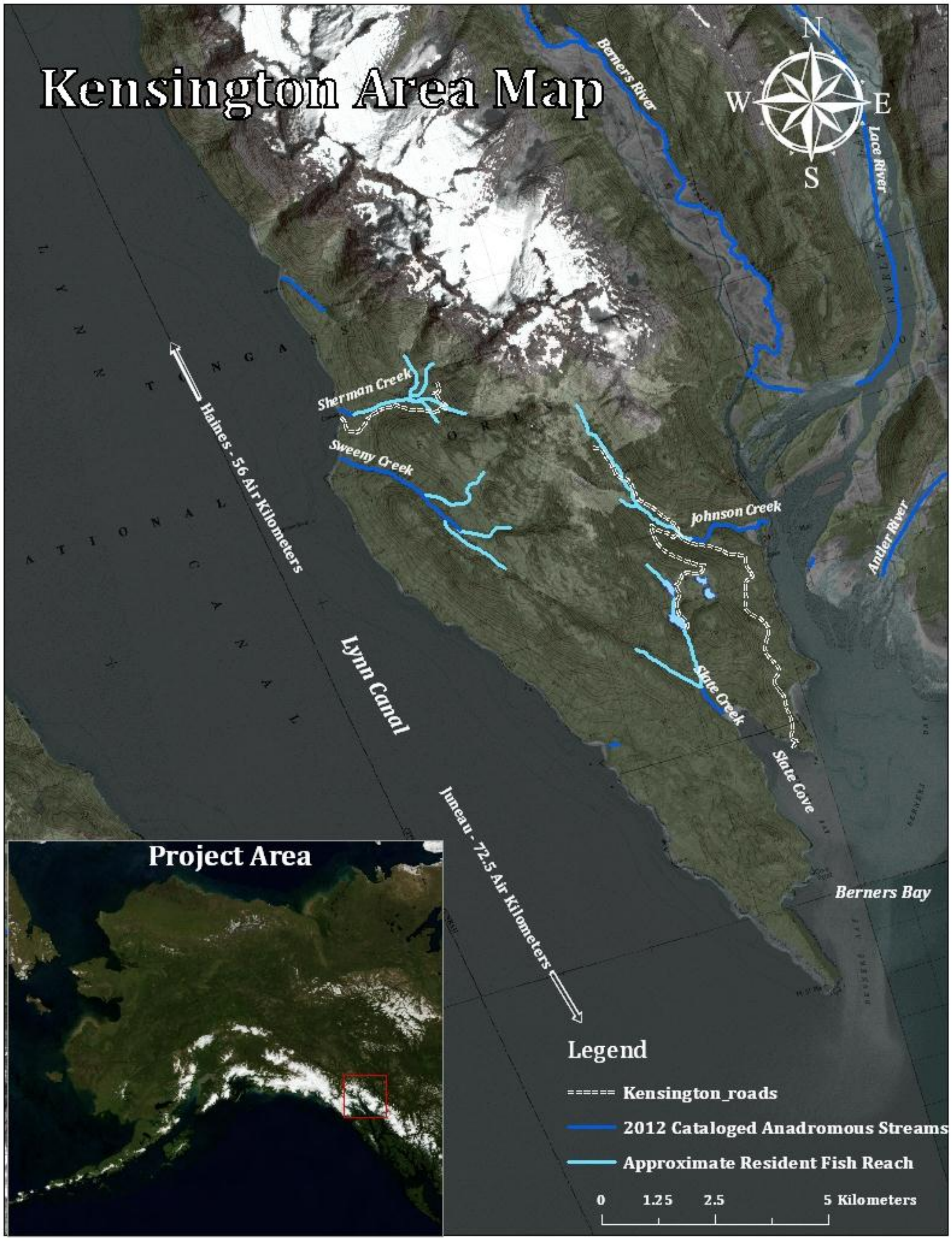

Figure 1.–Kensington Gold Mine area map.

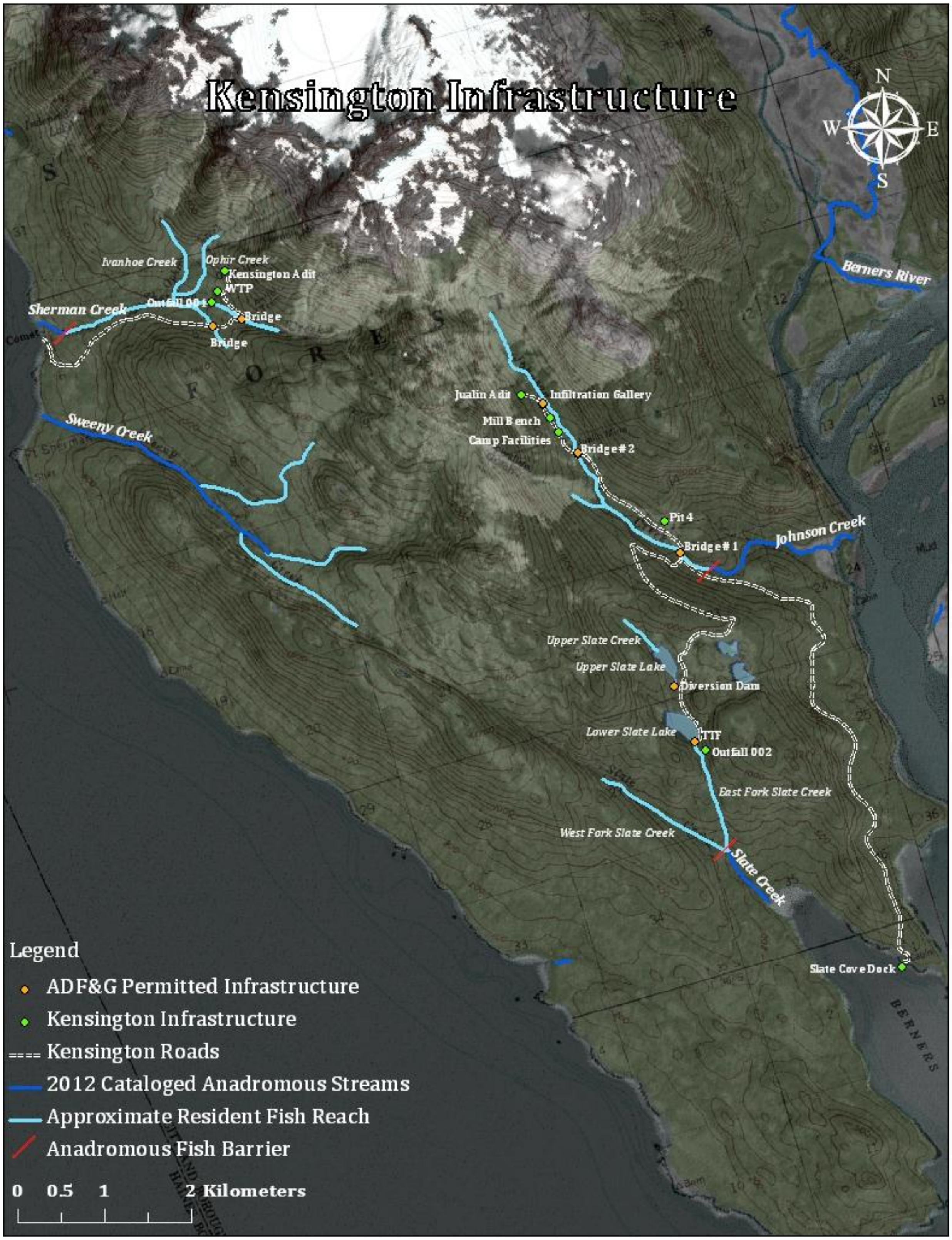

Figure 2.–Kensington Gold Mine infrastructure.

Mine infrastructure is located in three drainages that support anadromous fish (Figure 2):

- The TTF in the Slate Creek drainage;
- The camp and mill facilities in the Johnson Creek drainage, and;
- The mine water treatment facility in the Sherman Creek drainage.

The Kensington and Jualin adits were connected in July 2007, making travel through the ore body between the Johnson and Sherman Creek drainages possible. The mine began production on June 24, 2010 and produces gold concentrate that is exported for processing. Tailings are disposed as slurry from the mill through a pipeline into the TTF. Under ADF&G's authorities at Alaska Statute (AS) 16.05.841 and 16.05.871, Habitat permits a dam and stream diversion in the Slate Creek drainage that allows Dolly Varden char to bypass the TTF and move downstream into East Fork Slate Creek. Habitat permits activities in two other waterbodies where Kensington Gold Mine activities occur, including an infiltration gallery and bridges at Johnson Creek, and bridges over tributaries to Sherman Creek (Timothy and Kanouse 2012, Appendix B).

Contractors gathered aquatic data for the Kensington Gold Mine from the late 1980s through 2005 that, in part, informed Habitat permit decisions, the USFS Plan of Operations monitoring requirements (Coeur 2005), the Environmental Protection Agency (EPA) National Pollutant Elimination Discharge System (NPDES) Permit No. AK-005057-1 (Timothy & Kanouse 2012, Appendix A), and the DEC Alaska Pollutant Elimination System (APDES) Permit No. AK0050571 (Timothy and Kanouse 2012, Appendix A). Contractor reports include Archipelago Marine Research Ltd. (1991), Dames and Moore (1991), Earthworks Technology, Inc. (2002), EVS Environment Consultants (2000), Flory (1998, 1999, 2000, 2001a, 2001b, 2002, 2004), HDR Alaska, Inc. (2003), Kline Environmental Research, LLC (2001, 2003, 2005), Konopacky Environmental (1992a, 1992b, 1993a, 1993b, 1993c, 1995, 1996a, 1996b, 1996c, 1996d), Pentec Environmental (1990, 1991), and Steffen Robertson and Kirsten Consulting Engineers and Scientists (1997). Monitoring reports include Flory (2006, 2007, 2008, 2009a, 2009b, 2009c, 2009d, 2011) and (Timothy and Kanouse 2012).

Habitat began the aquatic studies for the Kensington Gold Mine in Slate, Johnson, and Sherman Creeks in 2011. The aquatic monitoring requirements at the mine changed in 2011 as DEC assumed responsibility for mine discharge permitting, compliance, and enforcement, previously held by the EPA. The APDES Permit requires periphyton, benthic macroinvertebrate, resident fish and sediment sampling. Overall stream health is assessed by estimates of periphyton community composition and chlorophyll *a* biomass, benthic macroinvertebrate composition and abundance, resident Dolly Varden char abundance, condition, and whole body metals concentrations in the Slate Creek system, sediment metals concentrations, sediment toxicity, and pink salmon spawning substrate quality. Habitat also completes adult salmon counts and the tailing habitability studies the USFS Plan of Operations requires (Coeur 2005).

PURPOSE

The purpose of this technical report is to summarize our 2012 aquatic study data and document the condition of biological communities and sediments in the Slate, Johnson, and Sherman Creek drainages near mine development and operations. This report satisfies the aquatic study requirements of Coeur's USFS approved 2005 Plan of Operations and APDES Permit AK0050571.

STUDY AREA

We sample the locations within the drainages listed in Table 1.

Table 1.–Aquatic studies sample sites in three drainages.

Slate Creek	Johnson Creek	Sherman Creek
Lower Slate Creek East Fork Slate Creek West Fork Slate Creek TTF (Lower Slate Lake) Upper Slate Creek	Lower Johnson Creek Upper Johnson Creek	Lower Sherman Creek

Note: Drainages are located near the Kensington Gold Mine, 2012.

Slate Creek Drainage

Slate Creek (Figure 3) drains a 10.5 km^2 watershed (Coeur 2005) into Slate Cove on the northwest side of Berners Bay. Two waterfalls about 1 km upstream of the mouth prevent upstream anadromous fish passage to the East and West Forks. There are two lakes in this drainage; Lower Slate and Upper Slate Lakes, both upstream of the East Fork. Many of the plants and animals that inhabit lakes differ from those that inhabit rivers, so results of samples taken in Lower Slate and East Fork Slate Creeks below the lakes will differ from those of West Fork Slate and Upper Slate Creeks, Johnson Creek, and Sherman Creek, where lakes are not present.

The Catalog of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes (Catalog; Johnson and Blanche 2012) lists Lower Slate Creek (Stream No. 115-20-10030) providing habitat for pink salmon *Oncorhynchus gorbuscha*, chum salmon *O. keta*, coho salmon *O. kisutch*, and eulachon *Thaleichthys pacificus*. Dolly Varden char and cutthroat trout *O. clarkii* are present below the waterfalls. Above the waterfalls, Dolly Varden char are present in East Fork Slate, West Fork Slate and Upper Slate Creeks.

We access Slate Creek by kayak from the Slate Cove dock when conditions permit. During inclement weather, we access the creek hiking along the rocky shoreline, or through the woods to the mouth. Above the waterfalls, East Fork Slate Creek is on river left and West Fork Slate Creek is on river right.[c] The 1 km East Fork Slate Creek reach above the waterfalls, to a plunge pool at the base of an earthen dam that contains the TTF, is a series of steep cascade falls. Upstream of the TTF, a small concrete dam diverts water draining from Upper Slate Lake through a diversion pipeline and into East Fork Slate Creek at the plunge pool, bypassing the TTF. Upper Slate Creek is the inlet creek to Upper Slate Lake and is upstream of current mine operations.

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[c] The terms “river right” and “river left” are looking downstream in the direction water is flowing, per USGS convention.

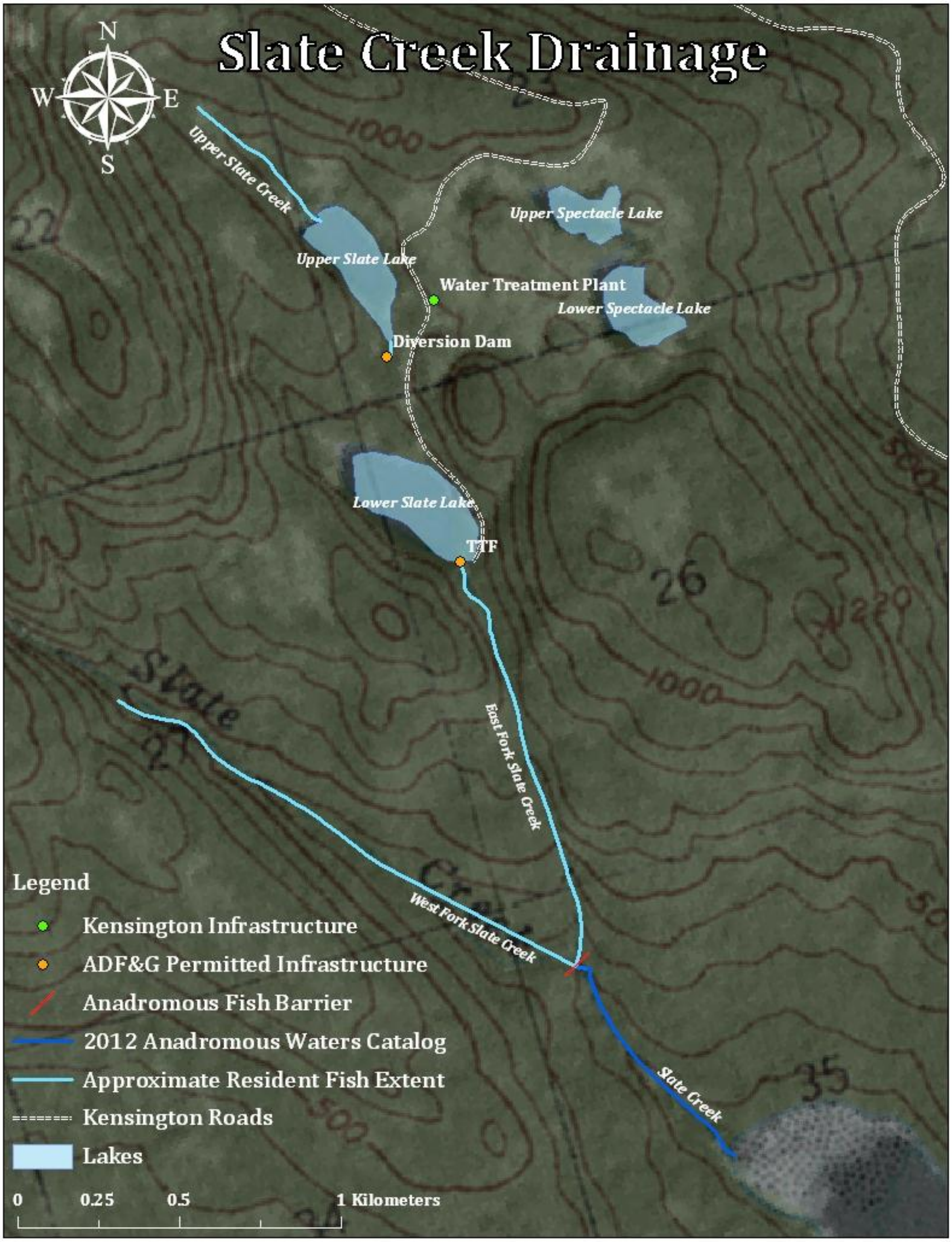

Figure 3.–Slate Creek Drainage.

Johnson Creek Drainage

Johnson Creek (Figure 4) drains a 14.6 km^2 watershed (Coeur 2005) to the north side of Berners Bay. A waterfall about 1.5 km upstream of the mouth prevents anadromous fish passage. The Catalog (Johnson and Blanche 2012) lists Johnson Creek (Stream No. 115-20-10070) providing habitat for pink, chum, and coho salmon. Dolly Varden char and cutthroat trout are present below the waterfall, and Dolly Varden char are present above the waterfall.

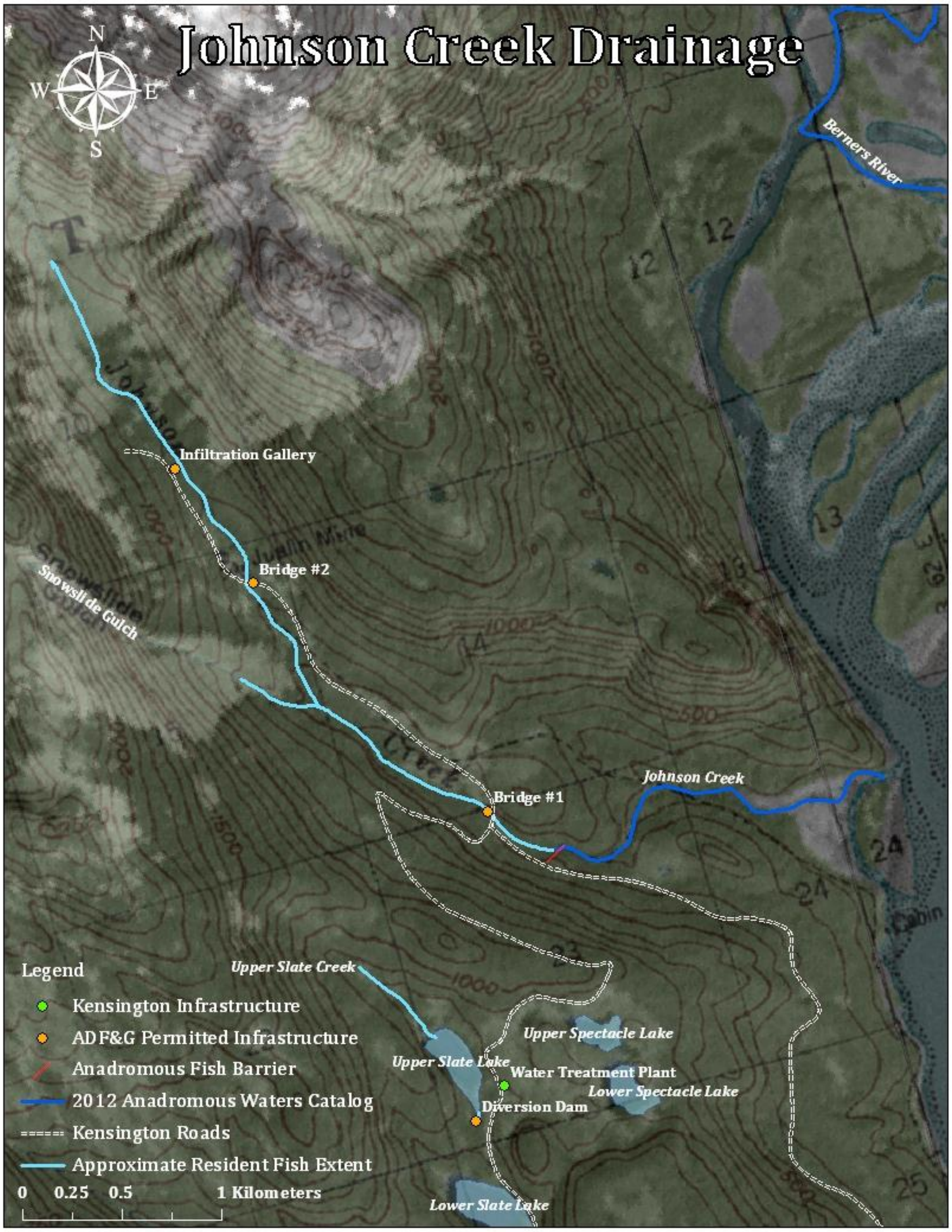

Figure 4.–Johnson Creek Drainage.

We access Lower Johnson Creek by hiking downhill from mile 3 of the Jualin road, through the woods and across meadows to the mouth. About 0.5 km above the anadromous barrier, the creek runs beneath the Jualin Road Bridge 1. The Snowslide Gulch tributary is on river right about 1 km upstream of Jualin Road Bridge 1. Further upstream, the creek runs beneath the Jualin Road Bridge 2 with camp facilities, the mill and the Jualin adit on river right. Upper Johnson Creek is between Jualin Road Bridge 2 and the headwaters. An infiltration gallery collects water from Johnson Creek at the mill bench to support the camp. Upper Johnson Creek above the waste rock pile near the Jualin adit to the headwaters is upstream of current mine operations.

Sherman Creek Drainage

Sherman Creek (Figure 5) drains a 10.84 km^2 watershed (Coeur 2005) to the east shore of Lynn Canal. A waterfall about 360 m upstream from the mouth prevents anadromous fish passage. The Catalog (Johnson and Blanche 2012) lists Sherman Creek (Stream No. 115-31-10330) providing habitat for pink, chum and coho salmon. Habitat submitted a nomination to remove coho salmon and correct the 2013 Catalog, since juvenile and adult coho salmon have not been documented in Sherman Creek. Above the waterfall, Dolly Varden char are present.

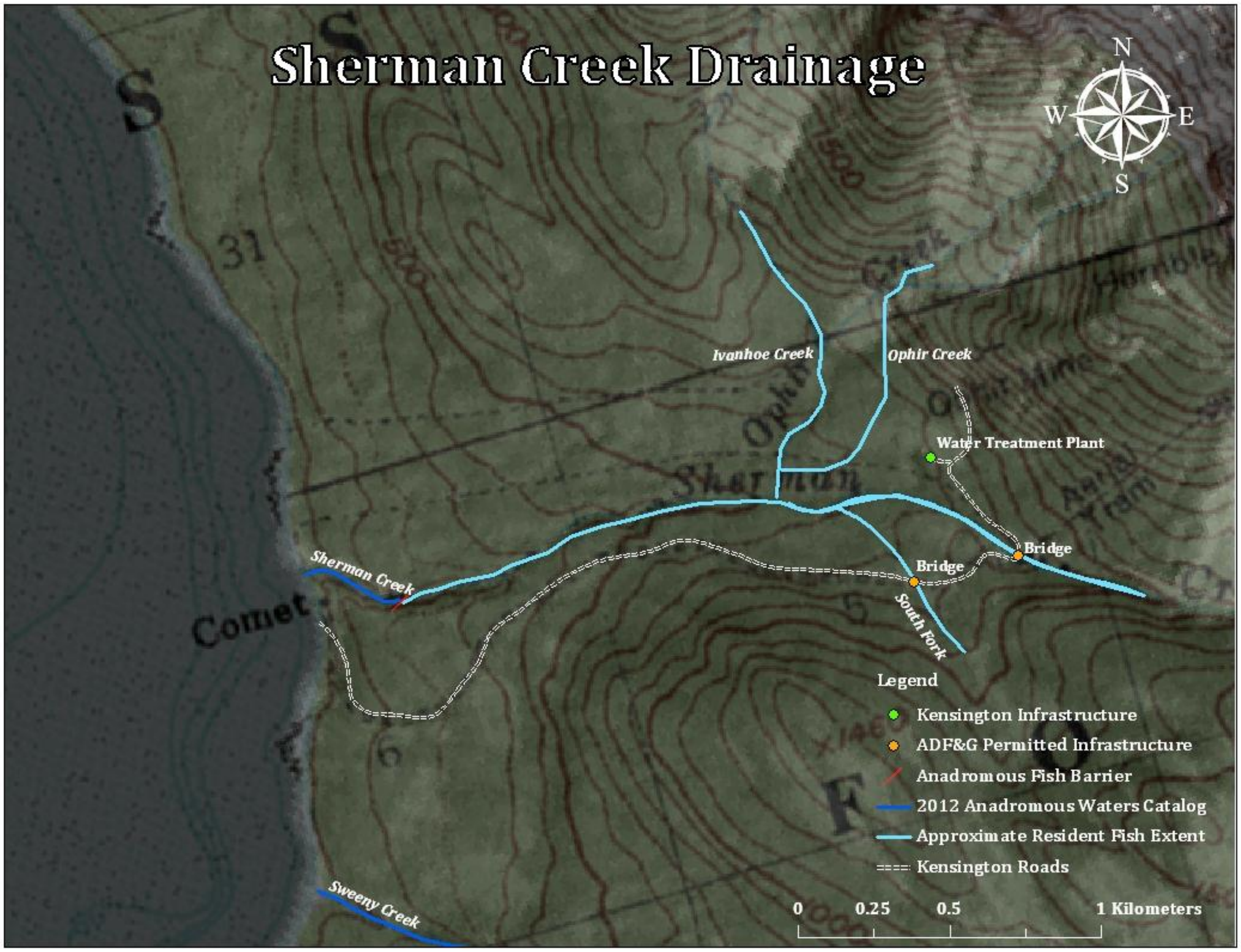

Figure 5.–Sherman Creek Drainage.

We access Sherman Creek by driving underground from the Jualin adit to the Kensington adit and then down the Comet Road to the beach where we walk north about 100 m to the mouth. Middle Sherman Creek is upstream of the waterfall and intercepts Ophir Creek on river right. Upstream of the Sherman and Ophir Creeks confluence, the South Fork of Sherman Creek is on river left. The mine water treatment plant Outfall 001 is upstream of the Sherman and South Fork Creeks confluence. The outfall discharge into Sherman Creek does not require an ADF&G fish passage permit as the discharge does not block fish passage (AS 16.05.841). Upper Sherman Creek above the Comet Road to the headwaters is upstream of current mine operations. The historic 2050 adit and a cabin are in this drainage.

AQUATIC STUDIES

We conduct the Kensington Gold Mine aquatic studies[d] at the frequency specified in the USFS Plan of Operations and DEC APDES Permit (Table 2). We note when we include studies in the Slate Creek drainage (Figure 6) in excess of those required by the USFS or DEC. We show maps of the stream segments and aquatic study sampling stations in Figures 7, 8, & 9. The latitude and longitude of each aquatic study sampling station is listed in Table 3.

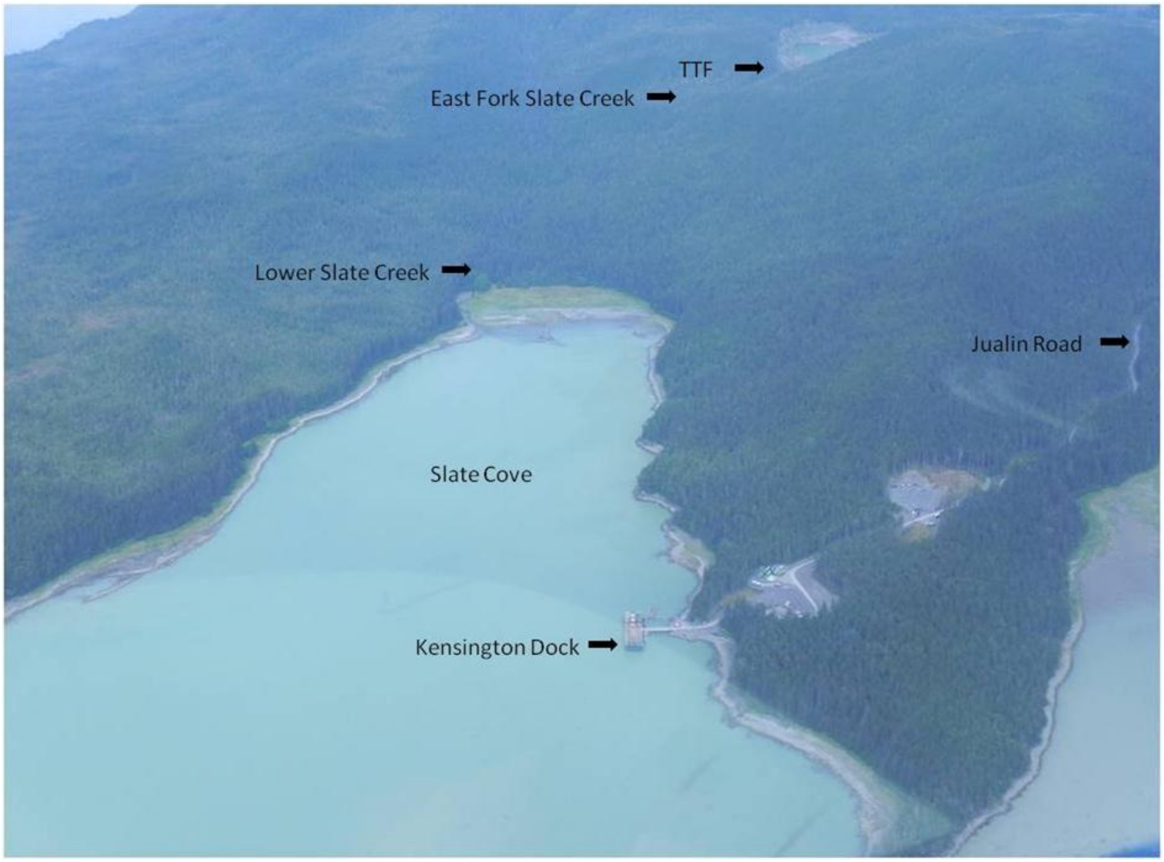

Figure 6.–Aerial view of the Slate Creek Drainage below the TTF.

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[d] For our own information, we use an Extech Exstick II field meter to measure basic water quality at each site during sampling, including temperature and conductivity. We use a Global Water Flow Probe FP101 to measure stream flow. Product names used in the publication are included for completeness but do not constitute product endorsement. The Alaska Department of Fish and Game does not endorse or recommend any specific company or their products.

Table 2.–Aquatic studies sampling frequency.

Location	Location Description	Aquatic Study	Sampling Frequency
Lower Slate Creek	Anadromous, drains to Berners Bay downstream of a 25 m barrier waterfall.	Periphyton biomass and composition	1/year
		Benthic macroinvertebrate composition and abundance	1/year
		Resident fish metals concentrations (Ag, Al, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
		Sediment metals concentrations and toxicity (Ag, Al, As, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
		Spawning substrate quality	1/year
		Adult salmon counts	Annually
East Fork Slate Creek	Riffles and cascade falls downstream of the TTF to the barrier waterfall.	Periphyton biomass and composition	1/year
		Benthic macroinvertebrate composition and abundance	1/year
		Resident fish population and condition	1/year
		Resident fish metals concentrations (Ag, Al, As, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
		Sediment metals concentrations and toxicity (Ag, Al, As, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
West Fork Slate Creek	Reference site, a tributary to Slate Creek located outside of mine influence.	Periphyton biomass and composition	1/year
		Benthic macroinvertebrate composition and abundance	1/year
Upper Slate Creek	Control site located on the north side of upper Slate Lake upstream of mine influence.	Periphyton biomass and composition	1/year
		Benthic macroinvertebrate composition and abundance	1/year
		Resident fish population and condition	1/year
		Resident fish metals concentrations (Ag, Al, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
		Sediment metals concentrations and toxicity (Ag, Al, As, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
Lower Johnson Creek	Anadromous, drains to Berners Bay below a 30 m barrier waterfall.	Sediment metals concentrations and toxicity (Ag, Al, As, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
		Adult salmon counts	Annually
Upper Johnson Creek	Adjacent to camp facilities, downstream of the mill bench.	Benthic macroinvertebrate composition and abundance	1/year
Lower Sherman Creek	Anadromous, drains to Lynn Canal below a 15 m barrier waterfall.	Periphyton biomass and composition	1/year
		Benthic macroinvertebrate composition and abundance	1/year
		Sediment metals concentrations and toxicity (Ag, Al, As, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
		Adult salmon counts	1/year

Note: Requirements of the DEC APDES Permit and USFS Plan of Operations.

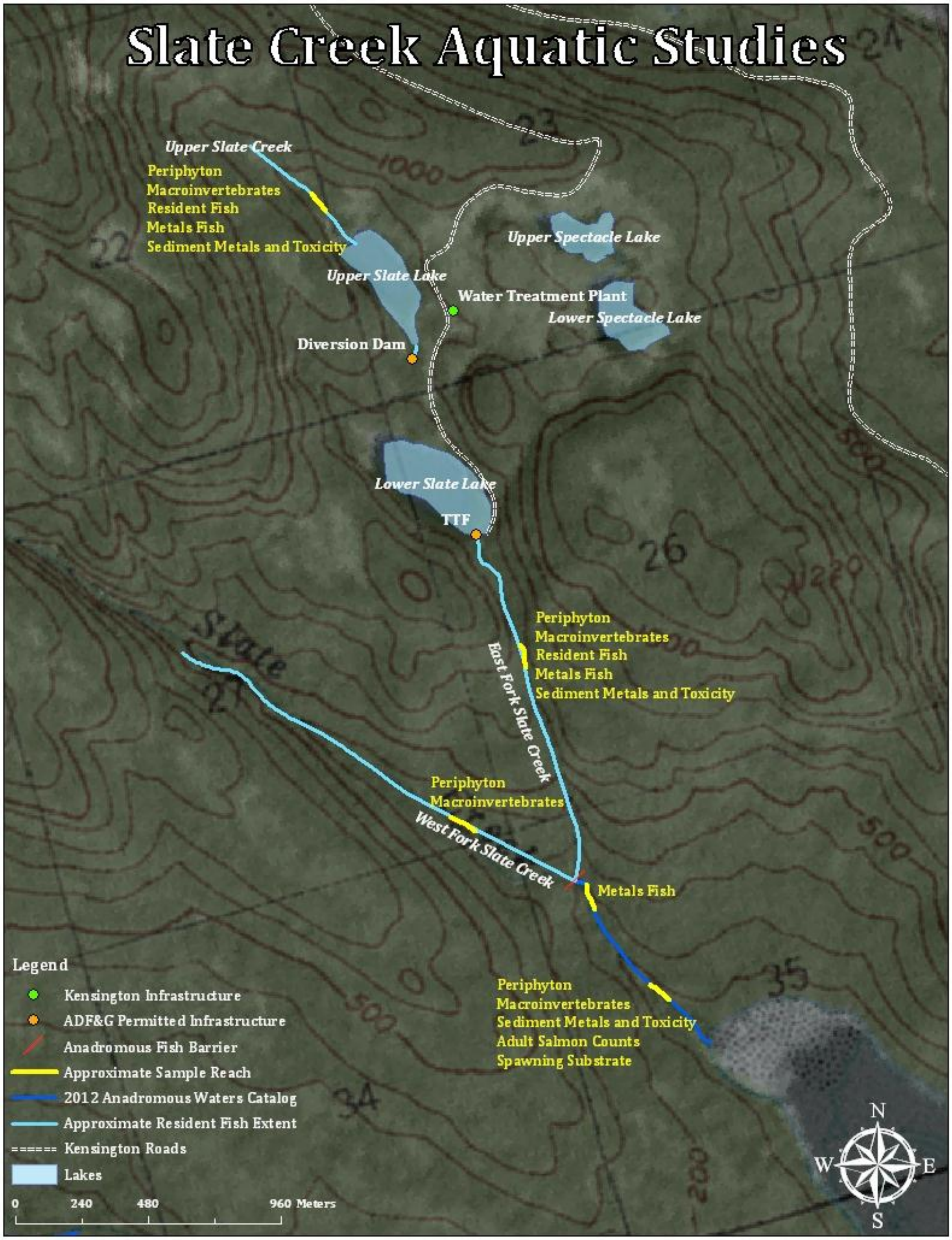

Figure 7.–Slate Creek aquatic studies.

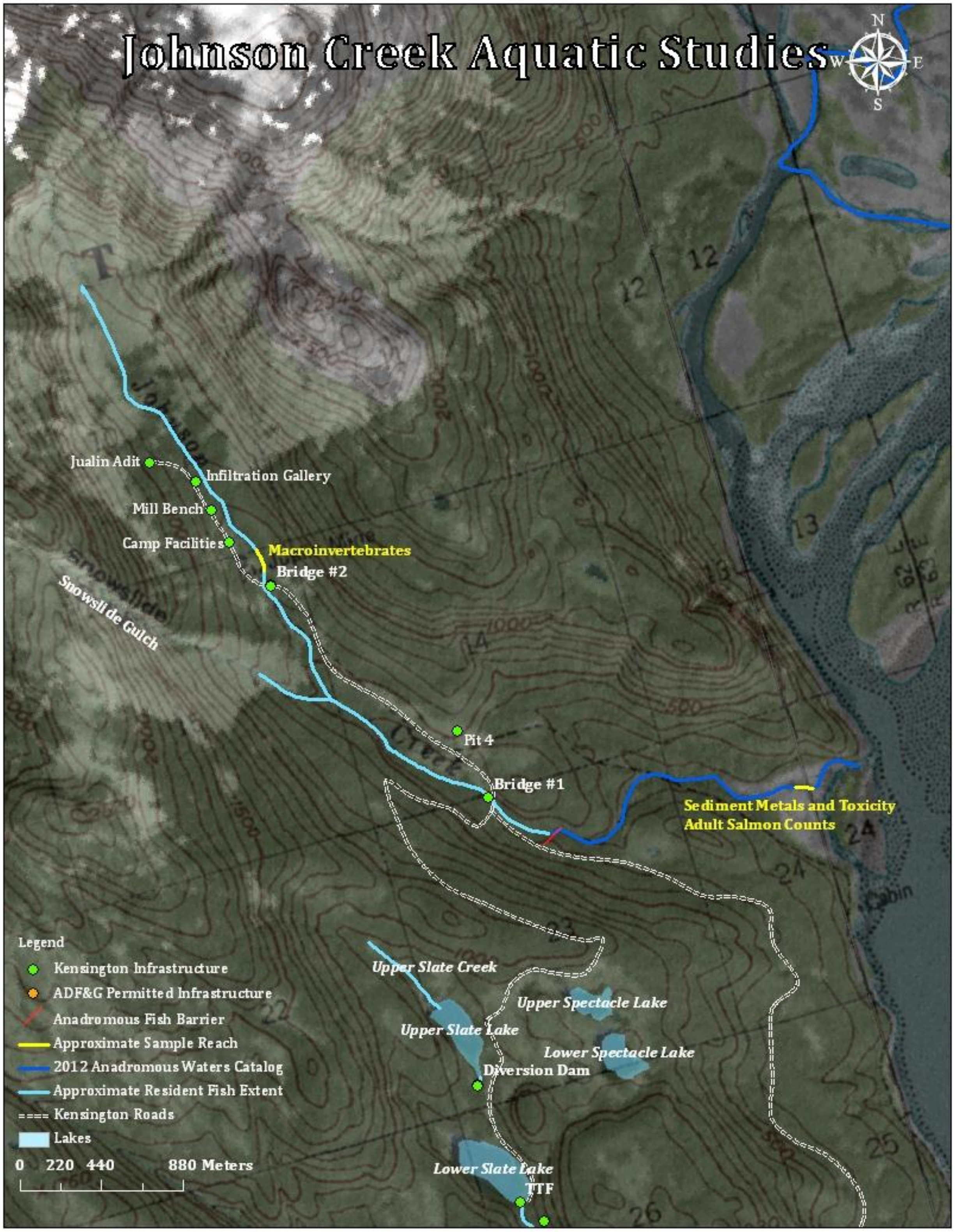

Figure 8.–Johnson Creek aquatic studies.

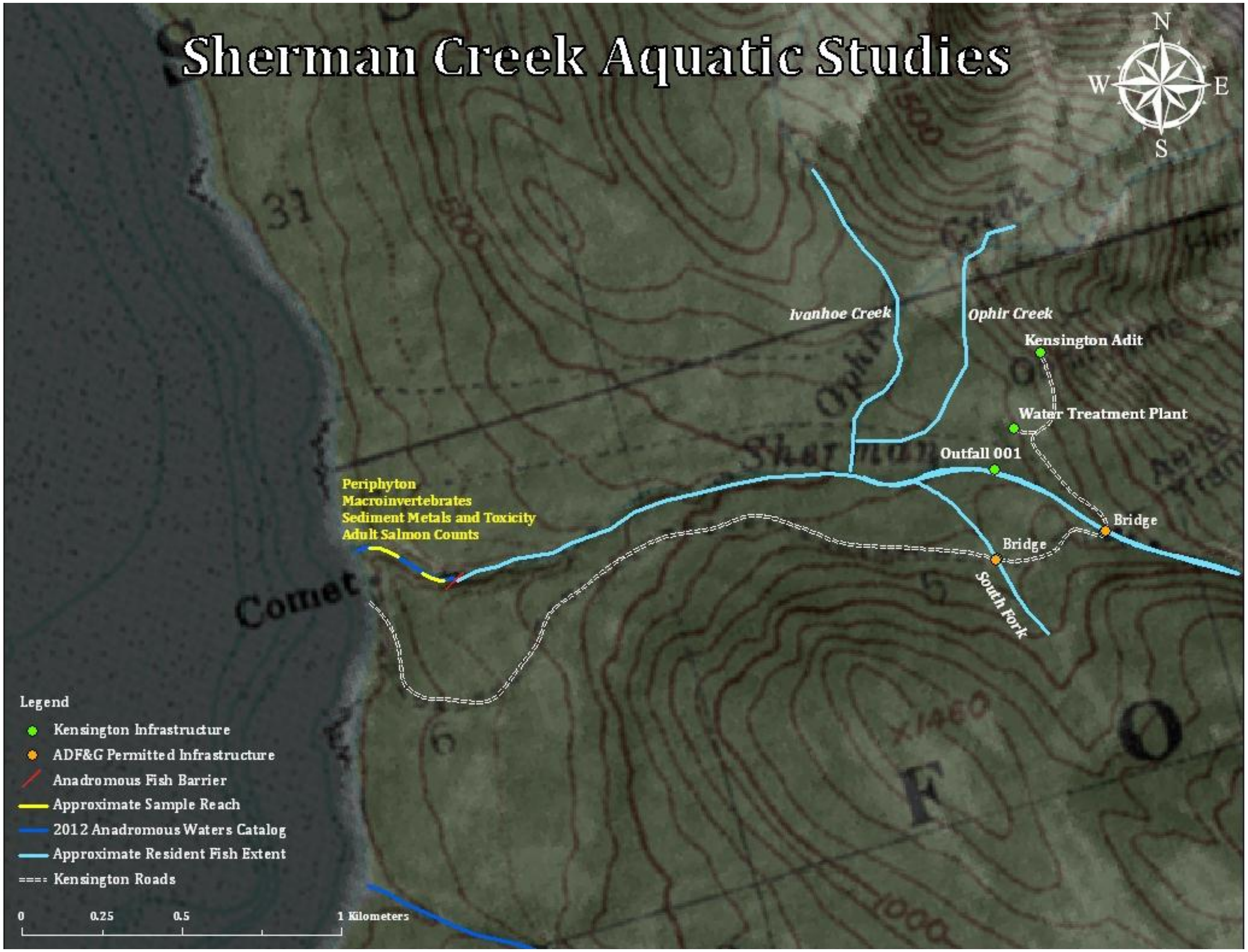

Figure 9.–Sherman Creek aquatic studies.

Table 3.–Latitude and longitude of sampling stations.

Location	Sample Parameter	Latitude	Longitude
Lower Slate Creek	Periphyton	58.7901^{o} N	135.0343^{o} W
	Benthic Macroinvertebrates	58.7901^{o} N	135.0342^{o} W
	Resident Fish Metals	58.7964^{o} N	135.0389^{o} W
	Sediment Metals and Toxicity	58.7920^{o} N	135.0360^{o} W
	Spawning Substrate Sample Point 1	58.7905^{o} N	135.0345^{o} W
	Spawning Substrate Sample Point 2	58.7905^{o} N	135.0345^{o} W
East Fork Slate Creek	Periphyton	58.8046^{o} N	135.0382^{o} W
	Benthic Macroinvertebrates	58.8045^{o} N	135.0381^{o} W
	Resident Fish	58.8040^{o} N	135.0382^{o} W
	Resident Fish Metals	58.8040^{o} N	135.0382^{o} W
	Sediment Metals and Toxicity	58.8053^{o} N	135.0383^{o} W
West Fork Slate Creek	Periphyton	58.7992^{o} N	135.0460^{o} W
	Benthic Macroinvertebrates	58.7995^{o} N	135.0459^{o} W
Upper Slate Creek	Periphyton	58.8191^{o} N	135.0416^{o} W
	Benthic Macroinvertebrates	58.8189^{o} N	135.0415^{o} W
	Resident Fish	58.8199^{o} N	135.0425^{o} W
	Resident Fish Metals	58.8199^{o} N	135.0425^{o} W
	Sediment Metals and Toxicity	58.8189^{o} N	135.0416^{o} W
Lower Johnson Creek	Sediment Metals and Toxicity	58.8235^{o} N	135.0048^{o} W
Upper Johnson Creek	Benthic Macroinvertebrates	58.8407^{o} N	135.0450^{o} W
Lower Sherman Creek	Periphyton Sample Point 1	58.8687^{o} N	135.1414^{o} W
	Periphyton Sample Point 2	58.8672^{o} N	135.1376^{o} W
	Benthic Macroinvertebrates Sample Point 1	58.8688^{o} N	135.1412^{o} W
	Benthic Macroinvertebrates Sample Point 2	58.8674^{o} N	135.1381^{o} W
	Sediment Metals and Toxicity	58.8687^{o} N	135.1413^{o} W

Source: World Geodetic System 84 datum, at Kensington Gold Mine, 2012.

MONITORING SCHEDULE

We document our 2012 aquatic studies data collection schedule in Table 4.

Table 4.–Aquatic studies data collection schedule.

Aquatic Study	Lower Slate	East Fork Slate	West Fork Slate	Upper Slate	Lower Johnson	Upper Johnson	Lower Sherman
Periphyton	2/8/12 5/2/12 7/25/12 10/30/12	2/7/12 4/27/12 7/24/12 10/30/12	7/25/12	2/7/12 4/27/12 7/24/12 10/30/12			7/26/12
Benthic Macroinvertebrates	2/8/12 5/2/12	2/8/12 4/27/12	5/2/12	10/30/12		4/26/12	4/30/12
Resident Fish		8/1/12		4/27/12			
Resident Fish Metals	8/20/12	8/1/12		8/2/12			
Sediment Metals and Toxicity	7/3/12	7/10/12		8/2/12	7/2/12		7/3/12
Adult Salmon Counts	7/16/12–10/30/12				7/17/12–11/5/12		7/16/12–9/18/12
Spawning Substrate Quality	7/9/12			7/2/12			

Note: Data collected by Habitat biologists at Kensington Gold Mine, 2012.

METHODS[e]

PERIPHYTON COMMUNITY COMPOSITION & BIOMASS

Rationale (APDES 1.5.3.5.2)

Periphyton are primary producers whose microcommunites include algae, cyanobacteria, heterotrophic microbes, and detritus attached to the submerged surfaces of aquatic ecosystems. The chlorophyll *a* pigment in periphyton samples provides an estimate of active algal biomass present. Chlorophyll *b* and *c* pigments provide an estimate of the composition of organisms present in addition to those found in chlorophyll *a*. We monitor periphyton community composition and biomass in Lower Slate Creek, East Fork Slate Creek, and Lower Sherman Creek receiving waters downstream of Kensington Gold Mine discharges as a reliable indicator of water quality and to detect changes over time. We monitor periphyton community composition and biomass in the West Fork Slate Creek and Upper Slate Creek reference sites to detect variations due to other natural factors that may include mineral seeps, climate, and stream flow.

Sample Collection and Analysis

We attempt to sample periphyton annually at low flows when there have not been high flows within the previous three weeks. We collect 10[f] smooth, flat, undisturbed, and perennially wetted rocks from a riffle area of submerged cobble in less than 0.45 m of water within each study reach using the collection methods described in Ott et al. (2010). We place a 5 × 5 cm square of high-density foam on each rock and scrub the area around the foam with a toothbrush to remove all attached algae outside the covered area. We rinse the rock by dipping it with foam intact in the stream.

We remove the foam square and scrub the sample area with a rinsed toothbrush over a 1 µm, 47 mm glass fiber filter attached to a vacuum pump. We use stream water in a wash bottle to rinse the loosened periphyton from the rock, the toothbrush, and the inside of the vacuum pump onto the filter. We pump most of the water through the filter then add a few drops[g] of saturated magnesium carbonate ($MgCO_3$) to the filter before we pump the sample dry. This prevents acidification and conversion of chlorophyll to phaeophyton. We remove the dry glass fiber filter, fold it in half with the sample on the inside, and wrap it in a coffee filter to absorb additional water. We place the sample in a sealed, labeled plastic bag with desiccant and store the samples in a light-proof cooler containing frozen gel packs until we can freeze them. Once we return to the office, we keep the samples frozen at –20°C until processing.

We follow U.S. Environmental Protection Agency protocol (1997) for chlorophyll extraction and measurement and instrument detection limit and error.[h] We remove the samples from the freezer, cut them into small pieces, and place them in a centrifuge tube with 10 ml of 90% buffered acetone. We cap the centrifuge tubes and place them in a metal rack, cover them with aluminum foil, and hold them in a refrigerator for not more than 24 hours to extract the chlorophyll. After extraction, we centrifuge the samples for 20 minutes at 1,600 rpm and then read them on a

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[e] We will provide footnotes under each specific aquatic study in the *Results* section when we deviate from the methods described in this section.

[f] We are working with Dan Reed, ADF&G Sport Fish biometrician, to evaluate sample size.

[g] This measurement is not exact as the amount of water used to dilute the magnesium carbonate is not exact and fixes the sample regardless of the concentration and without affecting data integrity.

[h] There are two main deviations from EPA Method 446. Our sample storage may exceed 3.5 weeks. Our filters are cut rather than homogenized due to risk of acetone exposure (Ott et al. 2010).

Shimadzu UV-1800 Spectrophotometer at optical densities (OD) 664 nm, OD 647 nm, and OD 630 nm.[i] We also take a reading at OD 750 nm to correct for turbidity. We use an acetone blank to correct for the solvent. We treat the samples with 80 μ1 of 0.1 N hydrochloric acid to convert chlorophyll to phaeophyton, and then read them again at OD 665 nm and OD 750 nm.

We use Statistix® 9 (Analytical Software. 2008. Statistix 9 User's Manual. Analytical Software, Tallahassee, Florida, http://www.statistix.com/features.html) to conduct the Kruskal-Wallis One-Way Analysis of Variance by ranks test to investigate significant differences ($p \leq 0.05$) in data distribution within sites between sample events (Neter et al. 1990).

Data Presentation

We include a figure of stream flow three weeks prior to field sampling in the East Fork Slate Creek section when the information is available. Discharge data is not available in Johnson or Sherman Creeks.

For each sample site, we provide a table showing sampling dates and chlorophylls *a, b,* and *c* mean concentrations (mg/m^2) for the calendar year, present a graph of the mean proportion of chlorophylls *a, b,* and *c* for all sampling events, and show algal biomass, estimated by the chlorophyll *a* concentration in each sample, for all sampling events. Data are in Appendix A.

BENTHIC MACROINVERTEBRATE COMPOSITION & ABUNDANCE

Rationale (APDES 1.5.3.2)

We sample benthic macroinvertebrates, paying close attention to the proportion of those classified in the Orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies); collectively known as EPT taxa. EPT taxa have limited mobility, a short life cycle, and are sensitive to changes in water quality. We monitor macroinvertebrate community composition and abundance in Lower Slate Creek, East Fork Slate Creek, Upper Johnson Creek, and Lower Sherman Creek annually between March and May after spring breakup and before peak snowmelt to detect changes over time. We monitor West Fork Slate Creek and Upper Slate Creek reference sites to detect variations due to other natural factors.

Sample Collection and Analysis

The APDES Permit requires we evaluate each reach for all areas that contain stream substrate with particles less than 20 cm along the longest axis, and then sample every third or fourth sampling site, until we collect six benthic macroinvertebrate samples. We sample with a Surber stream bottom sampler in riffles and runs representing different velocities (Barbour et al. 1999).

The Surber stream bottom sampler has a 0.093 m^2 sample area and a 300-micron mesh net that terminates at the cod end. After setting the frame in the substrate, we scrub rocks within the sample area with a brush and disturb gravels and silt manually, to about 10 cm depth, to dislodge insects into the net.

We remove each macroinvertebrate sample from the cod end of Surber sampler by rinsing the sample into a prelabeled 500 mL plastic bottle with minimum 70% denatured ethanol. We add additional ethanol to each bottle at three parts ethanol to one part sample. Habitat biologists sort macroinvertebrates from debris under dissecting stereoscopes and identify oligochaetes to Order,

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[i] In 2012, our error detection limit for the spectrophotometer was high, potentially due to scratches on the cuvettes. We disposed and replaced the cuvettes in late 2012, and will regularly replace the cuvettes to prevent high detection limits on future readings.

and all others to genus, using Merritt and Cummins (1996) and Stewart and Oswood (2006). We contract externally with an expert in macroinvertebrate identification to provide quality assurance and control and verify our insect identification in 10% of our total samples.

We calculate the density of aquatic macroinvertebrates per square meter by dividing the number of aquatic insects per sample by 0.093 m^2, the Surber sampling area.

The Shannon Diversity (H) and Evenness (E) Indices are commonly applied measures of diversity (Magurran 1988). We calculate the indices using the following equations:

$$H = -\sum_{i=1}^{S} (P_i \ \log_{10} P_i)$$

$$E = \frac{H}{\log_{10} S}$$

Where P_i is the number of invertebrates per genus divided by the total number of invertebrates in the sample, and S is the number of genera in the sample.[j]

A single insect community has an H value of 0 that increases with the insect number (richness) and insect evenness (abundance equality). Aquatic macroinvertebrate density is expressed as the mean number of invertebrates per m^2.

We use Statistix® 9 (Analytical Software 2008) to conduct the Kruskal-Wallis One-Way Analysis of Variance by ranks test to investigate significant differences ($p \leq 0.05$) in data distribution within sites between sample events (Neter et al. 1990).

Data Presentation

We present a figure of macroinvertebrate community composition and abundance by year. Though not required by the APDES permit, we include an additional February 2012 measurement in the Slate Creek figures. The Shannon Indices of Diversity and Evenness are in narrative. Data are in Appendix B.

RESIDENT FISH POPULATION

Rationale (APDES 1.5.3.3)

The APDES Permit requires resident fish population estimates by species and habitat type in 360 m reaches in East Fork Slate and Upper Slate Creeks so that statistical comparisons can be made between years within a reach. We estimate the variability of the data, including minimum detectable differences between samples, and the precision of the 95% confidence interval so that we can refine or revise sampling protocols.

Sample Collection and Analysis

In 2011, we completed habitat surveys in about the same 360 m reaches surveyed by Flory (2011) using the habitat types described in Bisson et al. (1981). Based on the results of those habitat surveys, we selected a 90 m sampling reach representative of the habitat types present. Though Bisson subdivides three main habitat types for precision to detect environmental change,

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[j] Assuming all species are represented in the sample.

we counted the main habitat types—riffles[k], pools[l], and glides[m]. The East Fork and Upper Slate Creeks sample sites are moderate gradient, narrow, shallow, and contained, with East Fork Slate Creek dominated by bedrock and boulder substrate. Channels of this type are stable and habitat features are unlikely to change during the Kensington Gold Mine period of operation. In 2012, we sampled in the representative 90 m reaches selected in 2011.

We sample resident fish populations using a modification[n] of a depletion method developed by the USFS (Bryant 2000). We isolate sample reaches using fine mesh nets and secure them to the stream bottom with large rocks. We saturate the 90 m reaches with 0.635 cm (1/4 in) and 0.317 cm (1/8 in) soft mesh and wire mesh minnow traps baited with whirl packs containing sterilized salmon roe (Magnus et al. 2006).

Biologists begin from the downstream end of each reach setting baited minnow traps opportunistically in all habitat types where water depth and flow allow. We record the habitat type in which each trap is set. We move away from the sampling site so fish are not disturbed while the traps soak for 1.5 h. We retrieve each trap, record the fish in each trap, and then place the fish in an aerated bucket for processing. We remove the spent bait packet, rebait each trap and reset it in the exact same spot, as quickly as possible. We leave the trap for another 1.5 h soak period, and then complete the sequence a third time.

Biologists anesthetize fish in the aerated bucket with clove oil[o], measure FL to the nearest 1 mm, weigh each to the nearest 0.1 g, and record the species (Pollard et al. 1997). Fish are kept in a live well secured in the stream outside the delineated sample reach during the sampling period, and returned to the sample reach after all three passes are complete.

We collect data to meet the assumptions of closure and of equal probability of capture (Lockwood and Schneider 2000) during all three sampling events by ensuring the following.

- Fish emigration and immigration during the sampling period is negligible.
    - Sample reaches are isolated using fine mesh nets having a cork and lead line.
    - The net is secured to the streambed with large rocks along the lead line.

- All fish are equally vulnerable to capture during a pass.
    - Baited minnow traps are set in all habitat types where water depth and flow allow.

- Fish do not become more wary of capture with each pass.
    - Trap numbers and placement remain constant during all three capture events.
    - Instream field crew is limited to two biologists.
    - Field crew completes all three capture events as quickly possible.
    - Field crew does not talk and uses hand signals to convey habitat type for each trap to the data recorder on shore.
    - Field crews move away from sampling sites so fish are not disturbed while the traps soak 1.5 h each capture event.

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[k] Steepest slopes and shallowest depths at flows below bankfull with a poorly defined thalweg.
[l] Deepest areas where water surface slope below bankfull is near zero.
[m] Immediately downstream of pools with negative bed slope and positive water surface slope.
[n] Shorter reaches, more minnow traps and three passes instead of four.
[o] Clove oil (.5 ml/gl) in 2012. We learned we should be diluting the clove oil with ethanol for solubility and will in 2013 (Anderson et al. 1997).

- Collection effort and conditions which affect collection efficiency remain constant.
    - All capture events begin at the downstream end of each reach.
    - Field crew moves upstream setting, retrieving and replacing traps as quickly as possible.
    - Data recorder notes time between capture events in field notebook.
    - Water temperature and clarity are recorded at the beginning of each capture event.
    - For the second and third capture events, the field crew removes the spent bait packet and rebaits and resets each trap in the exact same location.

We estimate resident fish populations using the multiple-pass depletion method developed by Lockwood and Schneider (2000), based on methods developed by Carle and Strub (1978). The repetitive method produces a maximum likelihood estimate (MLE) of fish with a 95% confidence interval.

Let *X* represent an intermediate sum statistic where the total number of passes, *k*, is reduced by the pass number, *i*, and multiplied by the number of fish caught in the pass, $C_{i,}$, for each pass,

$$X = \sum_{i=1}^{k} (k-i)C_i$$

Let *T* represent the total number of fish captured in the minnow traps for all passes. Let *n* represent the predicted population of fish, using *T* as the initial value tested. Using *X*, the MLE, *N*, is calculated by repeated estimations of *n*. The MLE is the smallest integer value of *n* greater than or equal to *T* which satisfies[p]:

$$\left[\frac{n+1}{n-T+1}\right]\prod_{i=1}^{k}\left[\frac{kn-X-T+1+(k-i)}{kn-X+2+(k-i)}\right]_{i} \leq 1.000$$

The probability of capture, *p*, is given by the total number of fish captured, divided by an equation where the number of passes is multiplied by the MLE and subtracted by the intermediate statistic, *X*,

$$p = \frac{T}{kN-X}$$

The variance of *N*, a measure of variability from the mean, is given by,

$$Variance\ of\ N = \frac{N(N-T)T}{T^2 - N(N-T)\left[\frac{(kp)^2}{(1-p)}\right]}$$

The SE of *N* is calculated by the square root of the variance of *N*, and the 95% confidence interval for the MLE is given by: MLE ± 2(SE). Because we sample a 90 m reach, we multiply the MLE and 95% confidence interval by four to extrapolate the data to a 360 m sample reach. A

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[p] Lockwood and Schneider (2000) suggest the result should be rounded to one decimal place (1.0). We use three decimal places (1.000) which is an option in Carle and Strub (1978).

MLE cannot be generated from samples from small populations if few fish are captured during the three sample events; in these cases, we present the number of fish captured as the result and do not include a MLE. We determine the precision of the estimate by expressing the 95% confidence interval as a percentage of the MLE.

Calculating a MLE using three-pass depletion data relies heavily on equal capture probability among passes (Bryant 2000, Carle and Strub 1968, Lockwood and Schneider 2000). To evaluate equal capture probability, we use the goodness of fit test in White et al. (1982), recommended by Lockwood and Schneider (2000), which follows the χ^2 test form. We first calculate expected numbers of fish captured for each pass ($C_1, C_{2.}, C_3$) using variables previously described

$$E(C_1) = N(1-p)^{i-1}p$$

Then we calculate χ^2,

$$\chi^2 = \frac{[C_1 - E(C_1)]^2}{E(C_1)} + \frac{[C_2 - E(C_2)]^2}{E(C_2)} + \frac{[C_3 - E(C_3)]^2}{E(C_3)}$$

If the goodness of fit test indicates we did not achieve equal capture probability, the MLE will be biased low.

We use Monte-Carlo simulations to assess the power of our three-pass depletion studies to detect changes in abundance of small ($N < 200$) fish populations. We simulate sampling according to the three-pass depletion design on each years population of fish where the abundance of fish differs by varying degrees, and estimate the abundance of each population using the techniques described in Lockwood and Schneider (2000). We use a Student's *t*-test with two degrees of freedom to test the null hypothesis that both estimates come from populations of equal size, with one degree of freedom associated with each estimate. We evaluate significance at $\alpha = 0.05$, conduct 10,000 simulations of three-pass depletions to evaluate power for probabilities of capture during each sampling pass of 0.30, 0.40, 0.50, 0.60, and 0.70 using the assumptions of the model and estimate the power as the proportion of simulations where the null hypothesis is rejected (Dan Reed, Sport Fish Biometrician, ADF&G, Nome, personal communication).

Data Presentation

We present resident fish population estimates by 360 m reach by year, population estimates by habitat type by 360 m reach by year, and the length frequency of this year's captures in figures. We present resident fish capture data, population estimates by reach by year, population estimates by habitat type by reach by year, precision of the population estimates, and power of the current year population estimates compared to the previous year population estimate in Appendix C.

RESIDENT FISH CONDITION

Rationale (APDES 1.5.3.3.1)

The APDES Permit requires us to compare fish condition by reach and by year in East Fork Slate and Upper Slate Creeks. Age, sex, season, maturation, diet, gut fullness, fat reserve, and muscular development affect fish condition.

Sample Collection and Analysis

We weigh the resident fish captured in our resident fish surveys to the nearest 0.1 g and measure FL to the nearest 1 mm.

We use the lengths and weights to calculate Fulton's condition factor (K) using the equation given in Anderson & Neumann (1996) where the weight of each fish measured in grams (W) is divided by the cubed length of fish (L) measured in millimeters, and the product multiplied by 100,000,

$$K = \frac{W}{L^3} \times 100{,}000$$

Data Presentation

We present the mean condition factor of resident fish in the East Fork Slate Creek and Upper Slate Creek sections, and provide resident fish length, weight, and condition factor data in Appendix C.

RESIDENT FISH METALS CONCENTRATIONS

Rationale (APDES 1.5.3.4)

The APDES Permit requires us to sample six Dolly Varden char within the size class 90–130 mm for whole body concentrations for the metallic elements aluminum (Al), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni), silver (Ag) and zinc (Zn), and the semi-metallic element selenium (Se), in Lower Slate, East Fork Slate and Upper Slate Creeks for a total of 18 fish. We recommended DEC choose this sample size as it is the size used for aquatic studies at other mines in Alaska and provides information without being cost prohibitive. The minimum size of 90 mm FL is the minimum amount of tissue (about 5 g) required for the laboratory to conduct the analyses. The maximum size of 130 mm FL improves the likelihood of sampling less than a three year old resident fish in Lower Slate Creek where Dolly Varden char may be anadromous (Balon 1980). In the future, we may be able to examine the relationship of tissue and water quality data to see if changes over time are related to operations or natural variability.

Sample Collection and Analysis

We capture fish in minnow traps baited with sterilized salmon roe, individually package them in clean, prelabeled bags, and measure FL to 1 mm. Samples are immediately stored in a cooler containing gel ice packs, then in a camp freezer until we return to Juneau and weigh the fish in the sealed bags, correcting for bag weight. We freeze the samples at –20°C until we ship them to a private laboratory, where they are individually digested, dried, and analyzed for Ag, Al, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn on a dry-weight basis. The private analytical laboratory provides Tier II quality assurance/quality control validation information for each analyte including matrix spikes, standard reference materials, laboratory calibration data, sample blanks and duplicates.

Data Presentation

We present a figure of whole body metals concentrations for each sample by element in the Lower Slate, East Fork Slate, and Upper Slate Creeks sections. We provide a figure with the 2012 whole body metals concentrations for Lower, East Fork and Upper Slate Creeks, a table with all data, and the laboratory report in Appendix D.

SEDIMENT METALS CONCENTRATIONS

Rationale (APDES 1.5.2)

Sediment metals concentrations are influenced by a variety of factors, including mineralogy, grain size, organic content, and human activity. We sample Lower Slate, East Fork Slate, Upper Slate, Lower Johnson, and Lower Sherman Creeks for the metallic elements Ag, Al, Cd, Cr, Cu, Pb, Hg, Ni, and Zn and the semi-metallic elements arsenic (As) and Se.

Sample Collection and Analysis

We collect sediment samples opportunistically in areas with fine sediment deposition, usually along the perimeter of the stream and in shallow eddies. We retain the sediment that passes through a 1.7 mm sieve in a plastic bucket, and transfer the sediment to a 100 mL glass jar the laboratory provides. Between sites, we rinse our sampling equipment in stream water. We store the samples in coolers on ice during transport between the mine and our lab, and store them in our refrigerator until we ship them to a private laboratory for analysis.

Data Presentation

We present sediment metals concentrations for each sample site in a figure. We include tables with Kensington Gold Mine sediment sample compositions, metallic element concentrations, and semi-metallic element concentrations for all six sample sites across years with this year's laboratory report in Appendix E.

SEDIMENT METALS TOXICITY

Rationale (APDES 1.5.2.3)

Sediment is a repository of metals introduced into surface waters. We monitor the toxicity of metals in sediments in the laboratory using *Chironomus dilutus* (midges) and *Hyalella azteca* (amphipods). We sample Lower Slate, East Fork Slate, Upper Slate, Lower Johnson, and Lower Sherman Creeks for the metallic elements Ag, Al, Cd, Cr, Cu, Pb, Hg, Ni, and Zn and the semi-metallic elements As and Se. Survival of *Chironomus dilutus* is generally lower than survival of *Hyalella azteca* on all mediums including the laboratory control sand.

Sample Collection and Analysis

We collect sediment samples opportunistically in areas with fine sediment deposition, usually along the perimeter of the stream and in shallow eddies. We retain the sediment that passes through a 1.7 mm sieve in a plastic bucket, and transfer the sediment to a 2 L plastic container the laboratory provides. Between sites, we rinse our sampling equipment in stream water. We store the samples in coolers on ice during transport between the mine and our lab, and store them in our refrigerator until we ship them to a private laboratory for analysis.

The private laboratory tests for short-term chronic toxicity of sediment using the organisms *Chironomus dilutus* and *Hyalella azteca* , and removes debris and large sediment from the sample prior to homogenizing. The laboratory uses eight replicates of sediment for each treatment, and the laboratory control sediment is commercial grade sand.

Data Presentation

We present organism survival and growth for each sample site in the narrative. We provide the laboratory report that lists significant differences ($p \leq 0.05$) between control and individual samples in Appendix E.

SPAWNING SUBSTRATE QUALITY

Rationale (APDES 1.5.3.5.1)

The APDES permit requires annual pink salmon spawning substrate sampling in Lower Slate Creek during July prior to spawning activity. We calculate the geometric mean particle size (d_g), an index of substrate textural composition, for each sample and for each sample site. We monitor spawning substrate quality to detect change over time.

Sample Collection

We collect four replicate samples from two locations in the anadromous portion of Slate Creek using a McNeil sampler, which has a 15 cm basal core diameter and 25 cm core depth. We choose sample sites selecting substrate measuring less than 10 cm, the maximum gravel size used by pink salmon (Lotspeich and Everest 1981; Kondolf and Wolman 1993), where the stream gradient is less than 3% (Valentine, B. E. 2001. Unpublished. Stream substrate quality for salmonids: Guidelines for Sampling, Processing, and Analysis. California Department of Forestry and Fire Protection, Coast Cascade Regional Office, Santa Rosa, CA). We push the McNeil sampler into the substrate until the sample core is buried, then transfer the sediments to a five gallon bucket using a stainless steel scoop. Samples are wet-sieved onsite using sieve sizes 101.6, 50.8, 25.4, 12.7, 6.35, 1.68, 0.42, and 0.15 mm. We measure the contents of each sieve to the nearest 5 mL[q] by the volume of displaced water in 600 mL and 1 L plastic beakers. We transfer the fines that pass through the 0.15 mm sieve to an Imhoff cone and allow them to settle for 10 minutes, then measure the displacement using the Imhoff cone gradations.

Data Presentation

We convert the wet weights to dry weights using standards identified by Zollinger (1981) for the fines that settle in the Imhoff cones. For all others, we convert the wet weights to dry weights using a correction factor derived from Shirazi et. al (1979), assuming a gravel density of 2.6 g/cm^3 previously used by Timothy and Kanouse (2012). We calculate the geometric mean particle size (d_g) using methods developed by Lotspeich and Everest (1981), where the midpoint diameter of particles retained in each sieve (d) is raised to a power equal to the decimal fraction of volume retained by that sieve (w), and multiplied the products of each sieve size to obtain the final product,

$$d_g = d_1^{w1} \times d_2^{w2} \times d_3^{w3} \ldots d_{\mathrm{n}}^{w\mathrm{n}}$$

We present a figure that shows the geometric mean particle size calculated for each sample at each sample point and a figure that shows the geometric mean particle size of all samples by year in the Lower Slate Creek results section. Raw data are in Appendix F.

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[q] The contents of the 0.15 mm sieve are measured to the nearest 1 mL using an Imhoff cone.

ADULT SALMON COUNTS

Rationale (USFS Plan of Operations)

The USFS Plan of Operations require weekly surveys of adult chum salmon, coho salmon, and pink salmon in Lower Slate, Lower Johnson, and Lower Sherman Creeks throughout the spawning season. We can detect shifts in the distribution of pink salmon spawning activity using the number of adult pink salmon observed in different reaches of each stream system (Daniel Reed, Division of Sport Fish Biometrician, ADF&G, Nome; memorandum, Review of Technical Report No 11-08: Aquatic Studies at Kensington Mine, 2011).

Sample Collection

We conduct foot surveys in the anadromous reaches of Slate and Sherman Creeks once per week, and survey Johnson Creek from a helicopter once per week, verifying survey results three times with foot surveys.

We section each creek to examine the distribution of adult salmon (Timothy and Kanouse 2012). Sherman Creek is sectioned into 50 m reaches, Slate Creek into 100 m reaches, and Johnson Creek by landmarks. We begin surveys at the stream mouth, ending at the anadromous fish barrier.

A team of two biologists wearing polarized sunglasses independently record the number of live fish and carcasses by species during each foot and aerial survey. We use the average of the two biologists' counts to estimate the total number of fish, by species, each survey. We also record weather and flow conditions each survey.

Data Presentation

We present figures of adult pink salmon counts by week and distribution in Lower Slate, Lower Johnson, and Lower Sherman Creeks. We present figures of adult chum salmon counts in Slate and Johnson Creek and adult coho salmon counts in Johnson Creek. Pentec (1990) documented a 1–3 week pink salmon residence time in Sherman Creek, so we divide the total number of adult pink salmon by two (residence time) in all systems to avoid overestimating (Neilson and Geen 1981). We do not adjust chum and coho salmon estimates as we have not identified the residence time of these fish in these stream systems. In Johnson Creek, we use a method developed by Jones et al. (1998) to adjust the adult pink and chum salmon aerial counts by multiplying our mean weekly count by a factor of 2.5, before we adjust for residence time. We also round down intermediate numbers and final numbers to whole numbers for the return estimate calculations. Data are in Appendix G.

RESULTS

SLATE CREEK

Lower Slate Creek

Periphyton Community Composition & Biomass

We collected periphyton samples in Lower Slate Creek at 58.7901°N, 135.0343°W, on July 25, 2012, as required in the APDES permit to sample annually at low stream flow and not within three weeks after peak snowmelt/outfall discharge. In addition we sampled three times, February 8, 2012, May 2, 2012, and October 30, 2012, to investigate the algal bloom in the TTF and changes in algal biomass downstream in East Fork Slate Creek in 2011.

Table 5 shows the average concentrations of chlorophylls *a*, *b*, and *c* (mg/m^2) in Lower Slate Creek samples collected during 2012. The 2011 and 2012 proportion of chlorophylls *a*, *b*, and *c* are shown in Figure 10.

Table 5.–Lower Slate Creek chlorophylls *a*, *b*, and *c* mean densities.

Sample Date	Chlorophyll *a* (mg/m^2)	Chlorophyll *b* (mg/m^2)	Chlorophyll *c* (mg/m^2)
February 8, 2012	1.73	0.04	0.13
May 2, 2012	0.96	0.02	0.11
July 25, 2012	2.31	0.05	0.18
October 30, 2012	1.31	0.00	0.16

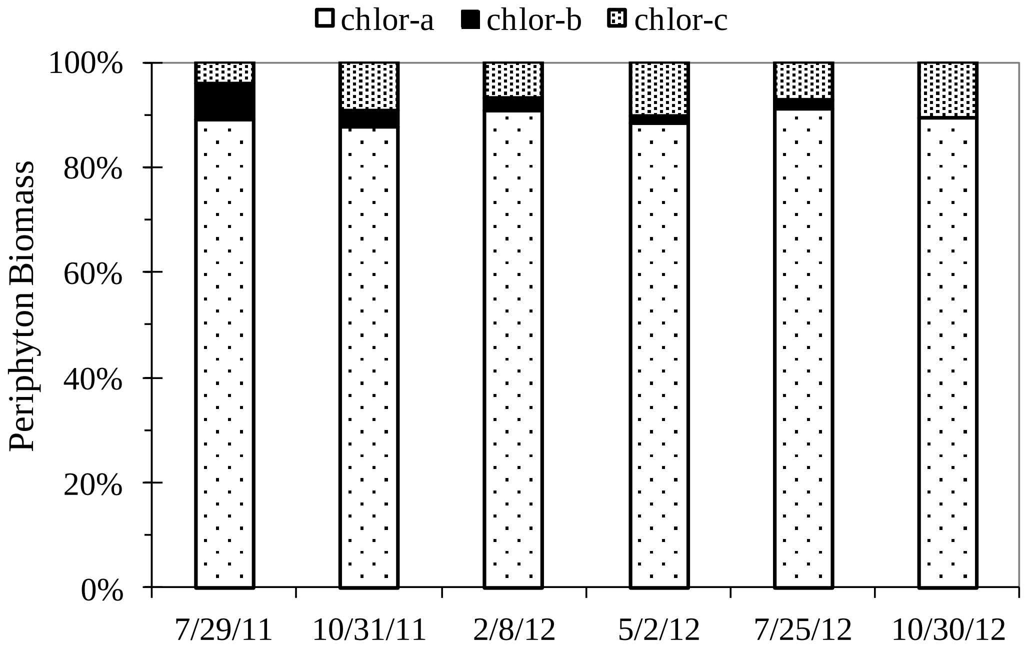

Figure 10.–Lower Slate Creek chlorophylls *a, b,* and *c* proportion.

Lower Slate Creek algal biomass, estimated from the chlorophyll *a* concentration in each sample, is shown in Figure 11.

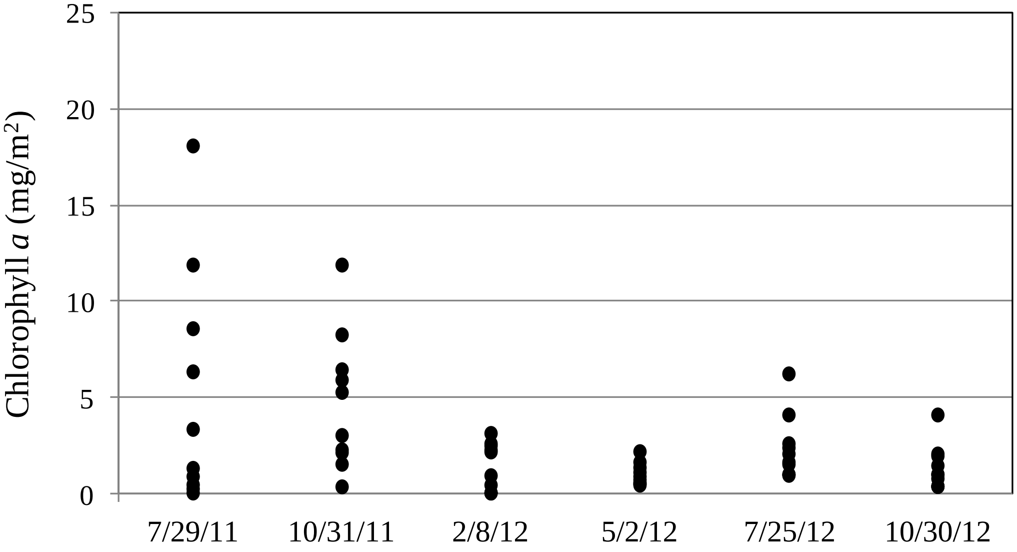

Figure 11.–Lower Slate Creek chlorophyll *a* densities.

Benthic Macroinvertebrate Composition & Abundance

We collected benthic macroinvertebrate samples in Lower Slate Creek at 58.7901°N, 135.0342°W, on February 8, 2012, to document aquatic life downstream of the TTF following the algal bloom in 2011. We collected benthic macroinvertebrate samples in Lower Slate Creek in the same location again on May 2, 2012, as required by the APDES Permit to sample between late March and late May, after spring breakup and before peak snowmelt.

In February, we identified 30 taxa among the 6 samples, and we estimate the mean number of aquatic benthic macroinvertebrates per m^2 at 2,452 insects, of which 38% are EPT taxa (Figure 12). The Shannon Diversity score is 0.75 and Evenness score is 0.64. The dominant taxa are Diptera: Chironomidae and Annelida: Oligochaeta, each representing about 28% of samples.

In May, we identified 32 taxa among the 6 samples, and we estimate the mean number of aquatic benthic macroinvertebrates per m^2 at 3,154 insects, of which 38% are EPT taxa (Figure 12). The Shannon Diversity score is 0.69 and Evenness score is 0.58. The dominant taxon is Diptera: Chironomidae, representing about 53% of samples.

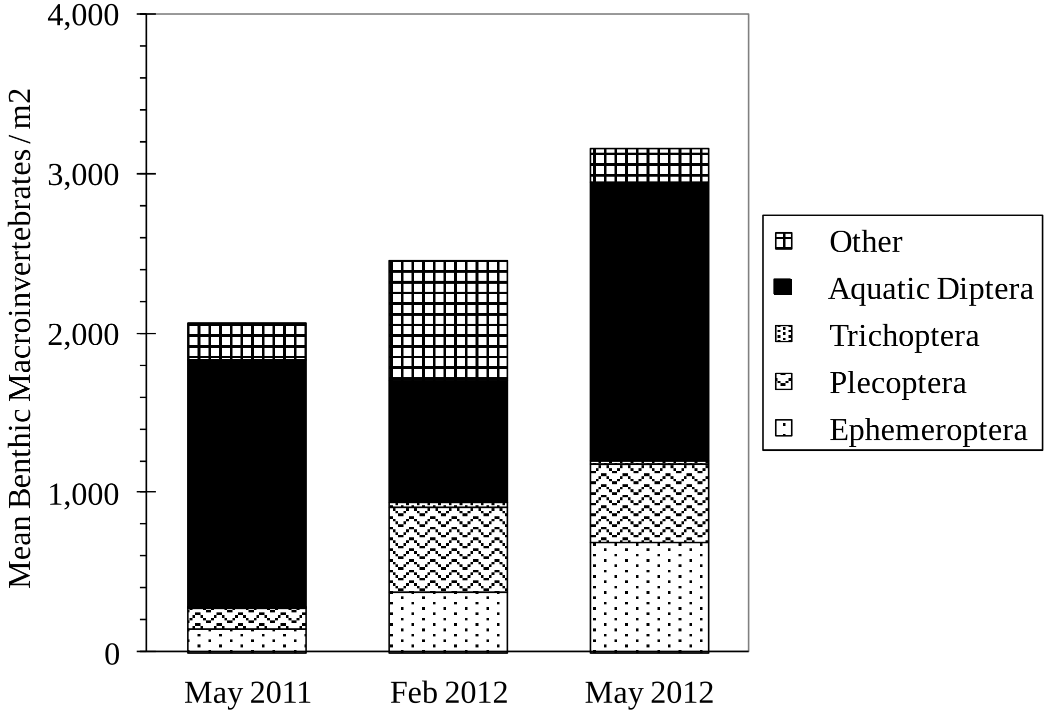

Figure 12.–Lower Slate Creek benthic macroinvertebrates.

Resident Fish Metals Concentrations

We captured six Dolly Varden char in Lower Slate Creek at 58.7964°N, 135.0389°W on August 20, 2012 within 200 m downstream of the waterfall barrier. We shipped the samples to Columbia Analytical in Kent, Washington, for laboratory analyses September 27, 2012 and received the results November 9, 2012. The laboratory processed the fish individually and the concentration for each fish is shown for each element, except for Ag and Ni which are undetected at the method reporting limit in two samples.

Though we present the information from 2011 and 2012 in Figure 13, we won't compare data between years because in 2011 we incorrectly completed the laboratory's chain of custody form and the laboratory homogenized all six fish, giving one concentration for each element. Columbia Analytical reported in 2011 they observed sediment in the bottom of their digestion tube containing the Lower Slate Creek fish samples[r], which may have elevated metals concentrations.

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[r] The probable source is sediment the fish ingested.

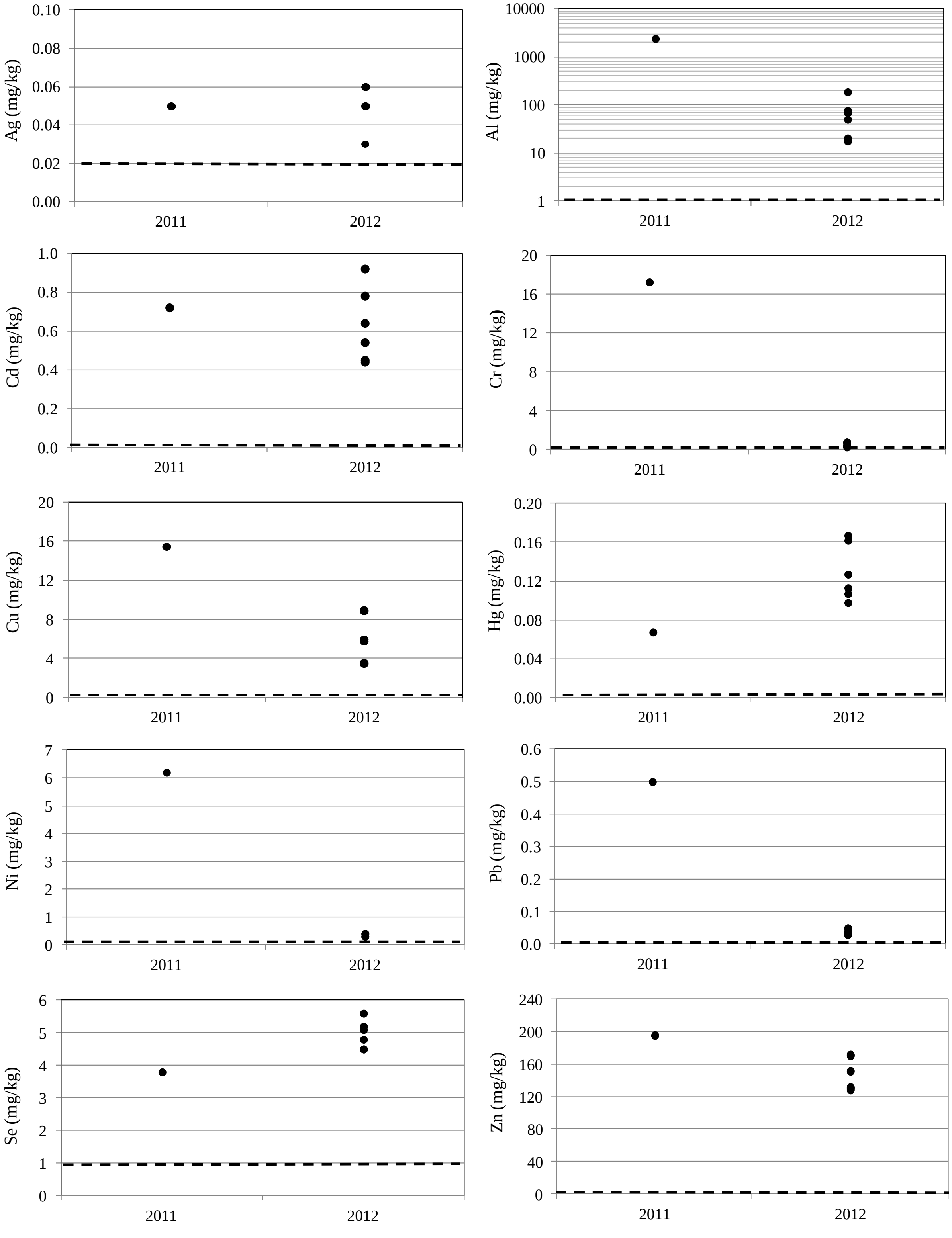

Figure 13.–Lower Slate Creek whole body metals concentrations.

Note: 2011 and 2012, juvenile Dolly Varden char.
Note: Dashed lines represent the method reporting limit, ND indicates the metal was not detected.

Sediment Metals Concentrations

We collected sediments in Lower Slate Creek at 58.7920°N, 135.0360°W on July 3, 2012 and shipped the samples to the AECOM Environmental Toxicology laboratory in Fort Collins, Colorado for analyses on July 19, 2012. We received the laboratory results on September 27, 2012.

Lower Slate Creek sediment metals concentrations are shown in Figure 14. Concentrations are similar to the 2011 results, and to results from sampling during the 2005–2010 period (Flory 2011). We include tables with 2011 and 2012 sediment composition, metals and semi metals data for all sites and the 2012 AECOM laboratory report in Appendix E.

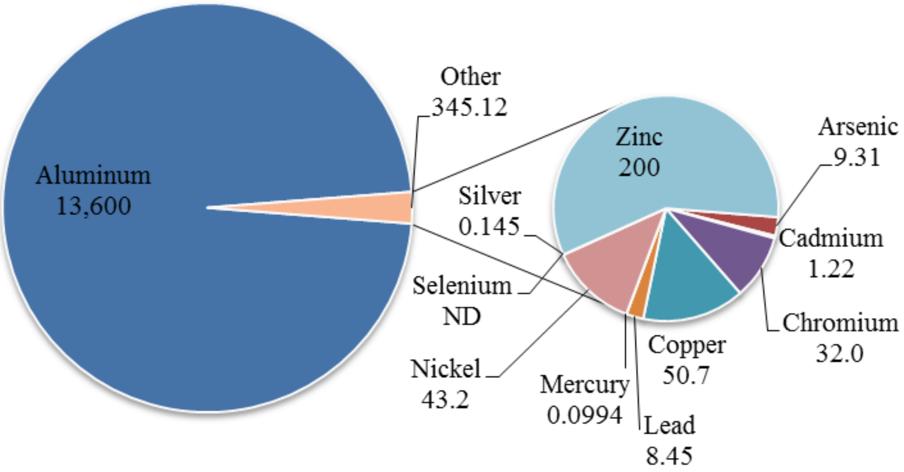

Figure 14.–Lower Slate Creek sediment metals concentrations.

Note: 2012 data presented in parts per million (mg/kg).

Sediment Toxicity

There are no statistical differences in growth or survival of *Chironomus dilutus* or *Hyalella azteca* on the Lower Slate Creek sediment sample compared to the control. We include the laboratory report that in Appendix E.

Adult Salmon Counts

We surveyed Lower Slate Creek for adult chum salmon and pink salmon between July 16 and September 10, 2012. We did not observe adult salmon during the first two surveys, or during the last survey.

Figure 15 presents our adult pink salmon count for each survey in Lower Slate Creek, and Figure 16 presents the distribution of pink salmon by section. We estimate the 2012 adult pink salmon return at 3,636 fish, the highest estimate in the eight years of monitoring (Flory 2011, Timothy and Kanouse 2012).

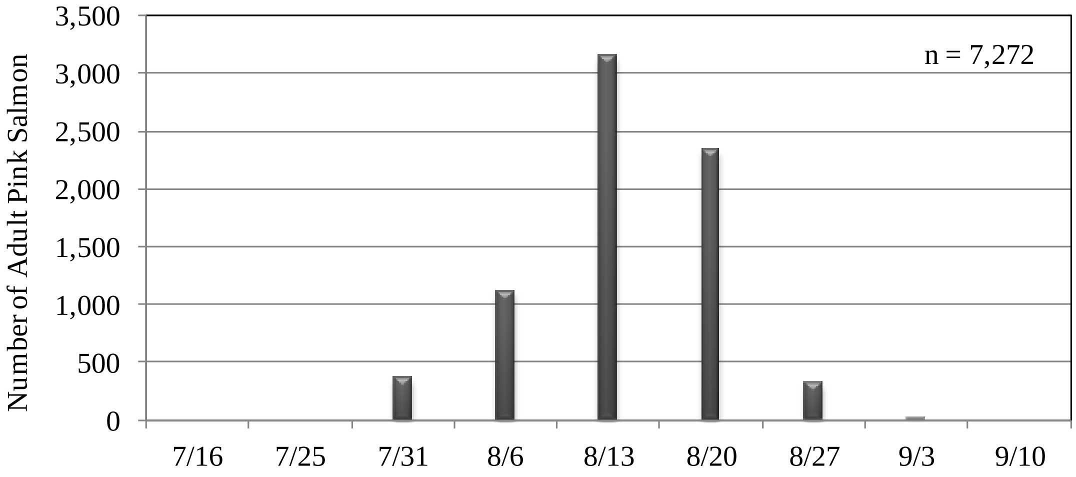

Figure 15.–Lower Slate Creek adult pink salmon counts.

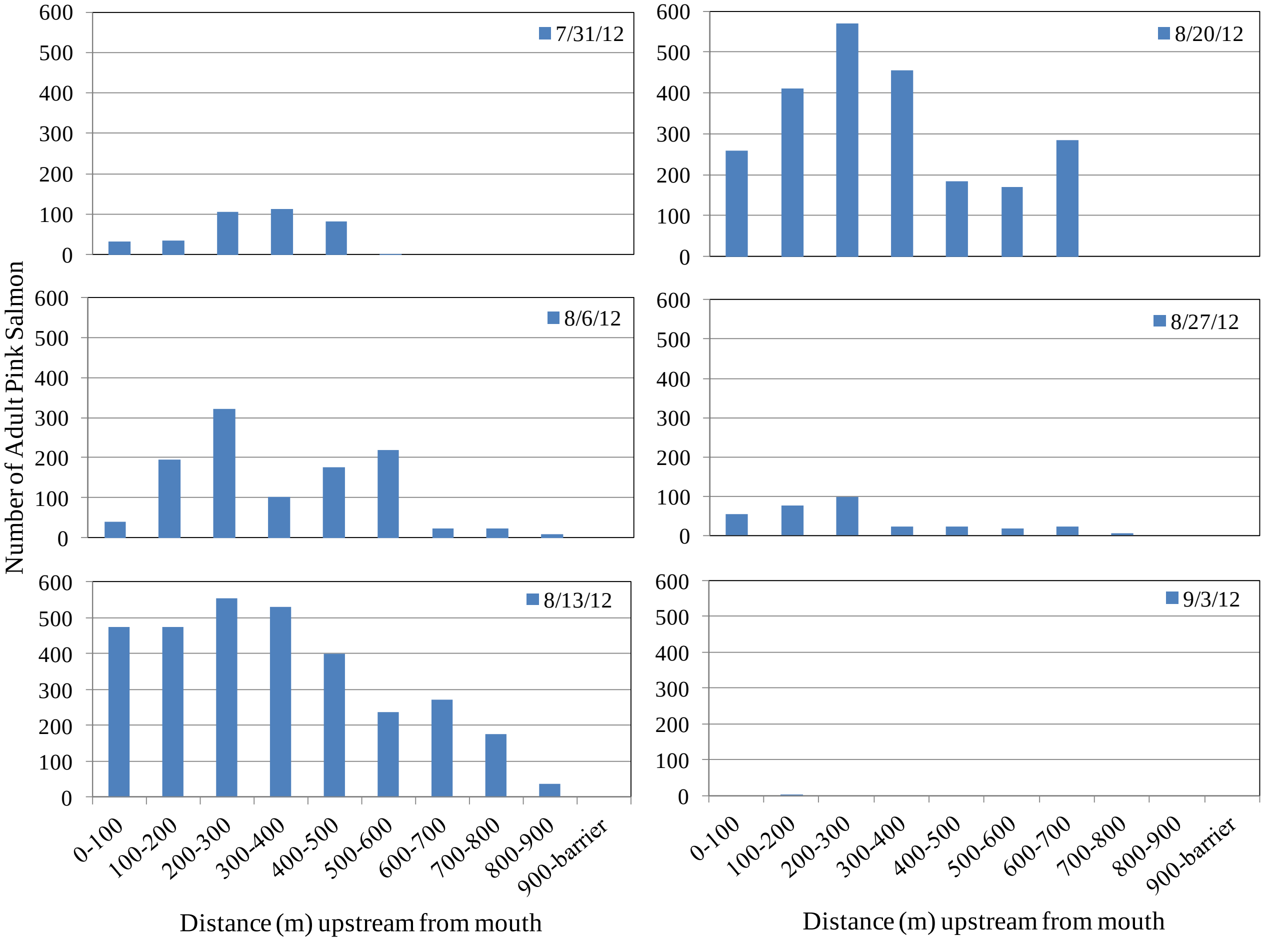

Figure 16.–Lower Slate Creek adult pink salmon distribution.

We observed one live adult chum salmon in Lower Slate Creek on August 15.

We surveyed for adult coho salmon between September 18 and October 30, 2012 and did not document any live fish or carcasses. Since we captured age-0 and 1-year-old juvenile coho salmon during resident fish abundance and distribution studies, we theorize Lower Slate Creek is the natal stream (Timothy and Kanouse 2012). We will continue our investigation of adult coho salmon in this stream during the coho salmon spawning season by foot and snorkel.

Spawning Substrate Quality

Sample Point 1, 58.7905°N, 135.0345°W

Sample Point 2, 58.7916°N, 135.0356°W

We present the geometric mean particle size for each of the four samples collected at Sample Point 1 and each of the four samples collected at Sample Point 2 in Lower Slate Creek on July 9, 2012 in Figure 17 (two sediment samples from Sample Point 2 have the same geometric mean, 11.6 mm).

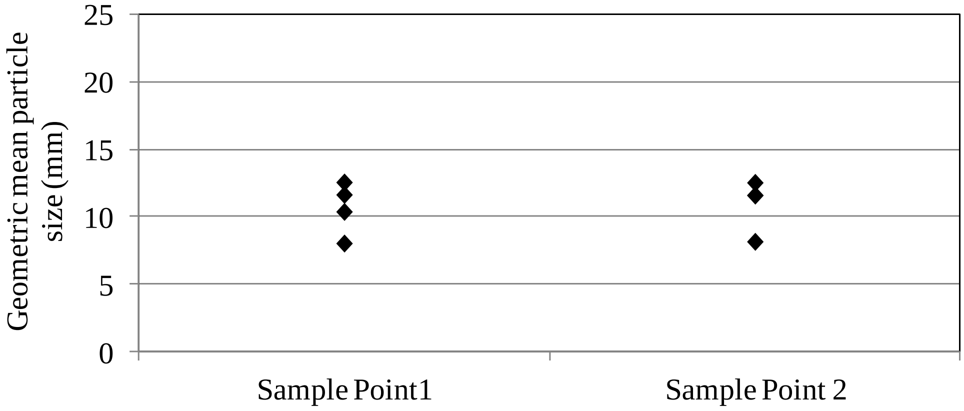

Figure 17.–Lower Slate Creek geometric mean particle sizes by sample and sample point.

In our 2012 Technical Report (Timothy and Kanouse), we reported the geometric mean particle size for substrate samples taken at Lower Slate Creek on August 17, 2011 as 6.54 mm at Sample Point 1, and 9.33 mm at Sample Point 2, and stated the substrate was finer than any year sampled since 2005. While entering the 2012 data, we noticed the formulas we used to calculate the 2011 results contained an error. We corrected the formulas and the results change to an geometric mean particle size for substrate samples taken at Lower Slate Creek on August 17, 2011 is 10.1 mm at Sample Point 1, and 10.9 mm at Sample Point 2 (Figure 17). This remains finer than any year sampled since 2005.

We include the corrected Lower Slate Creek data in Appendix F[s].

The geometric mean particle size for substrate samples taken at Lower Slate Creek on July 9, 2012 is 10.6 mm at Sample Point 1, and 10.9 mm at Sample Point 2 (Figure 18).

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[s] We also include corrected 2011 and new 2012 data for Johnson and Sherman Creeks in Appendix F, but do not summarize it in this technical report as the APDES permit does not require the sampling. Those results are summarized in Brewster, 2012.

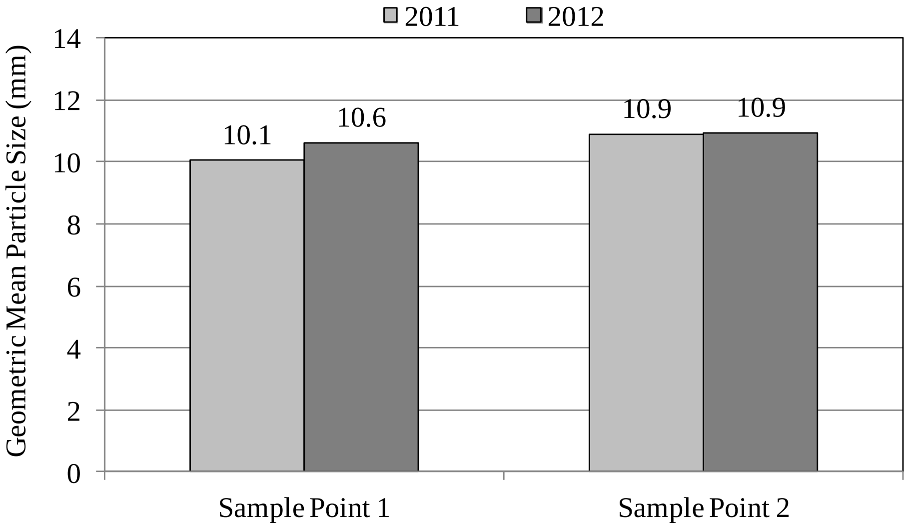

Figure 18.–Lower Slate Creek geometric mean particle size of all samples by year.

East Fork Slate Creek

Upper Slate Lake discharge is intercepted at a dam (Figure 19) and routed through a diversion pipeline around the TTF (Figure 20), discharging into East Fork Slate Creek (Gordon Willson-Naranjo, Division of Habitat Biologist, ADF&G, Douglas; December 12, 2012, memorandum, Kensington Gold Mine: Diversion Pipeline Fish Passage Trip Report). Treated water from the TTF wastewater treatment plant began discharging into East Fork Slate Creek in December 2010. Most sampling in East Fork Slate Creek occurs between 250 m and 300 m downstream of the plunge pool.

Figure 19.–Diversion dam, pipeline, and TTF.

Figure 20.–Approximate diversion pipeline route.

Periphyton Community Composition & Biomass

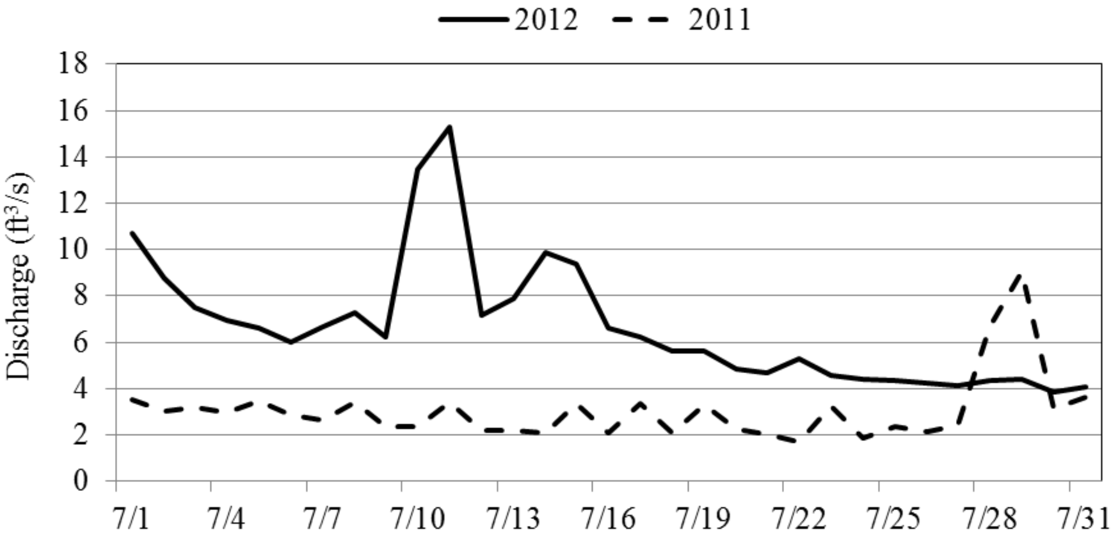

Figure 21.–East Fork Slate Creek discharge, July 2011 and 2012.

Note: Discharge calculated using Parshall Flume flow data and TTF WTP discharge data.

In July 2011, mean daily discharge in East Fork Slate Creek stayed below 4 ft^3/s except on July 29 when it peaked at about 9 ft^3/s during a rainstorm. In July 2012, three weeks prior to periphyton sampling, mean daily discharge stayed above 4 ft^3/s during this same period, except for July 30, when it dipped to 3.8 ft^3/s (Figure 21).

We collected periphyton samples in East Fork Slate Creek at 58.8046°N, 135.0382°W on July 24, 2012. In addition, we sampled three times, February 7, 2012, April 27, 2012, and October 30, 2012, to investigate the algal bloom in the TTF and changes in periphyton biomass in East Fork Slate Creek in 2011.

Table 6 shows the average concentrations of chlorophylls *a*, *b*, and *c* (mg/m^2) in East Fork Slate Creek samples collected during 2012. The 2011 and 2012 proportion of chlorophylls *a*, *b*, and *c* are shown in Figure 22.

Table 6.–East Fork Slate Creek chlorophylls *a*, *b*, and *c* mean densities.

Sample Date	Chlorophyll *a* (mg/m^2)	Chlorophyll *b* (mg/m^2)	Chlorophyll *c* (mg/m^2)
February 7, 2012	2.04	0.48	0.05
April 27, 2012	4.87	0.26	0.26
July 24, 2012	5.08	0.57	0.18
October 30, 2012	0.78	0.00	0.06

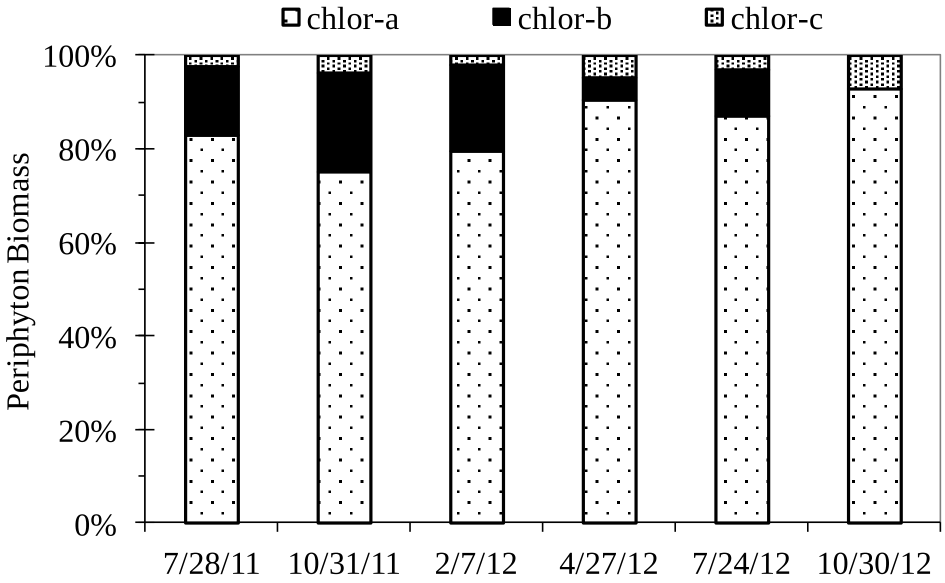

Figure 22.–East Fork Slate Creek chlorophylls *a*, *b*, and *c* proportion.

East Fork Slate Creek algal biomass, estimated from the chlorophyll *a* concentration for each sample, is shown in Figure 23. There are no significant differences between the mean ranks of July 2011 and July 2012 chlorophyll *a* densities in East Fork Slate Creek.

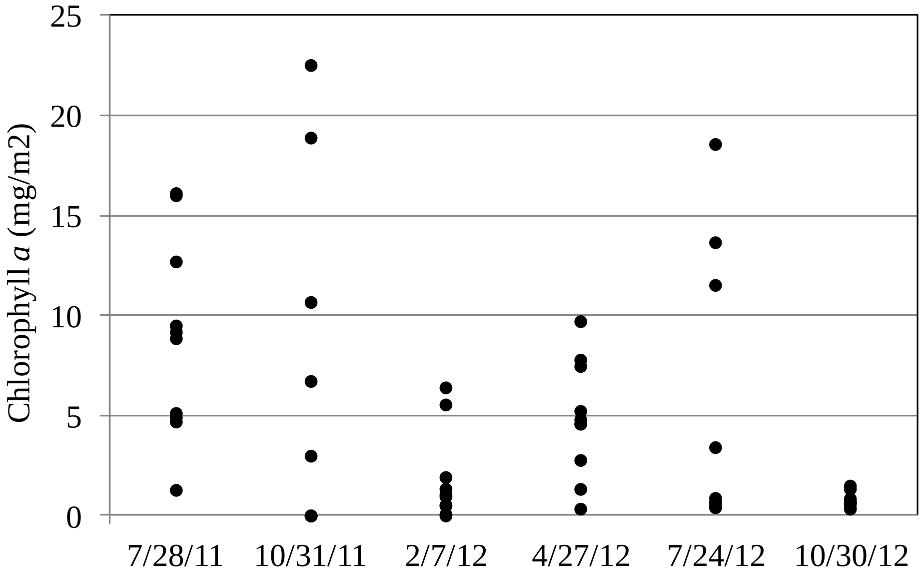

Figure 23.–East Fork Slate Creek chlorophyll *a* densities.

Benthic Macroinvertebrate Composition & Abundance

We collected six benthic macroinvertebrate samples in East Fork Slate Creek at 58.8045°N, 135.0381°W, on February 7, 2012, to investigate the algal bloom in the TTF and the change in algal biomass downstream in East Fork Slate Creek in 2011. We collected six benthic macroinvertebrate samples in Lower Slate Creek in the same location again on April 27, 2012, as required by the APDES Permit to sample between late March and late May, after spring breakup and before peak snowmelt.

In February, we identified 33 taxa among the six samples, and we estimate the mean number of aquatic benthic macroinvertebrates per m^2 at 10,703 insects, of which 22% are EPT taxa (Figure 24). The Shannon Diversity score is 0.73 and Evenness score is 0.57. The dominant taxon is Bivalvia: Sphaeriidae (pea clams), representing about 45% of samples.[t]

In April, we identified 33 taxa among the six samples, and we estimate the mean number of aquatic benthic macroinvertebrates per m^2 at 4,633 insects, of which 23% are EPT taxa (Figure 24). The Shannon Diversity score is 0.78 and the Evenness score is 0.61. The dominant taxon is Bivalvia: Sphaeriidae (pea clams), representing about 45% of samples[u].

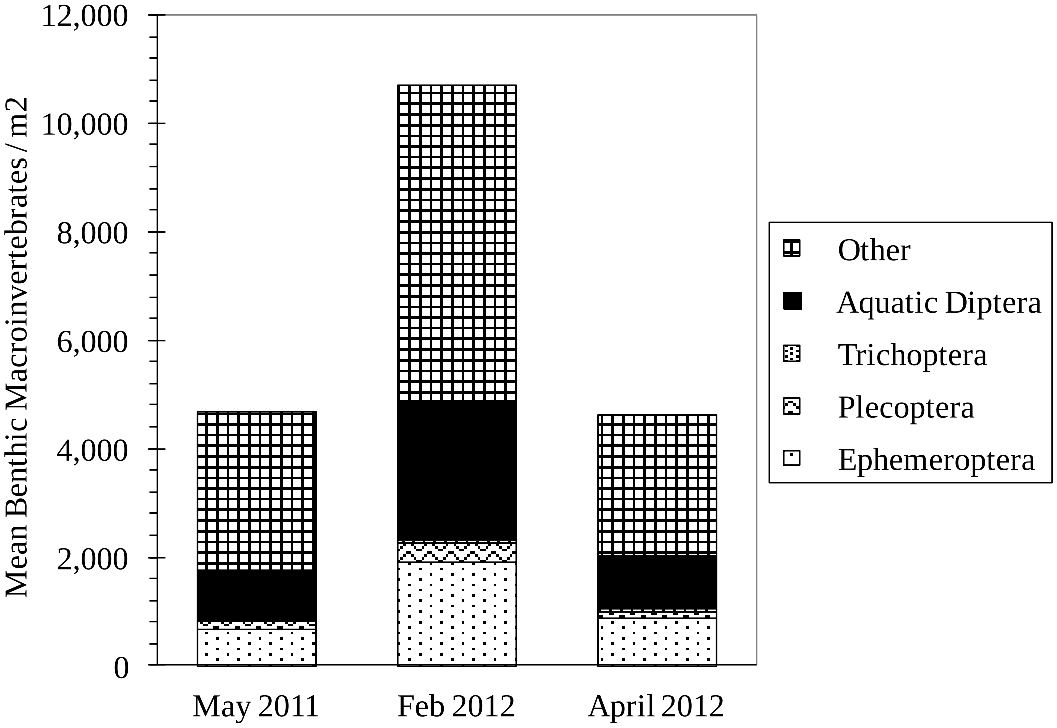

Figure 24.–East Fork Slate Creek benthic macroinvertebrates.

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[t] We do not observe this organism at other sites, except a few occasionally in the Lower Slate Creek samples. When we removed the pea clams from the East Fork Slate Creek February 2012 data set, the estimated mean benthic macroinvertebrate density decreased to 5,880 insects per m^2, percent EPT increased to 40%, and Chironomidae became the dominant taxon representing about 37% of samples.

[u] When we removed the pea clams from the East Fork Slate Creek April 2012 data set, the estimated mean benthic macroinvertebrate density decreased to 2,534 insects per m^2, percent EPT increased to 42%, and Chironomidae became the dominant taxon representing about 28% of samples.

Resident Fish Population & Condition

We sampled East Fork Slate Creek resident fish at 58.8040°N, 135.0382°W on August 1, 2012. We followed the methods described earlier in this report, except that two of our three minnow trapping intervals exceeded the 1.5 hr soak time because of blasting occurring upstream at the dam.

The 2012 Dolly Varden char population estimate for East Fork Slate Creek is 20 fish, half the 2011 estimate (Figure 25). We captured more Dolly Varden char in pools than riffles or glides (Figure 26) and the fish we captured are about the same size (Figure 27). Mean fish condition is 1.08 g/mm^3, about the same as in 2011.

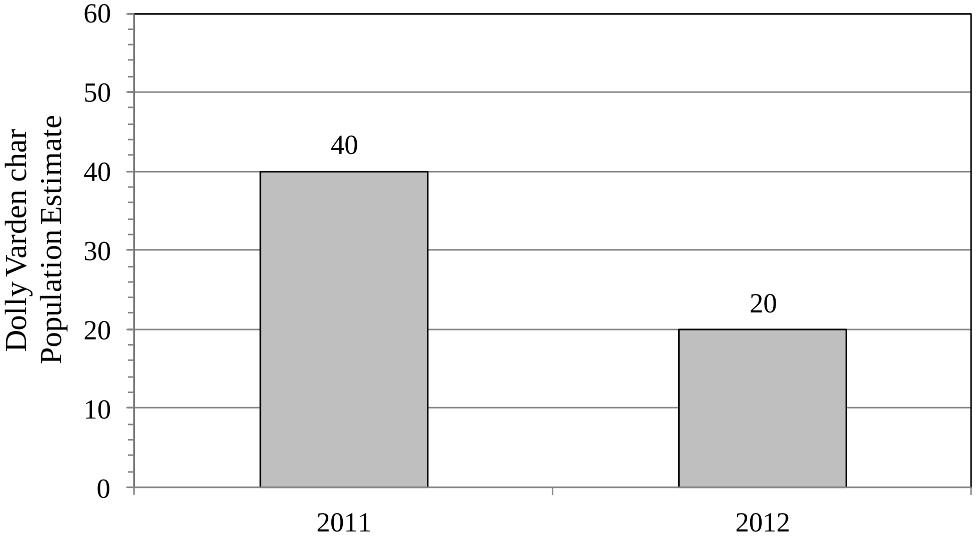

Figure 25.–East Fork Slate Creek resident fish population estimates.

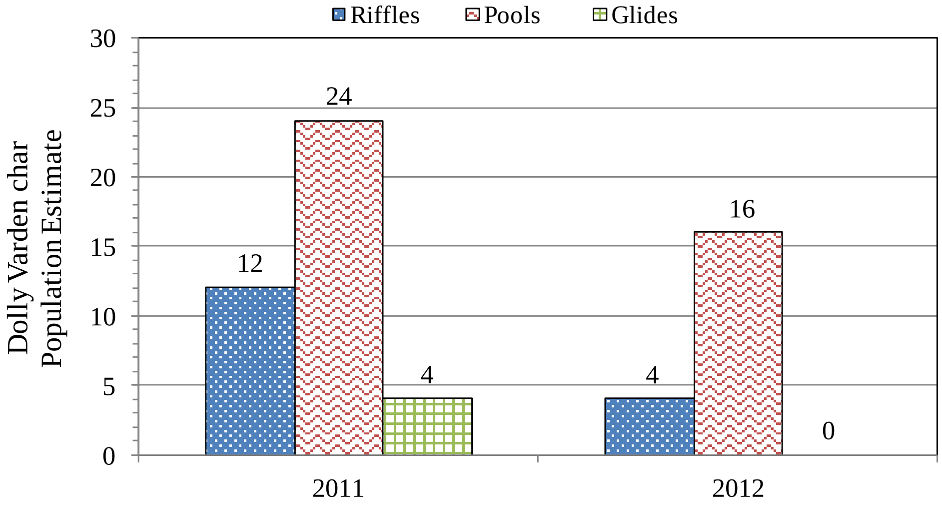

Figure 26.–East Fork Slate Creek resident fish population estimates by habitat type.

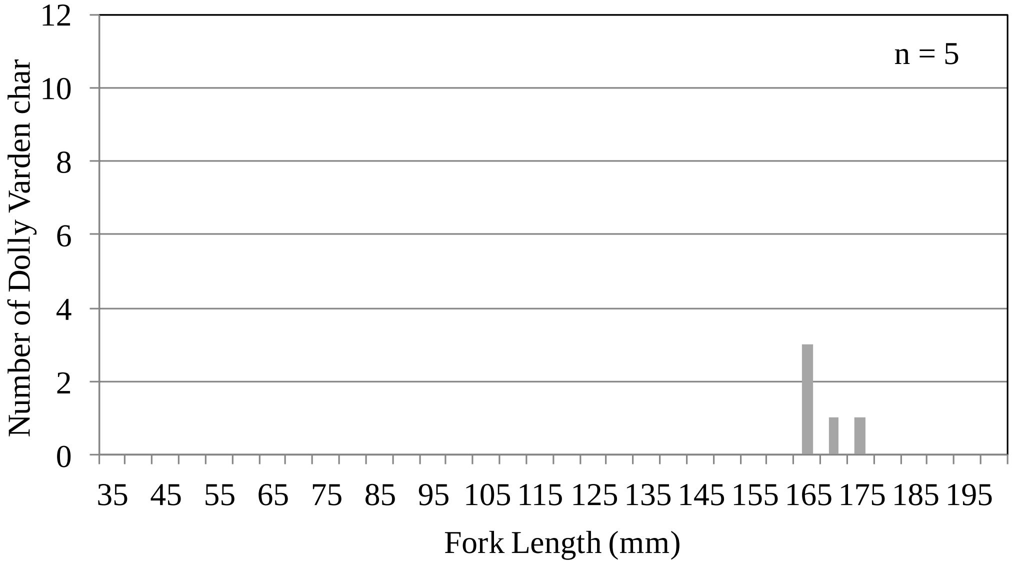

Figure 27.–East Fork Slate Creek resident fish length frequency.

Resident Fish Metals Concentrations

We captured six Dolly Varden char in East Fork Slate Creek at 58.8040°N, 135.0382°W on August 1, 2012. We shipped the fish samples to Columbia Analytical in Kent, Washington, for laboratory analyses September 27, 2012 and received the results November 9, 2012. The laboratory processed the fish individually and the concentration for each fish is shown for each element in Figure 28.

Though we present the information from 2011 and 2012 in the figure below, we won't compare data between years because in 2011 we incorrectly completed the laboratory's chain of custody form and the laboratory homogenized all six fish, giving one concentration for each element.

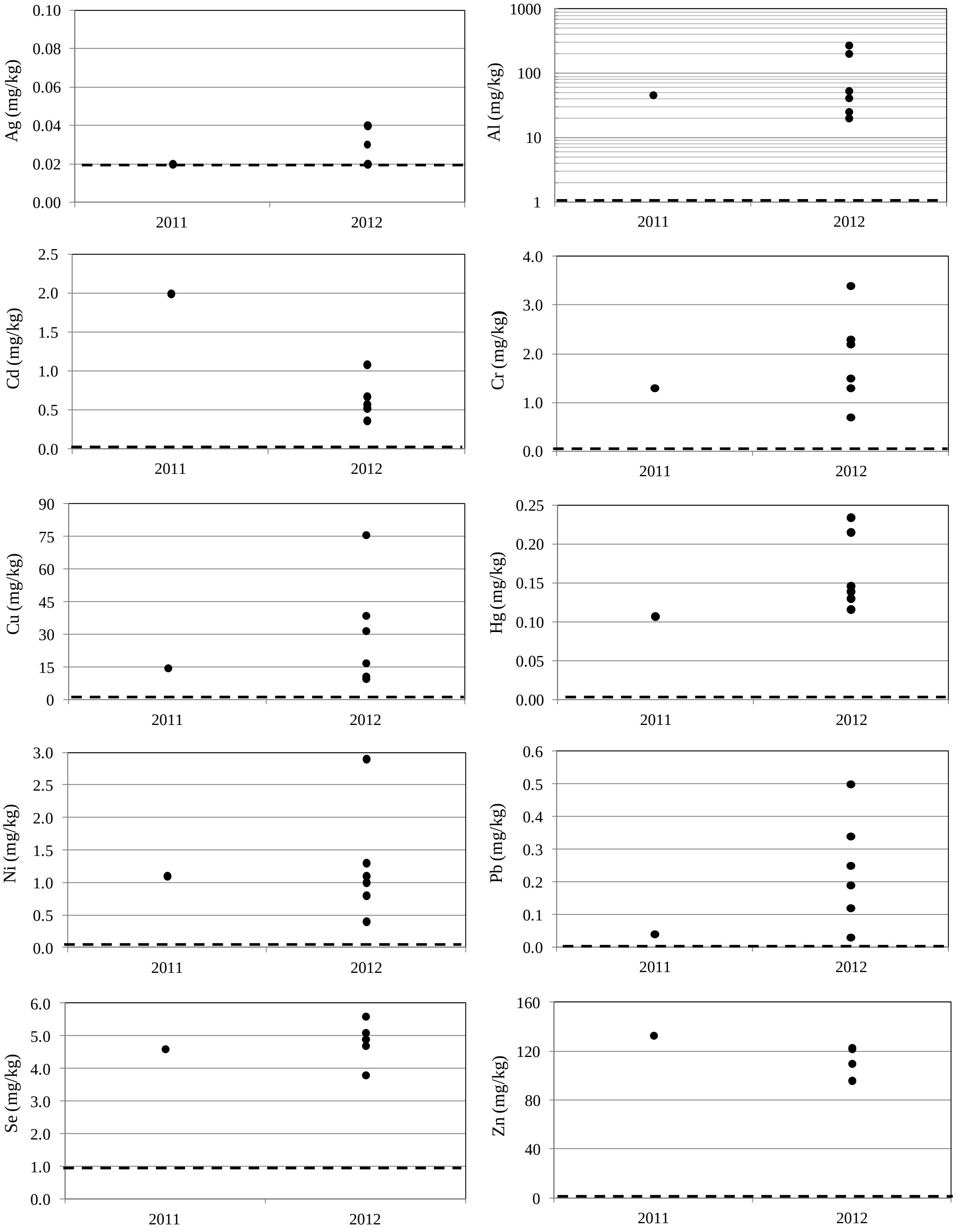

Figure 28.–East Fork Slate Creek whole body metals concentrations.

Note: 2012, juvenile Dolly Varden char.
Note: Dashed lines represent the method reporting limit.

Sediment Metals Concentrations

We collected sediments in East Fork Slate Creek at 58.8053°N, 135.0383°W on July 10, 2012, finding collection more difficult than in 2011. East Fork Slate Creek is characterized as an incised, bedrock canyon with water flow primarily from Upper Slate Lake via the diversion pipeline and the TTF water treatment plant effluent. We collected sediment upstream of the bedrock canyon under large woody debris and in eddies. We shipped the samples to the AECOM Environmental Toxicology laboratory in Fort Collins, Colorado for analyses on July 19, 2012. We received the laboratory results on September 27, 2012.

East Fork Slate Creek concentrations of Ag, Cr, Cu, Hg, Pb, and Zn are greater than in 2011, Cd and Ni concentrations are similar, and Al, As, and Se concentrations are lower. East Fork Slate Creek sediment metals concentrations are shown in Figure 29.

The 2012 East Fork Slate Creek sediment sample is composed of 26% sand, has the greatest percentage of total volatile solids (29%) and total organic carbon (17%), the lowest percentage of total solids (24%), and a similar amount of acid volatile sulfide (1%) compared to the sediment samples collected from our other sampling locations (Ben Brewster, Division of Habitat Biologist, ADF&G, Douglas; September 27, 2012, memorandum, Kensington Spawning Substrate Trip Report). We include tables with 2011 and 2012 sediment composition, metals and semi metals data for all sites and the 2012 AECOM laboratory report in Appendix E.

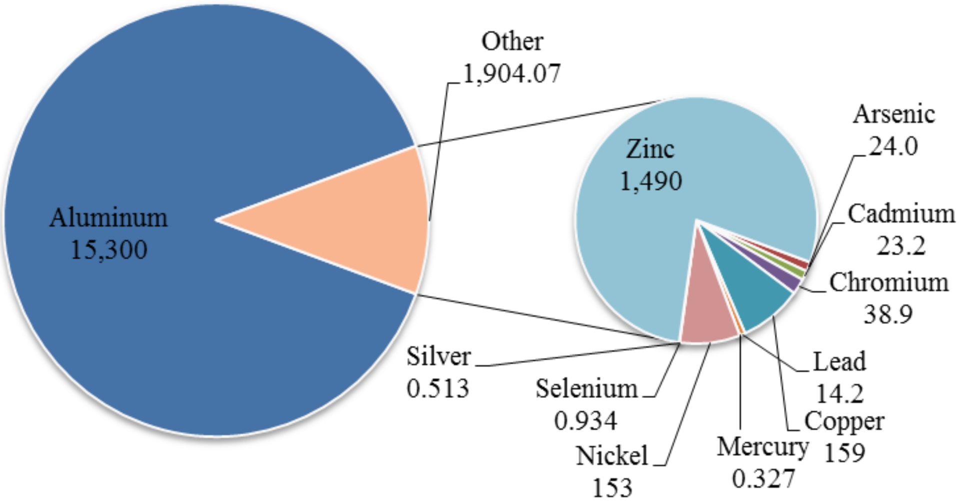

Figure 29.–East Fork Slate Creek sediment metals concentrations.

Note: 2012 data presented in parts per million (mg/kg).

Sediment Toxicity

There are no statistical differences in growth or survival of *Chironomus dilutus* or *Hyalella azteca* on the East Fork Slate Creek sediment sample compared to the control. We include the laboratory report in Appendix E.

Aquatic Vegetation Surveys

Tailing discharge to the TTF began June 24, 2010. In July 2011, the TTF was host to an algal bloom. In August 2011, Coeur began water sampling to detect chlorophyll *a* (Figure 30), nitrogen (Figure 31), phosphorus (Figures 32, 33), potassium (Figure 34), sulfur (Figure 35), and total organic carbon (Figure 36), among other parameters, at four locations: 1) upstream of the TTF (Control), 2) in the TTF, 3) the TTF water treatment plant effluent, and 4) downstream of effluent discharge in East Fork Slate Creek (EFSC).

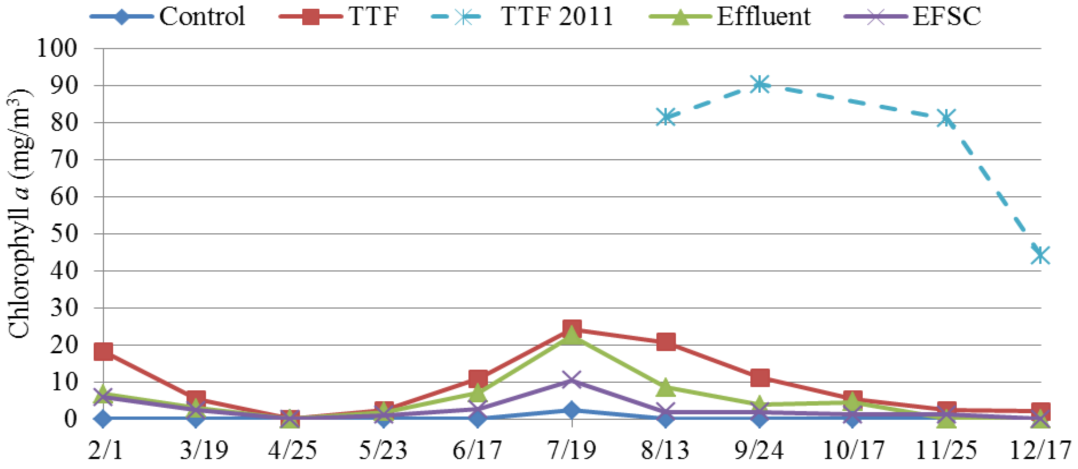

Figure 30.–Chlorophyll *a* parts per billion (mg/m^3) at four stations.

Chlorophyll *a* concentrations in the TTF have decreased from a high of 90 mg/m^3 on September 19, 2011. In 2012, chlorophyll *a* concentrations in the TTF, effluent, and East Fork Slate Creek are generally higher than the control, and follow control trends.

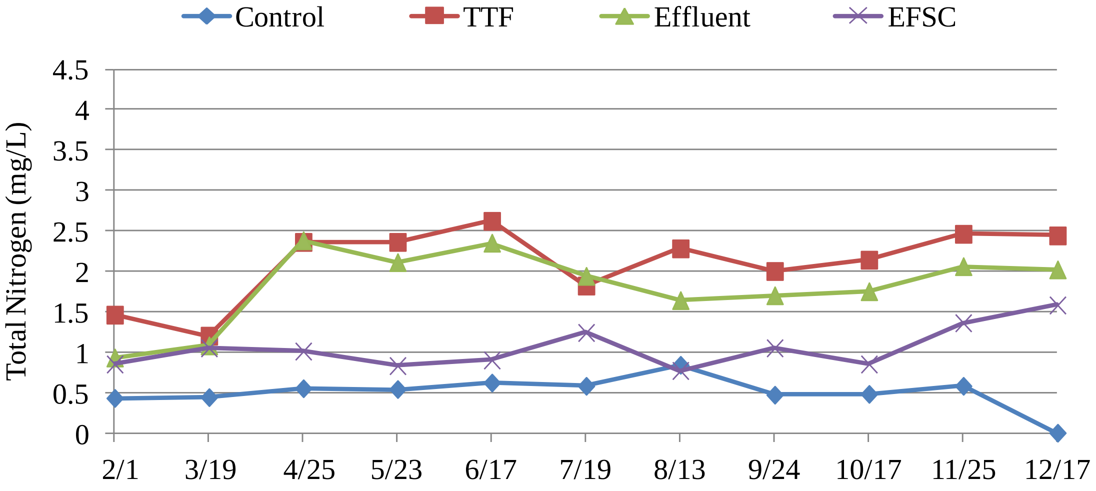

Figure 31.–Total Kjeldahl nitrogen parts per million (mg/L) at four stations.

The nitrogen concentrations are greatest in the TTF and effluent, increasing in East Fork Slate Creek toward the 2012 year end.

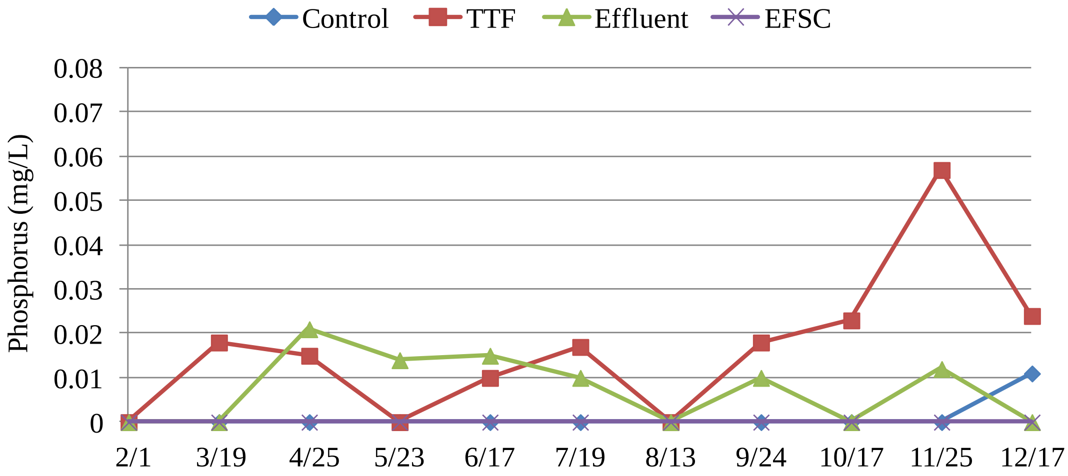

Figure 32.–Total phosphorus parts per million (mg/L) at four stations.

The 2011 phosphorous concentrations in the TTF were consistent with those found in eutrophic[v] lakes, though the TTF is in a formerly oligotrophic[w] lake, suggesting a source of phosphorous in the tailings caused the algal bloom. The erratic phosphorus concentrations in the TTF in 2012 continue to suggest phosphate deposit encounters during mining, with tailing discharge to the TTF. We are investigating a correlation between phosphorus spikes in the TTF and TDS spiking shortly thereafter downstream in East Fork Slate Creek (Figure 33).

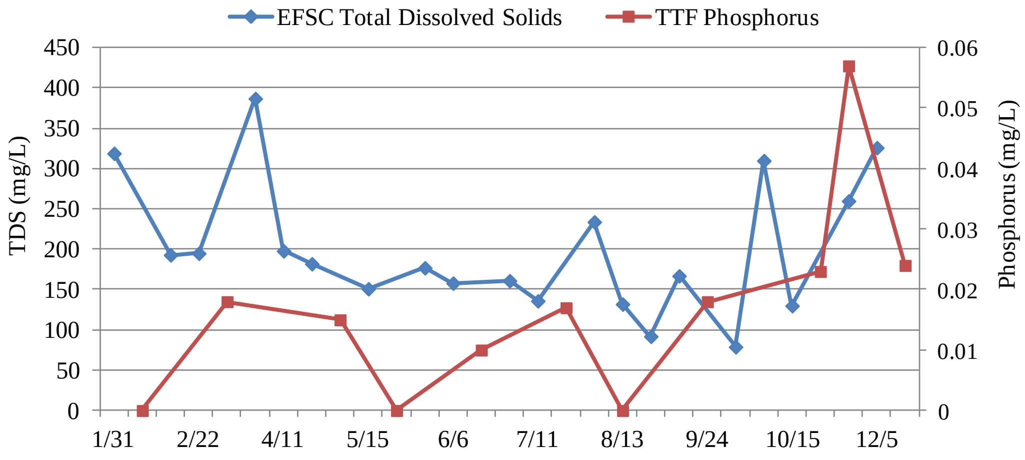

Figure 33.–East Fork Slate Creek TDS and TTF total phosphorus in parts per million (mg/L).

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[v] Warm water, high productivity.
[w] Cold water, low productivity.

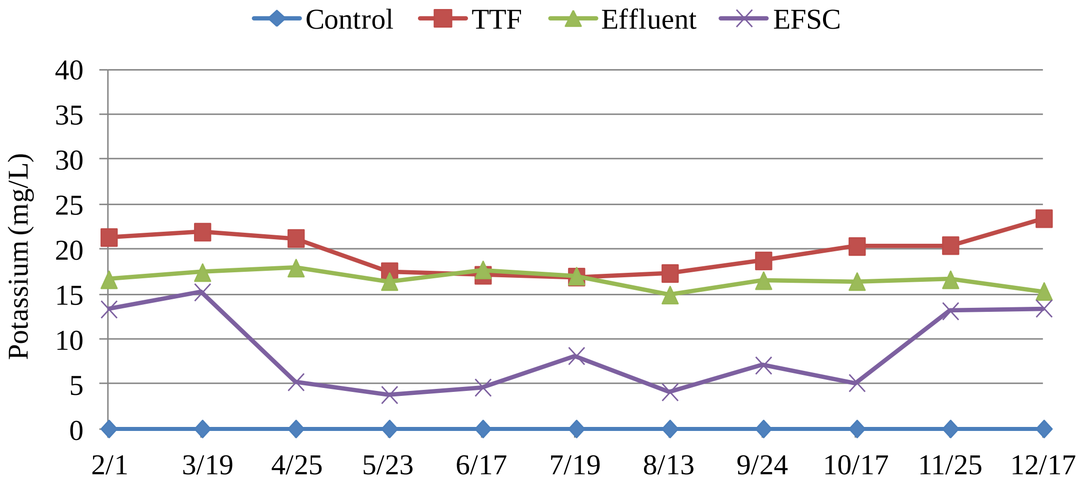

Figure 34.–Total recoverable potassium parts per million (mg/L) at four stations.

Potassium is not detected at the control site in 2012, and is highest in the TTF and in the effluent. East Fork Slate Creek potassium concentrations in 2012 are higher than the control and lower than the TTF and effluent. We continue to watch potassium levels in East Fork Slate Creek, as increases can disrupt the sodium/potassium ratio and become toxic to algae. We assess algal abundance in our periphyton biomass studies and the chlorophyll *a* concentrations in Coeur's water samples.

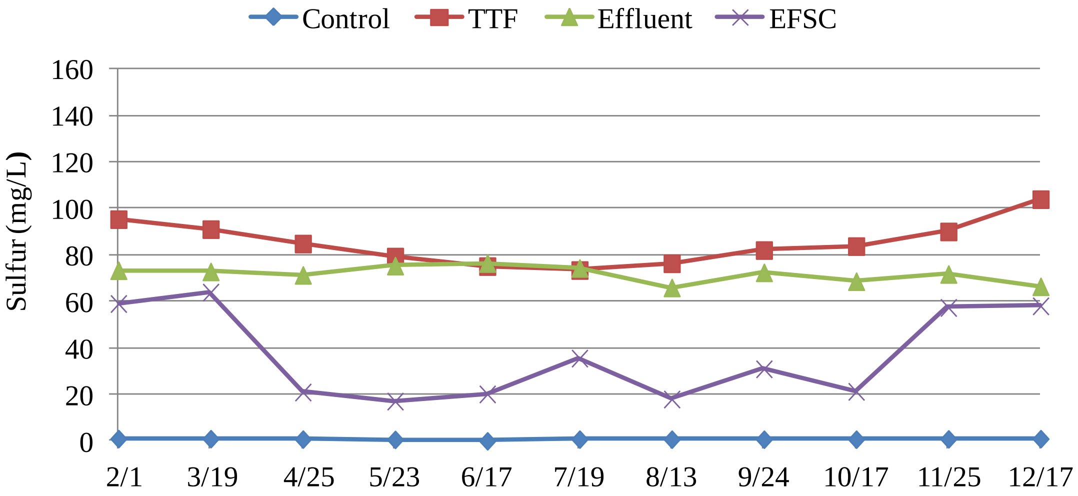

Figure 35.–Total sulfur parts per million (mg/L) at four stations.

Sulfur is present in low concentrations (<1.0 mg/L) upstream of the TTF in 2012, and is highest in the TTF and in the effluent. East Fork Slate Creek sulfur concentrations are higher than the control and lower than the TTF and effluent, and remain within a similar range across years.

Potassium and sulfur are present in potassium amyl xanthate (C5H11OCSSK), used in the milling process. Habitat biologists occasionally smell an odor reminiscent of the mill in East Fork Slate and Lower Slate Creeks. In a conversation with the lead author at the mine site in the spring of 2011, a former Kensington Mine employee suggested the xanthate molecules pass the water treatment facility, move downstream, dissolve in the water column and release the characteristic odor of sulfur into the air (Ron Johnson, Mill Manager, Kensington Gold Mine, Juneau, personal communication).

Sulfur can increase the acidity of water, so we regularly review Couer's monthly water quality data. In 2012, we find that the pH of East Fork Slate Creek water is about 7.5 to 8 throughout the year, within the normal range.

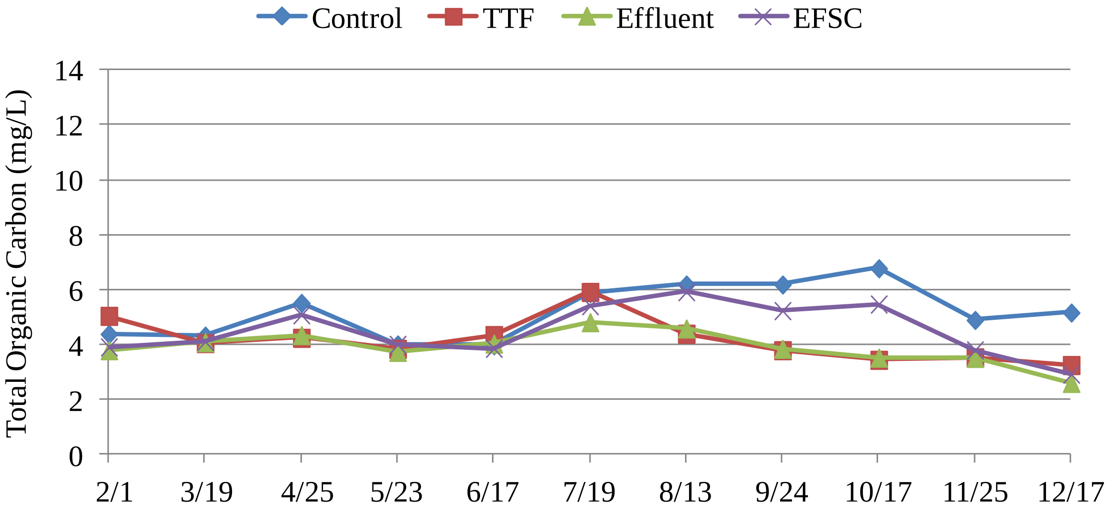

Figure 36.–Total Organic Carbon parts per million (mg/L) at four stations.

The total organic carbon at the control site and East Fork Slate Creek follow a similar trend in 2012 (Figure 36). The rate of vegetative growth depends, among other factors, on temperature and sunshine, both more abundant in 2011 than 2012, resulting in greater decaying natural organic matter in 2011.

West Fork Slate Creek

Periphyton Community Composition & Biomass

We collected periphyton samples in West Fork Slate Creek at 58.7992°N, 135.0460°W on July 25, 2012 (Figure 37). Table 7 shows the average concentration of chlorophylls *a*, *b*, and *c* (mg/m^2) in the sample. The 2011 and 2012 proportion of chlorophylls *a*, *b*, and *c* are shown in Figure 38. West Fork Slate Creek algal biomass, estimated from the chlorophyll *a* concentration in each sample, is shown in Figure 39.

Figure 37.–West Fork Slate Creek periphyton sample taken July 25, 2012.

Table 7.–West Fork Slate Creek chlorophylls *a*, *b*, and *c* mean densities

Sample Date	Chlorophyll *a* (mg/m^2)	Chlorophyll *b* (mg/m^2)	Chlorophyll *c* (mg/m^2)
July 25, 2012	1.01 (0.75)	0.00 (0.00)	0.10 (0.08)

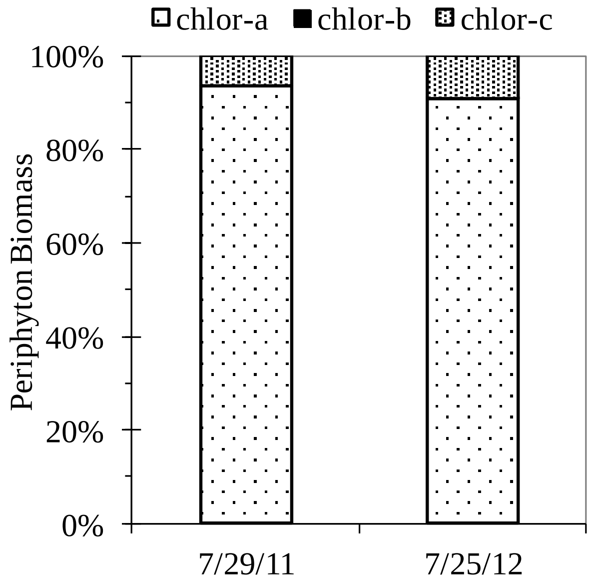

Figure 38.–West Fork Slate Creek chlorophylls *a*, *b*, and *c* proportion

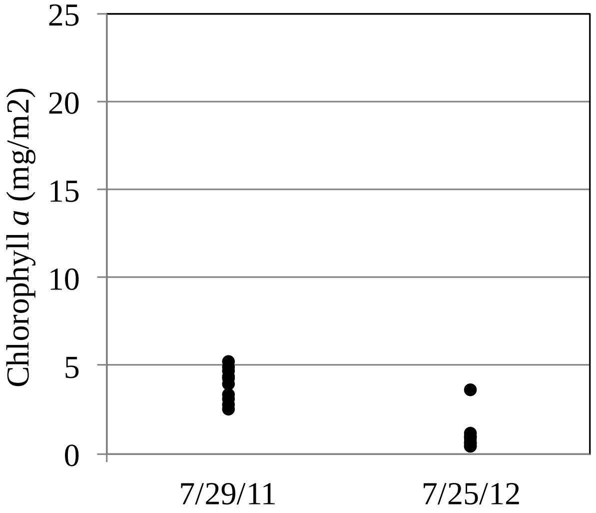

Figure 39.–West Fork Slate Creek chlorophyll *a* densities.

Benthic Macroinvertebrate Composition & Abundance

We collected six macroinvertebrate samples in West Fork Slate Creek at 58.7995°N, 135.0459°W, on May 2, 2012. We identified 31 taxa among the six samples, and we estimate the mean number of aquatic benthic macroinvertebrates per m^2 at 1,819 insects, of which 80% are EPT taxa (Figure 40). The Shannon Diversity score is 0.84 and the Evenness score is 0.71. The dominant taxon is Ephemeroptera: Baetidae, representing 32% of samples. When we compared the benthic macroinvertebrate samples collected in May 2011 and April 2012, we detected significant differences ($p \leq 0.05$) in insect density and the number of taxa per sample between years.

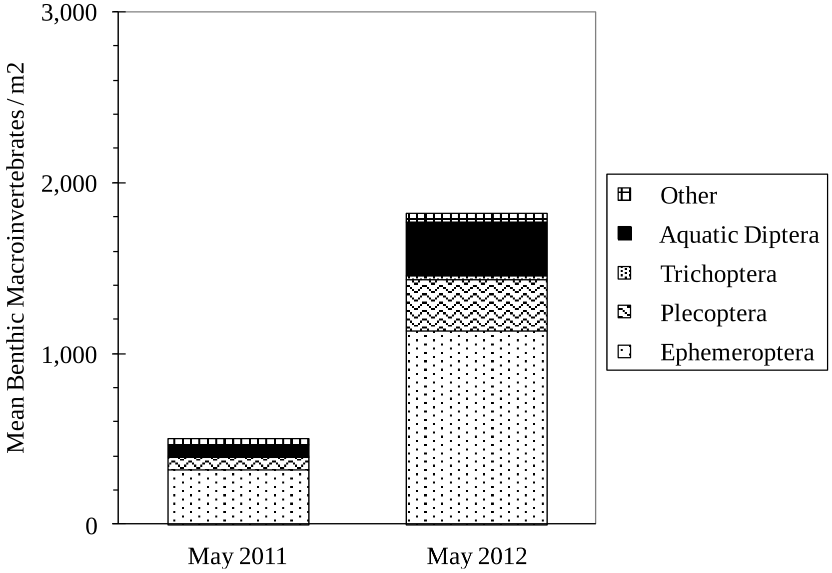

Figure 40.–West Fork Slate Creek benthic macroinvertebrates.

Upper Slate Creek

Periphyton Community Composition & Biomass

We collected 10 periphyton samples in Upper Slate Creek at 58.8191°N, 135.0416°W on July 24, 2012. In addition, we sampled three times, February 7, 2012, April 27, 2012, and October 30, 2012 to investigate the algal bloom in the TTF and the change in periphyton biomass downstream in East Fork Slate Creek in 2011.

Table 8 shows the average concentrations of chlorophylls *a*, *b*, and *c* (mg/m^2) in East Fork Slate Creek samples collected during 2012. The 2011 and 2012 proportion of chlorophylls *a*, *b*, and *c* are shown in Figure 41.

Table 8.–Upper Slate Creek chlorophylls *a*, *b*, and *c* mean densities.

Sample Date	Chlorophyll *a* (mg/m^2)	Chlorophyll *b* (mg/m^2)	Chlorophyll *c* (mg/m^2)
February 7, 2012	0.64	0.00	0.04
April 27, 2012	0.70	0.00	0.06
July 24, 2012	1.26	0.00	0.07
October 30, 2012	0.78	0.00	0.06

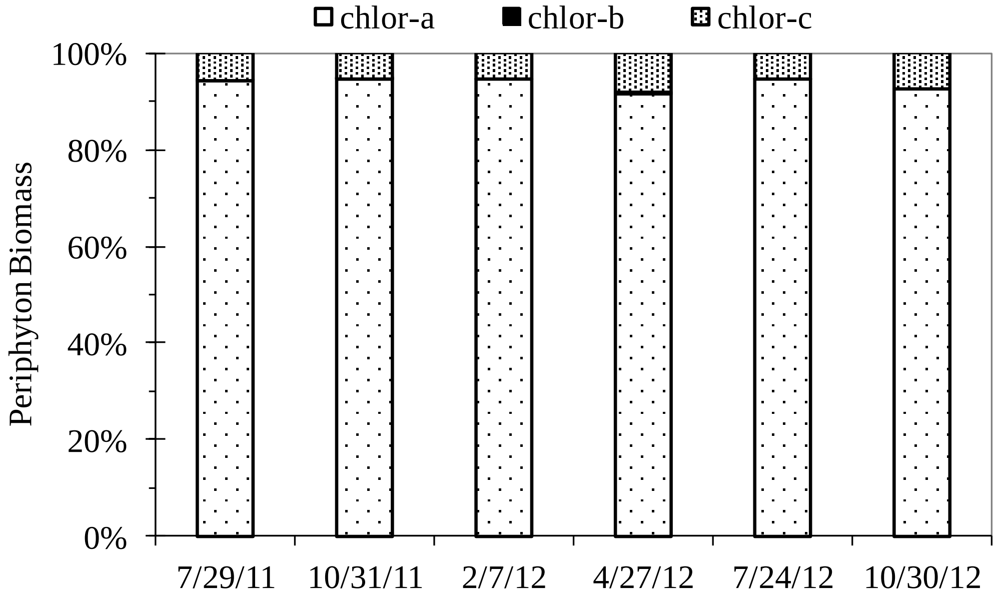

Figure 41.–Upper Slate Creek chlorophylls *a*, *b*, and *c* proportion.

Upper Slate Creek algal biomass, estimated from the chlorophyll *a* concentration in each sample, is shown in Figure 42.

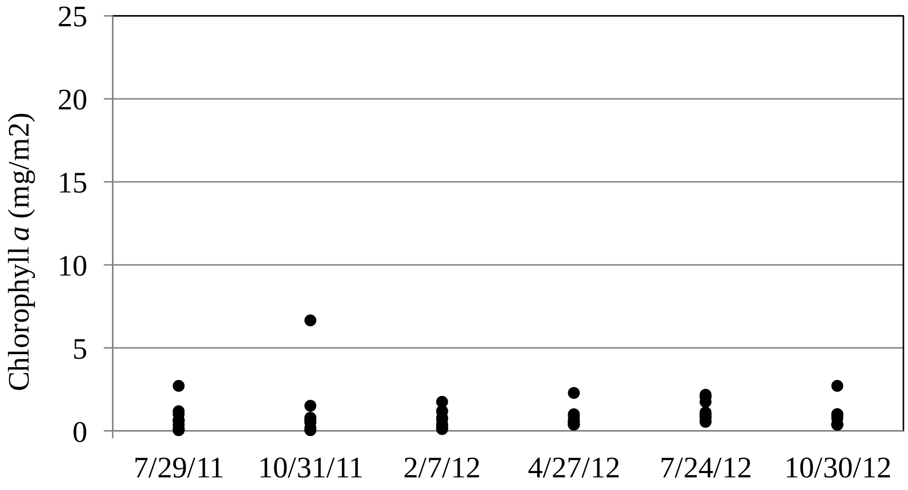

Figure 42.–Upper Slate Creek chlorophyll *a* densities.

Benthic Macroinvertebrate Composition & Abundance

We collected macroinvertebrate samples in Upper Slate Creek at 58.8189º N, 135.0415º W, on April 27, 2012. We identified 39 taxa among the six samples, and we estimate the mean number of aquatic benthic macroinvertebrates per m^2 at 2,256 insects, of which 68% are EPT taxa (Figure 43). The Shannon Diversity score is 1.04 and the Evenness score is 0.79. The dominant taxon is Diptera: Chironomidae, representing about 20% of samples.

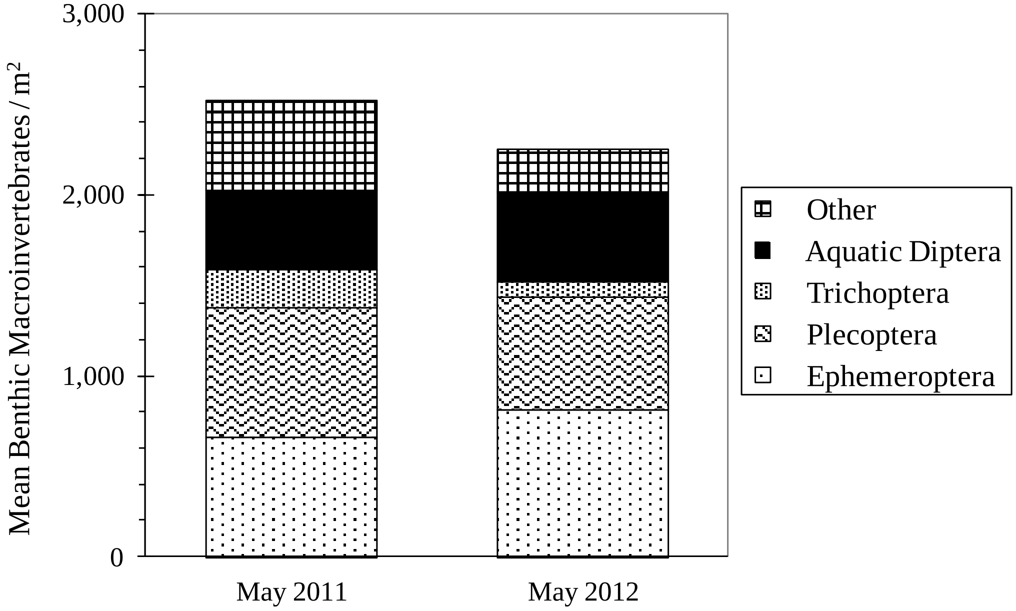

Figure 43.–Upper Slate Creek benthic macroinvertebrates.

Resident Fish Population & Condition

We sampled resident fish in Upper Slate Creek at 58.8199°N, 135.0425°W on August 2, 2012. The 2012 Dolly Varden char population estimate for Upper Slate Creek is 192±32 fish and significantly greater ($p \leq 0.05$) than our 2011 estimate (Figure 44). We captured more Dolly Varden char in pools than riffles or glides (Figure 45) and the fish we captured are from several age classes (Figure 46). Mean fish condition is 0.99 g/mm^3, about the same as fish condition in 2011.

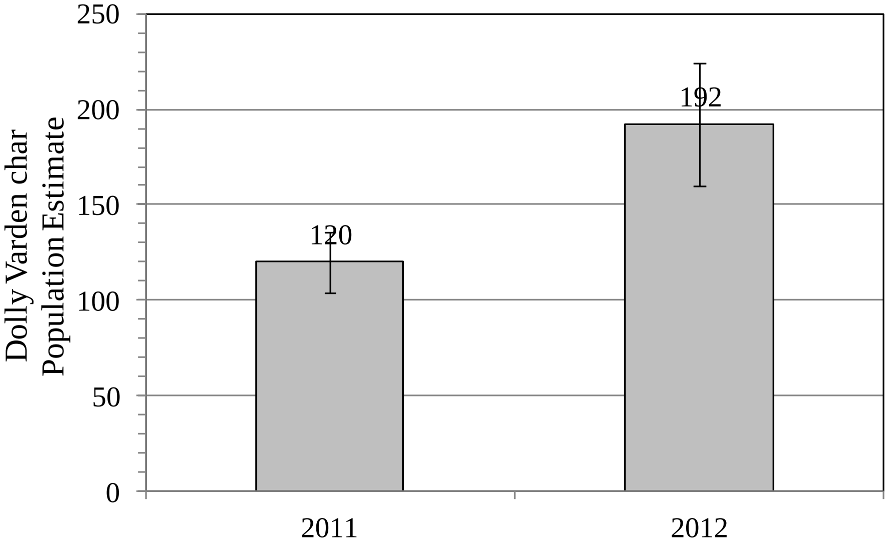

Figure 44.–Upper Slate Creek resident fish population estimates.

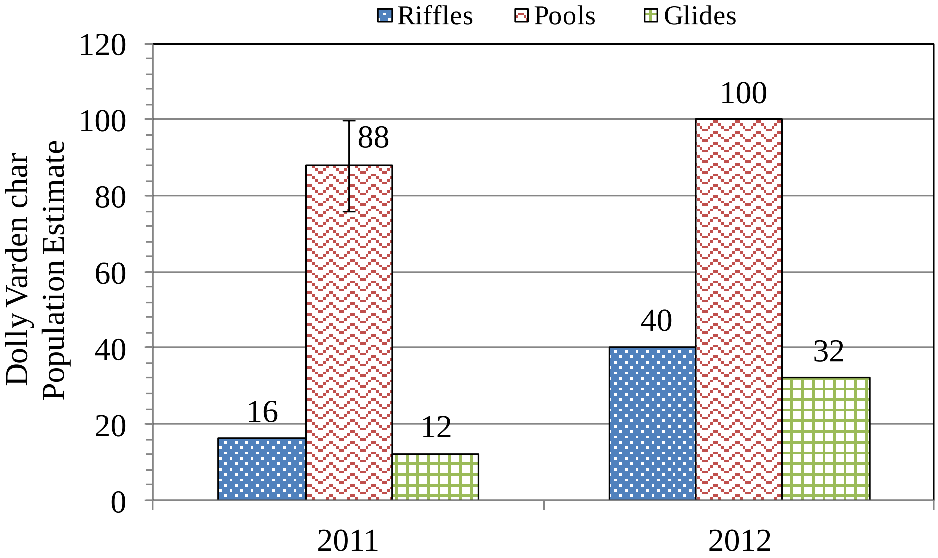

Figure 45.–Upper Slate Creek resident fish population estimates by habitat type.

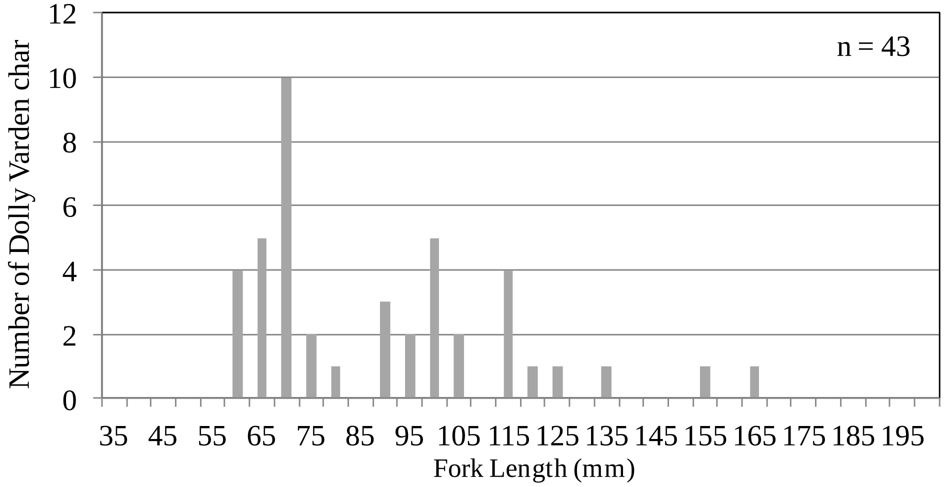

Figure 46.–Upper Slate Creek resident fish length frequency.

Resident Fish Metals Concentrations

We captured six Dolly Varden char in Upper Slate Creek at 58.8199°N, 135.0425°W on August 2, 2012. We shipped the fish samples to Columbia Analytical in Kent, Washington, for laboratory analyses September 27, 2012 and received the results November 9, 2012. The laboratory processed the fish individually and the concentration for each fish is shown for each element in Figure 47, except for Ag, which was undetected at the method reporting limit in five samples and Ni, which was undetected at the method reporting limit in one sample.

Though we present the information from 2011 and 2012 in the figure below, we won't compare data between years because in 2011 we incorrectly completed the laboratory's Chain of Custody form and the laboratory homogenized all six fish, giving just one concentration for each element for all six fish. Columbia Analytical reported they observed sediment in the bottom of their digestion tube containing the 2011 Upper Slate Creek homogenized fish sample[x], which may have increased the concentrations of some elements.

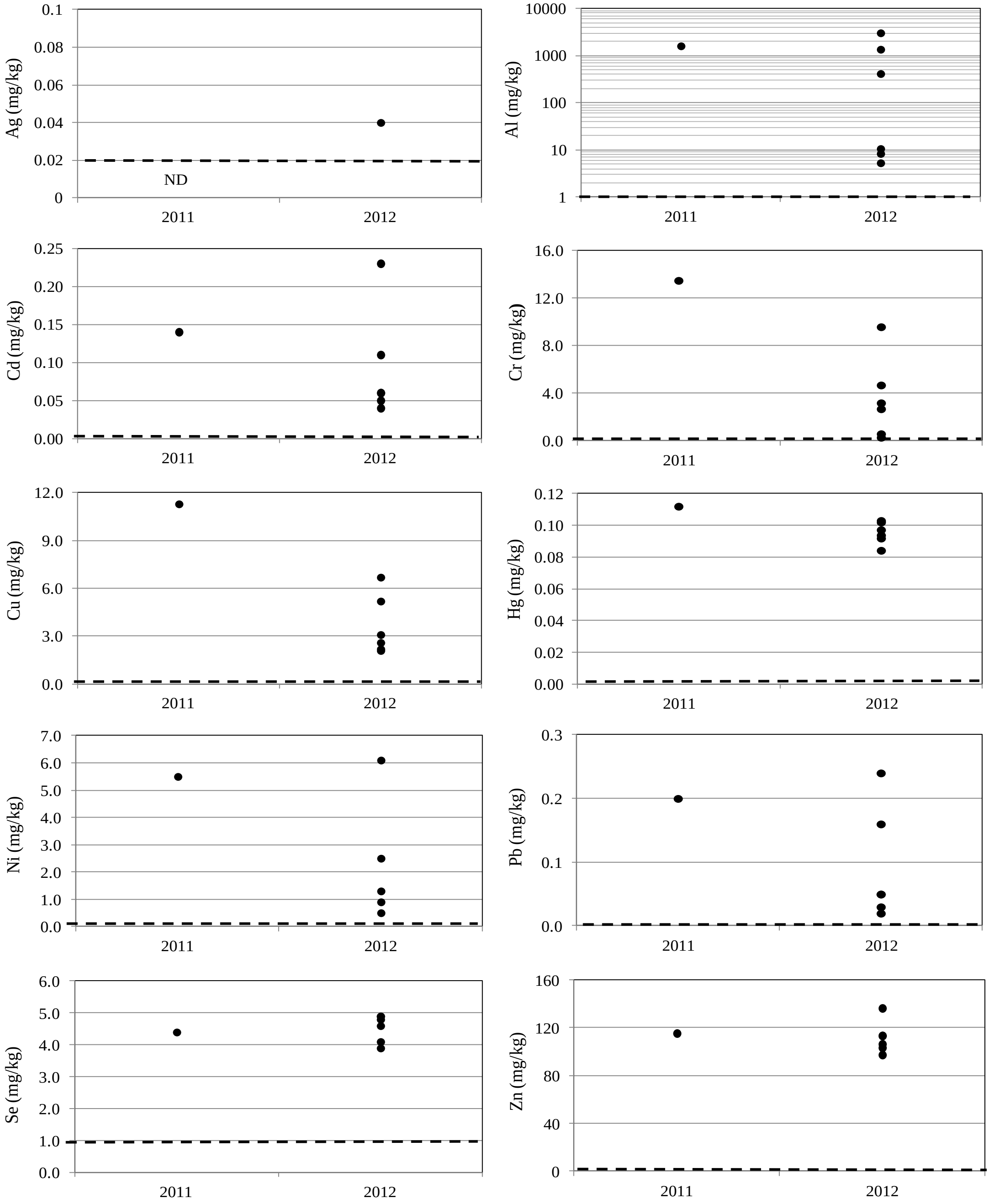

Figure 47.–Upper Slate Creek whole body metals concentrations.

Note: 2012, juvenile Dolly Varden char.
Note: Dashed lines represent the method reporting limit.
Note: ND indicates the metal was not detected at the method reporting limit.

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[x] The probable source is sediment the fish ingested.

Sediment Metals Concentrations

We collected sediments in Upper Slate Creek at 58.8189°N, 135.0416°W on July 2, 2012. We shipped the samples to the AECOM Environmental Toxicology laboratory in Fort Collins, Colorado for analyses on July 19, 2012. We received the laboratory results on September 27, 2012.

The Upper Slate Creek Hg concentration is greater in 2012 than 2011 when it was not detected at the method reporting limit (0.0366 mg/kg). Concentrations of the other elements are similar to those in 2011. Upper Slate Creek sediment metals concentrations are shown in Figure 48. We include tables with 2011 and 2012 sediment composition, metals and semi metals data for all sites and the 2012 AECOM laboratory report in Appendix E.

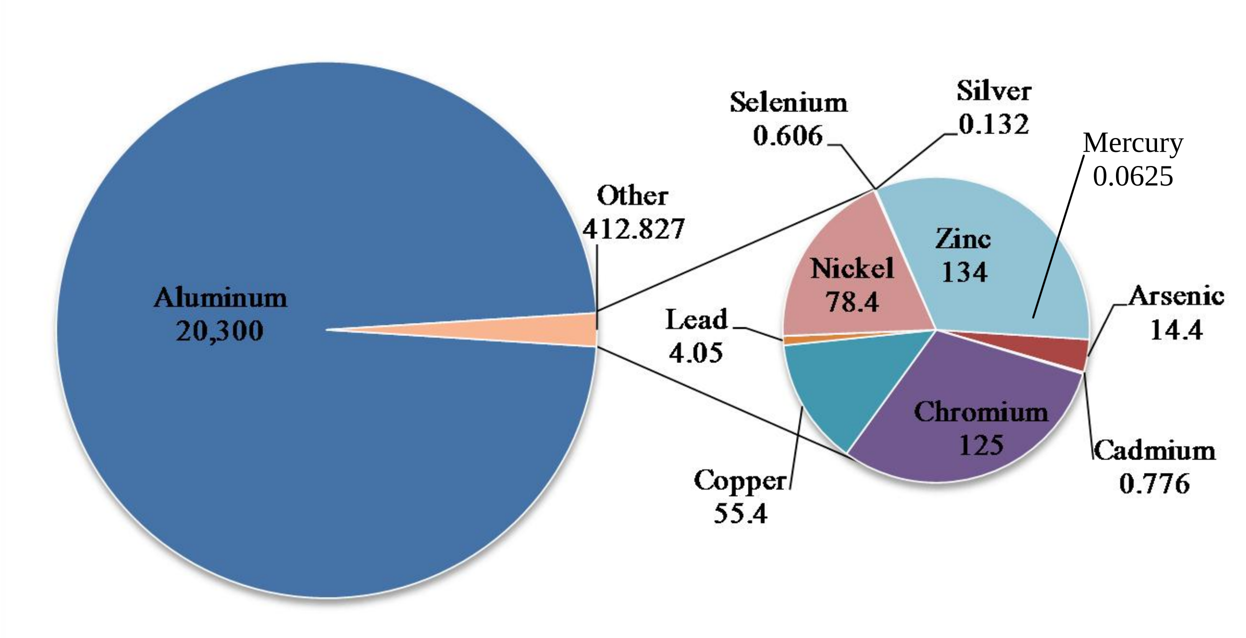

Figure 48.–Upper Slate Creek sediment metals concentrations.

Note: 2012 data presented in parts per million (mg/kg).

Sediment Toxicity

There are no statistical differences in growth or survival of *Chironomus dilutus* or *Hyalella azteca* on the Upper Slate Creek sediment sample compared to the control. We include the laboratory report in Appendix E.

JOHNSON CREEK

Lower Johnson Creek

Sediment Metals Concentrations

We collected sediments in Lower Johnson Creek at 58.8235°N, 135.0048°W on July 2, 2012. We shipped the samples to the AECOM Environmental Toxicology laboratory in Fort Collins, Colorado for analyses on July 19, 2012. We received the laboratory results on September 27, 2012.

The 2012 Ag concentration is twice that of 2011 though still similar to 2005–2010 (Flory 2011). The concentrations of the other elements are similar to 2011. Lower Johnson Creek sediment metals concentrations are shown in Figure 49. We include tables with 2011 and 2012 sediment composition, metals and semi metals data for all sites and the 2012 AECOM laboratory report in Appendix E.

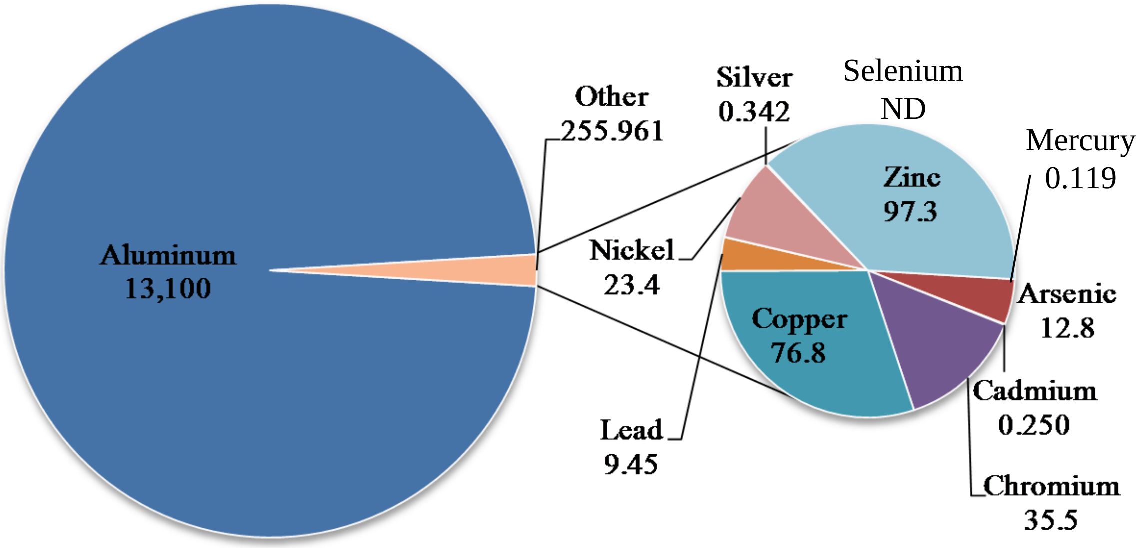

Figure 49.–Lower Johnson Creek sediment metals concentrations.

Note: 2012 data presented in parts per million (mg/kg).

Sediment Toxicity

We collected sediments in Lower Johnson Creek at 58.8235°N, 135.0048°W on July 2, 2012 (Figure 50). There are no statistical differences in growth or survival of *Chironomus dilutus* or *Hyalella azteca* on the Lower Johnson Creek sediment sample compared to the control. We include the laboratory report in Appendix E.

Figure 50.–Ben Brewster collects sediment in Lower Johnson Creek.

Adult Salmon Counts

We surveyed Lower Johnson Creek for adult chum salmon and pink salmon between July 17 and September 19, 2012.

Figure 51 presents the adult pink salmon count for each Lower Johnson Creek survey, and Figure 52 presents the weekly distribution of adult pink salmon. The 2012 adult pink salmon estimate is 6,267 fish, similar to the 2006 and 2009 estimates (Flory 2011).

We observed adult chum salmon in the lower and middle portions of the Johnson Creek between July 24 and August 7, and estimate adult chum salmon return at 248 fish, similar to estimates for previous years.

We surveyed Lower Johnson Creek for coho salmon between September 26 and November 5 by foot and by snorkeling on October 23, October 30, and November 5. We observed most adult coho salmon in the middle portion of Lower Johnson Creek between Site 4 and Site 10. We estimate coho salmon at 90 fish, the highest in eight years of monitoring (Flory 2011, Timothy and Kanouse 2011). This is an overestimation as we unknowingly counted adult Dolly Varden char as adult coho salmon prior to snorkeling. We will snorkel deep pools in Lower Johnson Creek each week in 2013 during the coho salmon spawning season to verify Dolly Varden char are not included in the adult coho salmon estimate.

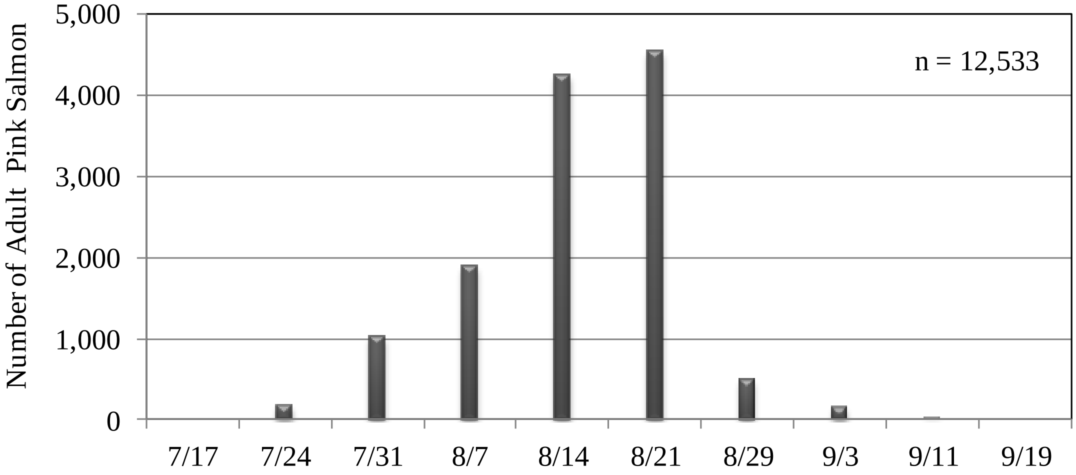

Figure 51.–Lower Johnson Creek adult pink salmon counts.

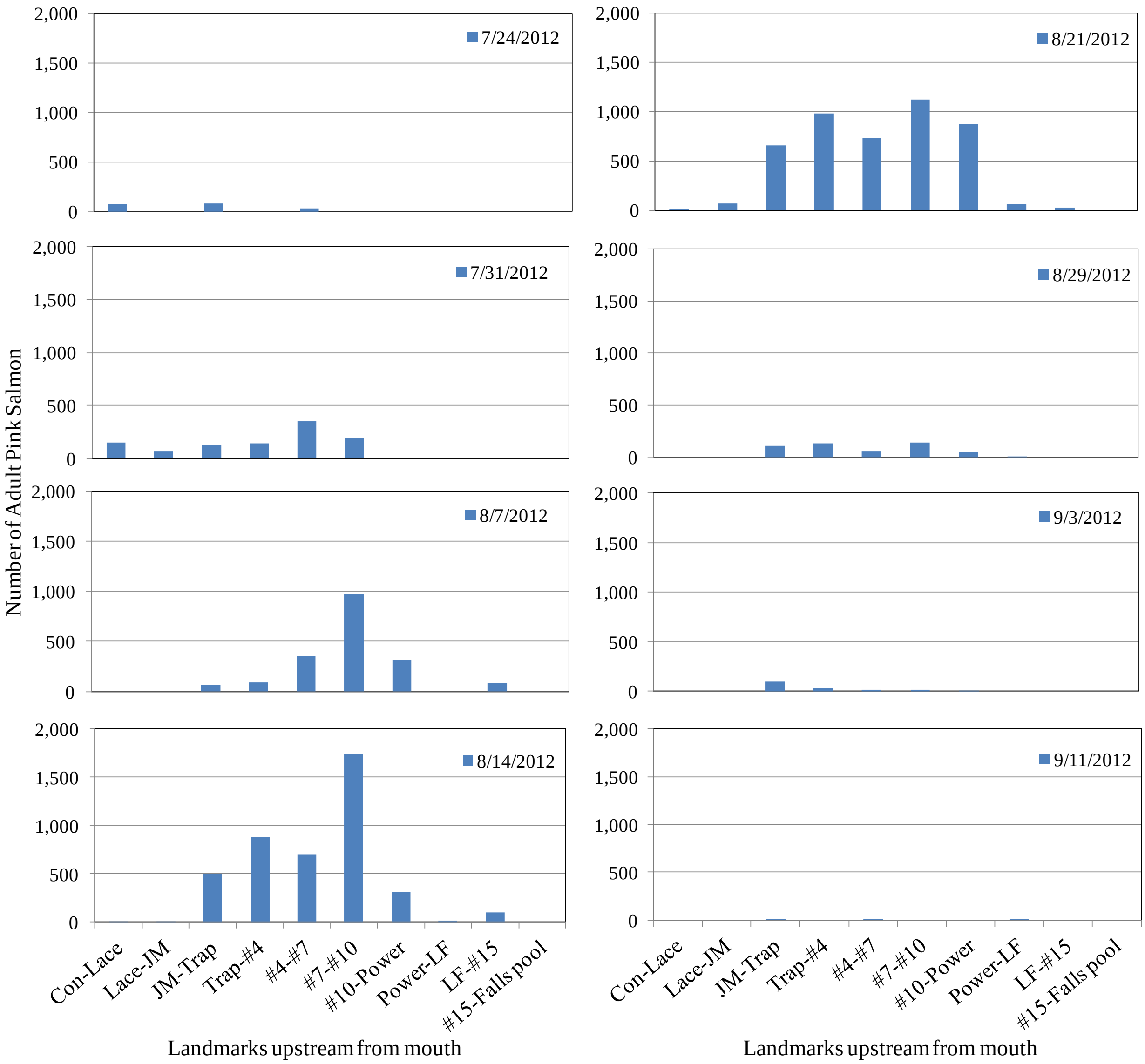

Figure 52.–Lower Johnson Creek adult pink salmon distribution.

Upper Johnson Creek

Benthic Macroinvertebrate Composition & Abundance

We collected macroinvertebrate samples in Upper Johnson Creek at 58.8407°N, 135.0450°W, on April 26, 2012. We identified 28 taxa among the six samples, and we estimate the mean number of aquatic benthic macroinvertebrates per m^2 at 3,968 insects, of which 64% are EPT taxa (Figure 53). The Shannon Diversity score is 0.81 and the Evenness score is 0.68. The dominant taxon is Diptera: Chironomidae, representing about 26% of samples.

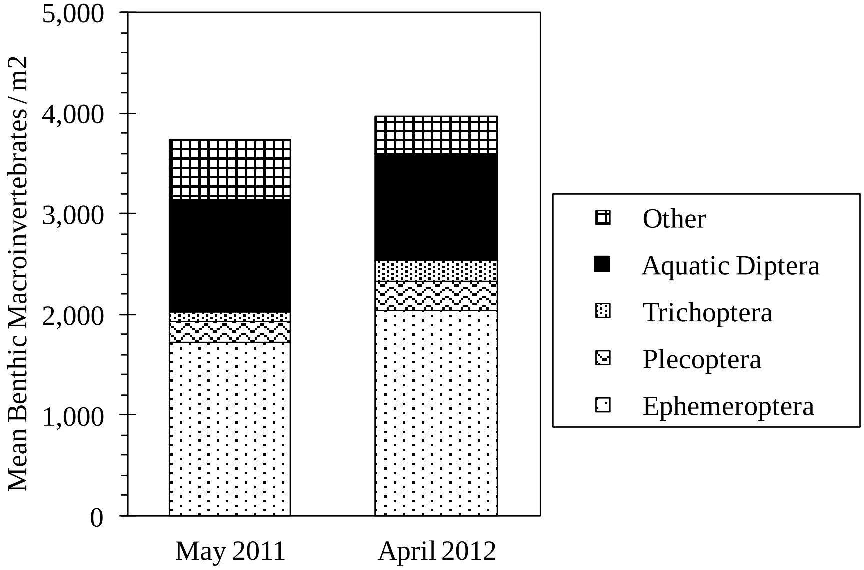

Figure 53.–Upper Johnson Creek benthic macroinvertebrates.

SHERMAN CREEK

Lower Sherman Creek

Periphyton Community Composition & Biomass

We collected periphyton samples in Lower Sherman Creek on July 26, 2012 in two locations; Sample Point 1 at 58.8687°N, 135.1414°W, and Sample Point 2 at 58.8672°N, 135.1376°W. Tables 9 and 10 show the average concentration of chlorophylls *a*, *b*, and *c* (mg/m^2) in the samples. The 2011 and 2012 proportion of chlorophylls *a*, *b*, and *c* are shown in Figures 54 and 55.

Table 9.–Lower Sherman Creek Sample Point 1 chlorophylls *a*, *b*, and *c* mean densities.

Sample Date	Chlorophyll *a* (mg/m^2)	Chlorophyll *b* (mg/m^2)	Chlorophyll *c* (mg/m^2)
July 26, 2012	2.54	0.93	0.08

Table 10.–Lower Sherman Creek Sample Point 2 chlorophylls *a*, *b*, and *c* mean densities.

Sample Date	Chlorophyll *a* (mg/m^2)	Chlorophyll *b* (mg/m^2)	Chlorophyll *c* (mg/m^2)
July 26, 2012	0.67	0.01	0.09

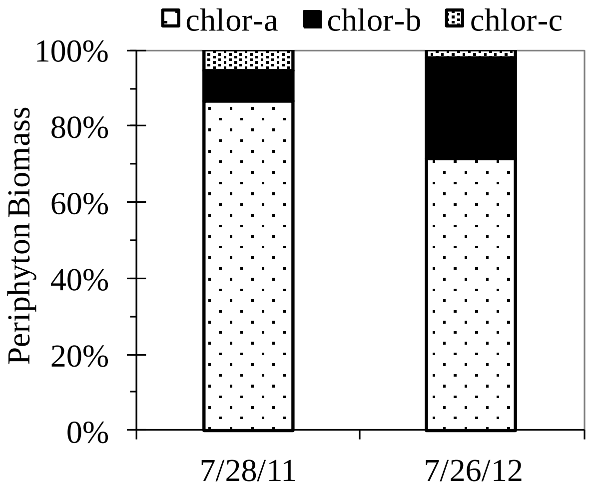

Figure 54.–Lower Sherman Creek Sample Point 1 chlorophylls *a, b,* and *c* proportion.

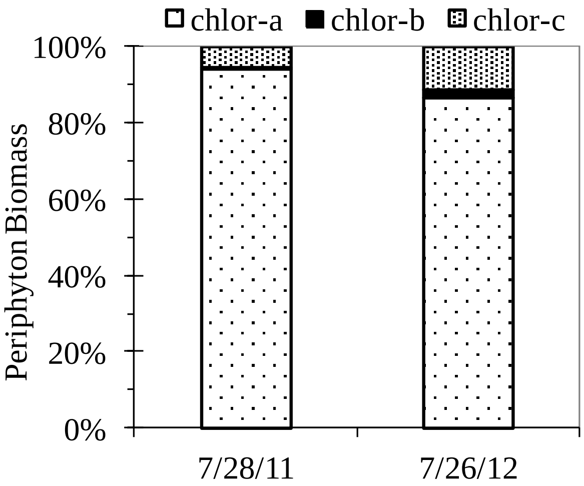

Figure 55.–Lower Sherman Creek Sample Point 2 chlorophylls *a*, *b*, and *c* proportion.

Lower Sherman Creek Sample Points 1 and 2 algal biomass, estimated by the chlorophyll *a* concentration in each sample, is shown in Figures 56 and 57.

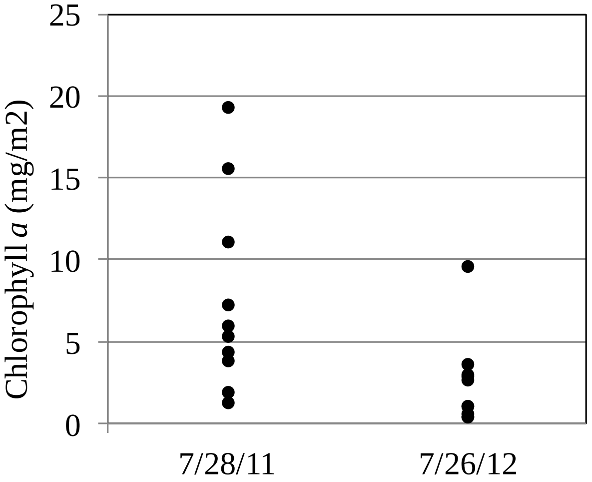

Figure 56.–Lower Sherman Creek Sample Point 1 chlorophyll *a* densities.

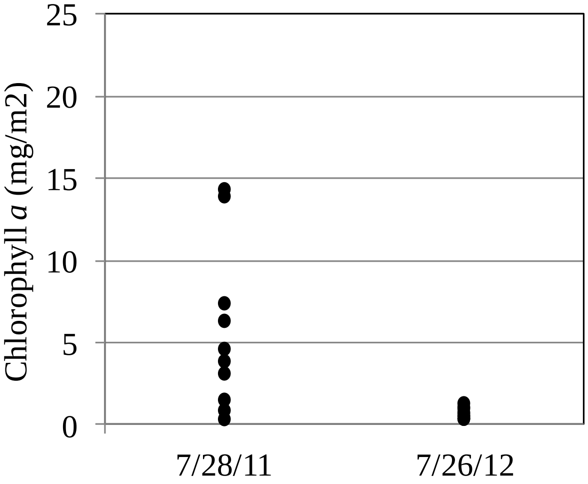

Figure 57.–Lower Sherman Creek Sample Point 2 chlorophyll *a* densities.

Benthic Macroinvertebrate Composition & Abundance

Sherman Creek Sample Point 1

We collected macroinvertebrate samples in Lower Sherman Creek at Sample Point 1, 58.8688°N, 135.1412°W, on April 30, 2012. We identified 31 taxa among the six samples, and we estimate the mean number of aquatic benthic macroinvertebrates per m^2 at 2,733 insects, of which 66% are EPT taxa (Figure 58). The Shannon Diversity score is 0.74 and the Evenness score is 0.62. The dominant taxon is Ephemeroptera: Baetidae, representing 44% of samples.

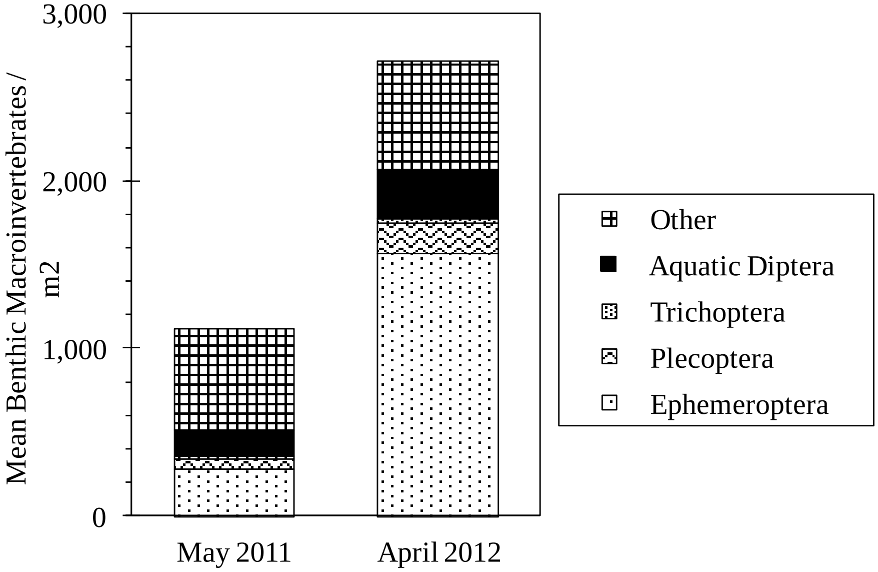

Figure 58.–Lower Sherman Creek Sample Point 1 benthic macroinvertebrates.

Sherman Creek Sample Point 2

We collected macroinvertebrate samples in Lower Sherman Creek at Sample Point 2, 58.8674°N, 135.1381°W, on April 30, 2012. We identified 37 taxa among the six samples, and we estimate the mean number of aquatic benthic macroinvertebrates per m^2 at 2,823 insects, of which 79% are EPT taxa (Figure 59). The Shannon Diversity score is 0.70 and the Evenness score is 0.57. The dominant taxon is Ephemeroptera: Baetidae, representing 57% of samples.

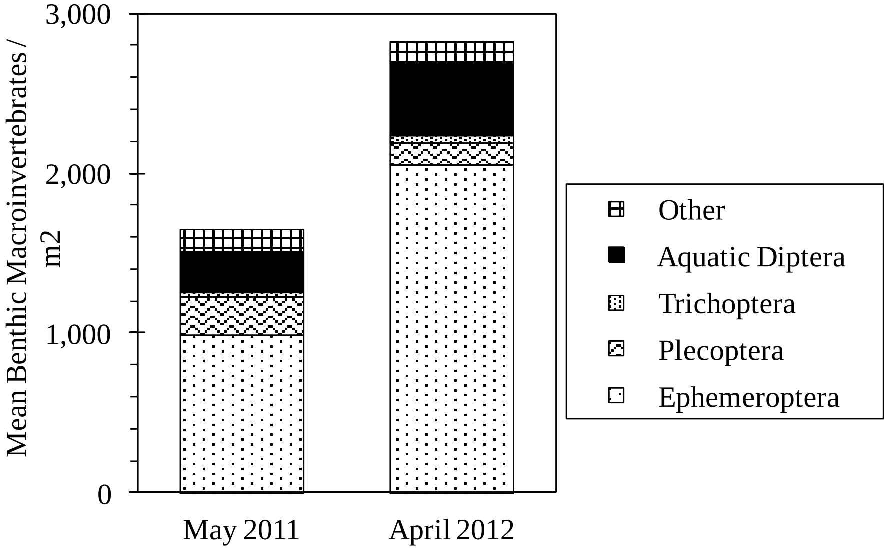

Figure 59.–Lower Sherman Creek Sample Point 2 benthic macroinvertebrates.

Sediment Metals Concentrations

We collected sediments in Lower Sherman Creek at 58.8687°N, 135.1413°W on July 3, 2012. We shipped the samples to the AECOM Environmental Toxicology laboratory in Fort Collins, Colorado for analyses on July 19, 2012. We received the laboratory results on September 27, 2012.

The 2012 Ag concentration is twice that of 2011 though still similar to 2005–2010 (Flory 2011). The concentrations of the other elements are similar to 2011. Lower Sherman Creek sediment metals concentrations are shown in Figure 60. We include tables with 2011 and 2012 sediment composition, metals and semi metals data and the 2012 AECOM laboratory report for Lower Sherman Creek[y] in Appendix E.

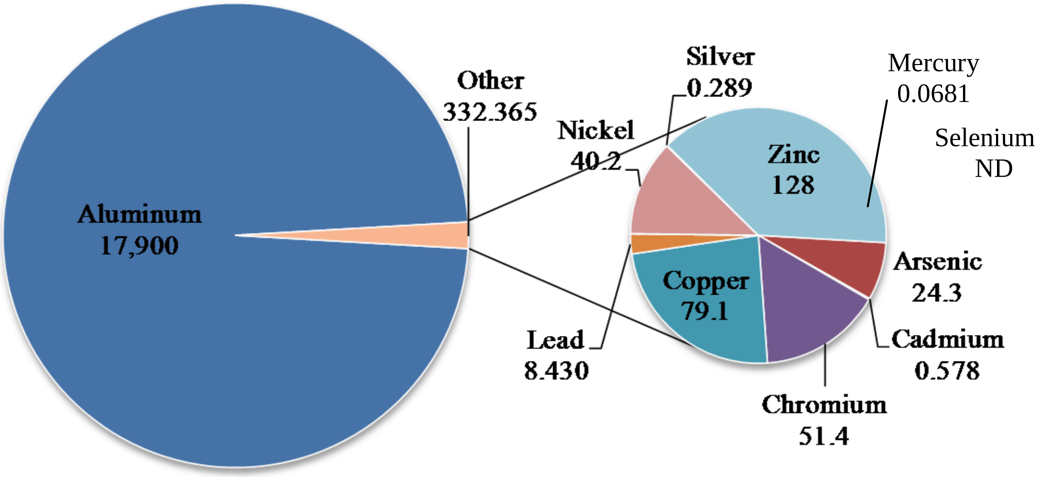

Figure 60.–Lower Sherman Creek sediment metals concentrations.

Note: 2012 data presented in parts per million (mg/kg).

Sediment Toxicity

There are no statistical differences in growth or survival of *Chironomus dilutus* or *Hyalella azteca* on the Lower Sherman Creek sediment sample compared to the control. We include the laboratory report in Appendix E.

Adult Salmon Counts

We surveyed Lower Sherman Creek for adult chum salmon and pink salmon between July 16 and September 18, 2012.

Figure 61 presents our adult pink salmon count for each survey in Lower Sherman Creek, and Figure 62 presents the distribution of pink salmon by section. We estimate the 2012 adult pink salmon return at 804 fish, less than estimates reported for the previous three years and similar to the 2006 and 2008 estimates (Flory 2011, Timothy and Kanouse 2012).

We did not observe live adult chum and coho salmon or any carcasses.

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[y] We also provide this information for Middle Sherman Creek in Appendix E, though the information is not required in the APDES permit.

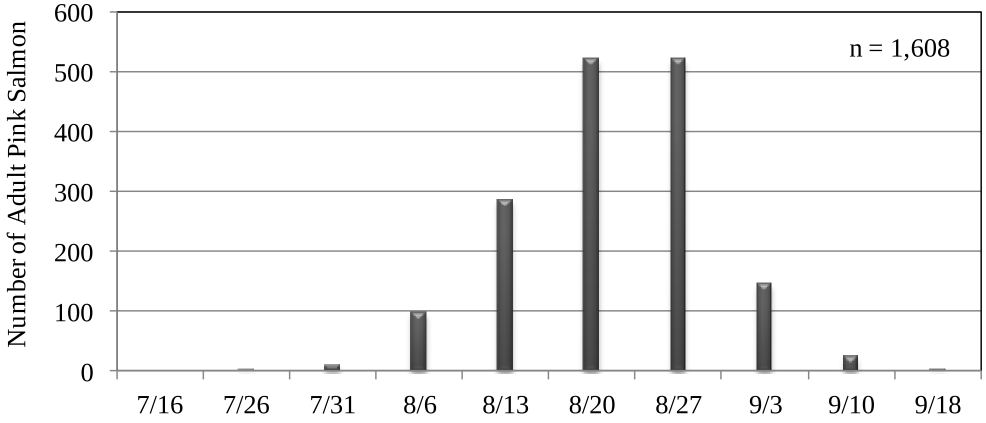

Figure 61.–Lower Sherman Creek adult pink salmon counts.

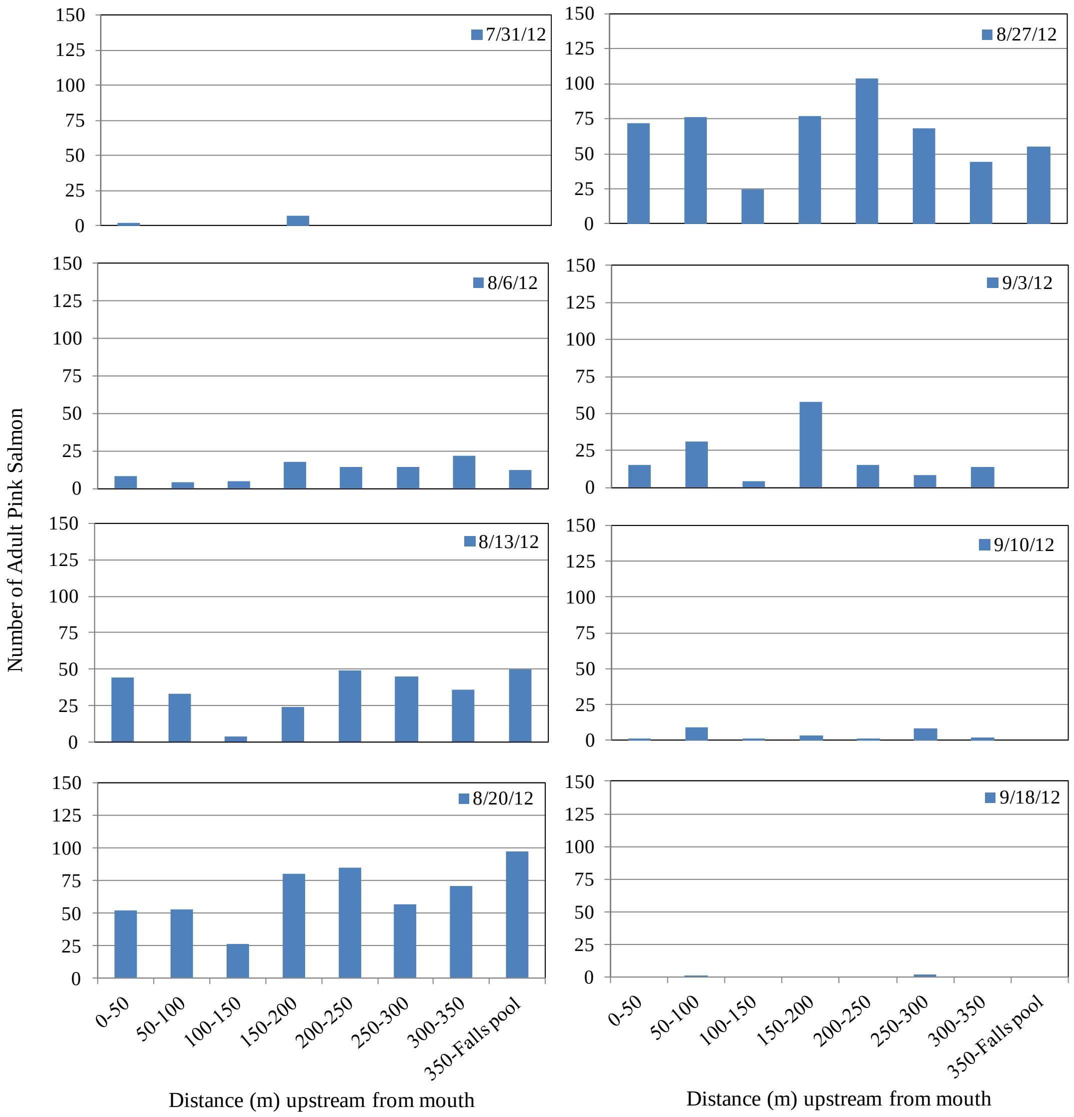

Figure 62.–Lower Sherman Creek adult pink salmon distribution.

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[z] This publication is actually the resident fish survey report.

[aa] This publication is actually the invertebrate tissue analysis.

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[bb] Actually published February 2010.

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APPENDIX A: PERIPHYTON DATA

Appendix A.—Periphyton data for samples collected near Kensington Gold Mine, 2011–2012.

	July 2011			October 2011			February 2012			April/May 2012		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
Upper Slate Creek												
	-	0.00	0.00	6.62	0.00	0.25	0.32	0.00	0.02	0.96	0.00	0.10
	0.32	0.00	0.04	0.46	0.00	0.02	0.75	0.00	0.06	0.53	0.00	0.01
	0.96	0.01	0.07	0.75	0.00	0.05	0.33	0.00	0.02	0.83	0.00	0.05
	0.11	0.00	0.00	0.53	0.00	0.04	1.14	0.00	0.01	**0.34**	-	-
	2.67	0.00	0.26	0.55	0.00	0.02	**0.07**	-	-	**0.34**	-	-
	-	0.00	0.00	1.47	0.00	0.03	1.15	0.00	0.04	0.45	0.01	0.04
	0.60	0.00	0.12	0.14	0.01	0.05	1.71	0.00	0.10	**0.34**	-	-
	1.14	0.00	0.01	-	0.00	0.15	0.21	0.00	0.03	0.60	0.00	0.02
	0.53	0.00	0.00	0.64	0.00	0.11	**0.07**	-	-	**0.34**	-	-
	0.60	0.00	0.02	-	-	-	0.64	0.00	0.01	2.24	0.00	0.15
mean	0.87	0.00	0.05	1.40	0.00	0.08	0.64	0.00	0.04	0.70	0.00	0.06
max	2.67	0.01	0.26	6.62	0.01	0.25	1.71	0.00	0.10	2.24	0.01	0.15
min	0.11	0.00	0.00	0.14	0.00	0.02	0.07	0.00	0.01	0.34	0.00	0.01
East Fork Slate Creek												
	9.51	2.16	0.24	18.90	7.97	1.11	0.53	0.00	0.00	7.80	0.74	0.34
	9.18	0.02	0.20	10.68	1.30	0.36	0.96	0.11	0.00	**0.34**	-	-
	1.28	0.03	0.00	2.99	0.79	0.12	1.34	0.37	0.09	5.23	0.00	0.16
	5.13	1.15	0.11	6.73	1.88	0.64	-	0.03	0.00	4.81	1.56	0.19
	16.02	0.18	0.44	22.53	5.43	0.99	1.07	0.09	0.00	7.48	0.00	0.50
	8.86	1.94	0.70	-	-	-	0.50	0.08	0.00	1.33	0.00	0.08
	4.70	0.70	0.13	-	-	-	6.41	2.04	0.09	2.78	0.00	0.09
	16.13	5.35	0.28	-	-	-	**0.07**	-	-	4.59	0.00	0.33
	4.91	0.49	0.12	-	-	-	5.55	1.44	0.19	4.59	0.00	0.17
	12.71	3.59	0.15	-	-	-	1.92	0.14	0.07	9.72	0.00	0.47
mean	8.84	1.56	0.24	12.37	3.47	0.64	2.04	0.48	0.05	4.87	0.26	0.26
max	16.13	5.35	0.70	22.53	7.97	1.11	6.41	2.04	0.19	9.72	1.56	0.50
min	1.28	0.02	0.00	2.99	0.79	0.12	0.07	0.00	0.00	0.34	0.00	0.08
West Fork Slate Creek												
	2.52	0.00	0.19	-	-	-	-	-	-	-	-	-
	4.70	0.00	0.43	-	-	-	-	-	-	-	-	-
	2.78	0.00	0.26	-	-	-	-	-	-	-	-	-
	3.35	0.00	0.04	-	-	-	-	-	-	-	-	-
	4.27	0.00	0.25	-	-	-	-	-	-	-	-	-
	4.91	0.00	0.42	-	-	-	-	-	-	-	-	-
	3.95	0.00	0.27	-	-	-	-	-	-	-	-	-
	3.10	0.00	0.25	-	-	-	-	-	-	-	-	-
	4.38	0.00	0.39	-	-	-	-	-	-	-	-	-
	5.23	0.00	0.20	-	-	-	-	-	-	-	-	-
mean	3.92	0.00	0.27	-	-	-	-	-	-	-	-	-
max	5.23	0.00	0.43	-	-	-	-	-	-	-	-	-
min	2.52	0.00	0.04	-	-	-	-	-	-	-	-	-
Lower Slate Creek												
	0.21	0.05	0.00	6.41	0.00	0.87	2.56	0.01	0.16	0.56	0.00	0.06
	1.28	0.02	0.11	11.85	1.30	0.99	2.46	0.00	0.21	0.46	0.00	0.07
	0.85	0.01	0.07	2.99	0.15	0.13	-	-	-	0.85	0.00	0.10
	3.31	0.08	0.25	2.10	0.00	0.21	2.14	0.04	0.14	0.50	0.00	0.13
	11.85	3.11	0.30	5.23	0.03	0.63	-	-	-	1.32	0.00	0.25
	18.05	0.42	0.91	1.50	0.00	0.18	0.41	0.04	0.04	2.15	0.00	0.20
	-	0.13	0.00	0.32	0.00	0.00	0.90	0.11	0.05	0.41	0.00	0.00
	0.43	0.05	0.00	8.22	0.25	0.77	2.23	0.10	0.10	1.60	0.16	0.13
	8.54	0.39	0.58	2.24	0.00	0.23	3.10	0.00	0.30	1.07	0.00	0.11
	6.30	0.03	0.38	5.87	0.00	0.85	0.00	0.03	0.05	0.69	0.00	0.07
mean	5.65	0.43	0.26	4.67	0.17	0.48	1.72	0.04	0.13	0.96	0.02	0.11
max	18.05	3.11	0.91	11.85	1.30	0.99	3.10	0.11	0.30	2.15	0.16	0.25
min	0.21	0.01	0.00	0.32	0.00	0.00	0.00	0.00	0.04	0.41	0.00	0.00

Note: Bolded values are the spectrophotometer error detection limit, chlor-*a* not detected.

Appendix A.—Page 2 of 3.

	July 2012			October 2012		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
Upper Slate Creek						
	2.03	0.00	0.14	**0.34**	-	-
	0.96	0.00	0.09	0.70	0.00	0.00
	0.75	0.00	0.00	0.84	0.00	0.00
	0.50	0.00	0.03	0.96	0.00	0.10
	2.03	0.00	0.14	2.67	0.00	0.23
	1.07	0.00	0.14	0.37	0.00	0.11
	0.55	0.00	0.02	0.32	0.00	0.01
	1.71	0.00	0.06	0.96	0.00	0.00
	2.14	0.00	0.12	**0.34**	-	-
	0.83	0.00	0.00	**0.34**	-	-
mean	1.26	0.00	0.08	0.78	0.00	0.07
max	2.14	0.00	0.14	2.67	0.00	0.23
min	0.50	0.00	0.00	0.32	0.00	0.00
East Fork Slate Creek						
	11.53	3.24	0.28	0.60	0.00	0.02
	0.41	0.04	0.04	0.73	0.00	0.07
	0.88	0.00	0.05	**0.34**	-	-
	0.50	0.00	0.03	1.50	0.00	0.16
	3.42	0.00	0.11	0.85	0.00	0.03
	0.64	0.08	0.05	0.64	0.00	0.07
	18.58	0.00	0.66	0.75	0.00	0.02
	13.67	2.32	0.57	1.34	0.00	0.02
	0.69	0.00	0.00	0.41	0.00	0.08
	0.43	0.00	0.00	0.64	0.00	0.07
mean	5.08	0.57	0.18	0.78	0.00	0.06
max	18.58	3.24	0.66	1.50	0.00	0.16
min	0.41	0.00	0.00	0.34	0.00	0.02
West Fork Slate Creek						
	1.15	0.00	0.04	-	-	-
	0.41	0.00	0.08	-	-	-
	0.53	0.00	0.02	-	-	-
	0.64	0.00	0.16	-	-	-
	3.62	0.00	0.24	-	-	-
	0.85	0.00	0.14	-	-	-
	0.96	0.01	0.07	-	-	-
	0.41	0.00	0.08	-	-	-
	0.60	0.00	0.12	-	-	-
	0.96	0.00	0.06	-	-	-
mean	1.01	0.00	0.10	-	-	-
max	3.62	0.01	0.24	-	-	-
min	0.41	0.00	0.02	-	-	-
Lower Slate Creek						
	1.60	0.13	0.07	0.96	0.00	0.08
	4.06	0.00	0.39	2.03	0.00	0.21
	2.03	0.00	0.18	0.75	0.00	0.05
	0.96	0.00	0.04	**0.34**	-	-
	2.56	0.04	0.22	1.92	0.00	0.20
	0.92	0.00	0.01	1.42	0.00	0.24
	1.49	0.13	0.13	4.06	0.00	0.33
	2.35	0.12	0.19	0.96	0.00	0.00
	6.19	0.05	0.54	**0.34**	-	-
	0.96	0.00	0.06	**0.34**	-	-
mean	2.31	0.05	0.18	1.31	0.00	0.16
max	6.19	0.13	0.54	4.06	0.00	0.33
min	0.92	0.00	0.01	0.34	0.00	0.00

Note: Bolded values are the spectrophotometer error detection limit, chlor-*a* not detected.

Appendix A.—Page 3 of 3.

	July 2011			July 2012		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
Sherman Creek Sample Site 1						
	1.28	0.00	0.05	1.07	0.00	0.14
	5.34	0.00	0.36	2.88	0.87	0.16
	5.98	0.00	0.54	0.41	0.04	0.04
	3.84	0.10	0.48	2.67	1.27	0.00
	15.59	3.98	0.17	0.60	0.00	0.12
	11.11	2.64	0.28	1.07	0.00	0.11
	19.33	0.00	1.65	3.63	1.56	0.03
	7.26	0.00	0.74	9.61	4.12	0.08
	1.92	0.04	0.19	2.99	1.43	0.02
	4.38	0.17	0.44	0.43	0.00	0.06
mean	7.60	0.69	0.49	2.54	0.93	0.08
max	19.33	3.98	1.65	9.61	4.12	0.16
min	1.28	0.00	0.05	0.41	0.00	0.00
Sherman Creek Sample Site 2						
	3.10	0.00	0.26	1.05	0.04	0.12
	6.30	0.19	0.62	0.64	0.00	0.11
	4.59	0.00	0.38	0.73	0.00	0.07
	0.32	0.00	0.00	0.50	0.07	0.10
	13.88	0.00	0.54	**0.34**	-	-
	7.37	0.00	0.46	0.51	0.00	0.06
	1.50	0.00	0.09	0.96	0.00	0.16
	14.31	0.00	0.59	0.37	0.00	0.00
	0.85	0.00	0.01	1.28	0.00	0.09
	3.84	0.00	0.25	**0.34**	-	-
mean	5.61	0.02	0.32	0.67	0.01	0.09
max	14.31	0.19	0.62	1.28	0.07	0.16
min	0.32	0.00	0.00	0.34	0.00	0.00

Note: Bolded values are the spectrophotometer error detection limit, chlor-*a* not detected.

APPENDIX B: BENTHIC MACROINVERTEBRATE DATA

Appendix B.—Benthic macroinvertebrate data for samples collected near Kensington Gold Mine, 2011-2012.

Lower Slate Creek Benthic Macroinvertebrate Sample Data			
	May 2011	Feb 2012	May 2012
Total Aquatic Invert Taxa Counted	29	30	32
Total Ephemeroptera	85	213	387
Total Plecoptera	70	297	274
Total Trichoptera	2	15	8
Total Aquatic Diptera	862	422	975
Total Other	129	421	116
% Ephemeroptera	7%	16%	22%
% Plecoptera	6%	22%	16%
% Trichoptera	0%	1%	1%
% Aquatic Diptera	75%	31%	55%
% Other	11%	31%	7%
% EPT	14%	38%	38%
% Chironomidae	72%	29%	53%
% Dominant Aquatic Taxon	72%	41%	53%
Total Aquatic Inverts Counted	1148	1368	1760
Total Terrestrial Inverts Counted	0	1	4
Total Inverts Counted	1148	1369	1764
% Sample Aquatic	100%	100%	100%
% Sample Terrestrial	0%	0%	0%
Sample Size (m^2)	0.093	0.093	0.093
Mean # Aquatic Inverts / Sample	191	228	293
1 StDev	97	88	172
Estimated Mean # Aquatic Inverts / m^2	2057	2452	3154
1 StDev	1046	944	1849
Juvenile Fish	1	0	0

East Fork Slate Creek Benthic Macroinvertebrate Sample Data			
	May 2011	Feb 2012	April 2012
Total Aquatic Invert Taxa Counted	27	33	33
Total Ephemeroptera	387	1069	490
Total Plecoptera	70	194	73
Total Trichoptera	28	44	23
Total Aquatic Diptera	507	1427	547
Total Other	1624	3238	1451
% Ephemeroptera	15%	18%	19%
% Plecoptera	3%	3%	3%
% Trichoptera	1%	1%	1%
% Aquatic Diptera	19%	24%	21%
% Other	62%	54%	56%
% EPT	19%	22%	23%
% Chironomidae	17%	20%	15%
% Dominant Aquatic Taxon	55%	46%	45%
Total Aquatic Inverts Counted	2616	5972	2585
Total Terrestrial Inverts Counted	3	0	1
Total Inverts Counted	2619	5972	2586
% Sample Aquatic	100%	100%	100%
% Sample Terrestrial	0%	0%	0%
Sample Size (m^2)	0.093	0.093	0.093
Mean # Aquatic Inverts / Sample	436	995	431
1 StDev	101	699	123
Estimated Mean # Aquatic Inverts / m^2	4688	10703	4633
1 StDev	1081	7521	1325
Juvenile Fish	0	0	0

Appendix B.—Page 2 of 4.

West Fork Slate Creek Benthic Macroinvertebrate Sample Data		
	May 2011	May 2012
Total Aquatic Invert Taxa Counted	21	31
Total Ephemeroptera	181	634
Total Plecoptera	41	166
Total Trichoptera	3	11
Total Aquatic Diptera	35	175
Total Other	20	29
% Ephemeroptera	65%	63%
% Plecoptera	15%	16%
% Trichoptera	1%	1%
% Aquatic Diptera	13%	17%
% Other	7%	3%
% EPT	80%	80%
% Chironomidae	10%	15%
% Dominant Aquatic Taxon	39%	37%
Total Aquatic Inverts Counted	280	1015
Total Terrestrial Inverts Counted	2	0
Total Inverts Counted	282	1015
% Sample Aquatic	99%	100%
% Sample Terrestrial	1%	0%
Sample Size (m^2)	0.093	0.093
Mean # Aquatic Inverts / Sample	47	169
1 StDev	38	94
Estimated Mean # Aquatic Inverts / m^2	502	1819
1 StDev	410	1009
Juvenile Fish	0	0

Upper Slate Creek Benthic Macroinvertebrate Sample Data		
	May 2011	April 2012
Total Aquatic Invert Taxa Counted	33	39
Total Ephemeroptera	368	454
Total Plecoptera	401	349
Total Trichoptera	116	48
Total Aquatic Diptera	248	273
Total Other	275	135
% Ephemeroptera	26%	36%
% Plecoptera	29%	28%
% Trichoptera	8%	4%
% Aquatic Diptera	18%	22%
% Other	20%	11%
% EPT	63%	68%
% Chironomidae	15%	20%
% Dominant Aquatic Taxon	20%	24%
Total Aquatic Inverts Counted	1408	1259
Total Terrestrial Inverts Counted	1	0
Total Inverts Counted	1409	1259
% Sample Aquatic	100%	100%
% Sample Terrestrial	0%	0%
Sample Size (m^2)	0.093	0.093
Mean # Aquatic Inverts / Sample	235	210
1 StDev	109	123
Estimated Mean # Aquatic Inverts / m^2	2523	2256
1 StDev	1173	1321
Juvenile Fish	0	0

Appendix B.—Page 3 of 4.

Upper Johnson Creek Benthic Macroinvertebrate Sample Data	May 2011	April 2012
Total Aquatic Invert Taxa Counted	24	28
Total Ephemeroptera	962	1139
Total Plecoptera	114	163
Total Trichoptera	59	118
Total Aquatic Diptera	619	586
Total Other	330	208
% Ephemeroptera	46%	51%
% Plecoptera	6%	7%
% Trichoptera	3%	5%
% Aq. Diptera	30%	27%
% Other	16%	9%
% EPT	55%	64%
% Chironomidae	29%	26%
% Dominant Aquatic Taxon	37%	34%
Total Aquatic Inverts Counted	2084	2214
Total Terrestrial Inverts Counted	1	1
Total Inverts Counted	2085	2215
% Sample Aquatic	100%	100%
% Sample Terrestrial	0%	0%
Sample Size (m^2)	0.093	0.093
Mean # Aquatic Inverts / Sample	347	369
1 StDev	178	214
Estimated Mean # Aquatic Inverts / m^2	3735	3968
1 StDev	1918	2305
Juvenile Fish	0	0

Appendix B.—Page 4 of 4.

Sherman Creek Sample Point 1 Benthic Macroinvertebrate Sample Data	May 2011	April 2012
Total Aquatic Invert Taxa Counted	26	31
Total Ephemeroptera	157	876
Total Plecoptera	36	103
Total Trichoptera	7	14
Total Aquatic Diptera	89	160
Total Other	335	363
% Ephemeroptera	25%	58%
% Plecoptera	6%	7%
% Trichoptera	1%	1%
% Aquatic Diptera	14%	11%
% Other	54%	24%
% EPT	32%	66%
% Chironomidae	6%	8%
% Dominant Aquatic Taxon	53%	45%
Total Aquatic Inverts Counted	624	1525
Total Terrestrial Inverts Counted	1	0
Total Inverts Counted	625	1525
% Sample Aquatic	100%	100%
% Sample Terrestrial	0%	0%
Sample Size (m^2)	0.093	0.093
Mean # Aquatic Inverts / Sample	104	254
1 StDev	93	131
Estimated Mean # Aquatic Inverts / m^2	1118	2733
1 StDev	1000	1410
Juvenile Fish	10	12

Sherman Creek Sample Point 2 Benthic Macroinvertebrate Sample Data	May 2011	April 2012
Total Aquatic Invert Taxa Counted	30	37
Total Ephemeroptera	548	1143
Total Plecoptera	137	77
Total Trichoptera	14	26
Total Aquatic Diptera	143	254
Total Other	79	75
% Ephemeroptera	60%	73%
% Plecoptera	15%	5%
% Trichoptera	2%	2%
% Aquatic Diptera	16%	16%
% Other	9%	5%
% EPT	76%	79%
% Chironomidae	11%	15%
% Dominant Aquatic Taxon	30%	57%
Total Aquatic Inverts Counted	921	1575
Total Terrestrial Inverts Counted	1	2
Total Inverts Counted	922	1575
% Sample Aquatic	100%	100%
% Sample Terrestrial	0%	0%
Sample Size (m^2)	0.093	0.093
Mean # Aquatic Inverts / Sample	154	263
1 StDev	86	109
Estimated Mean # Aquatic Inverts / m^2	1651	2823
1 StDev	927	1174
Juvenile Fish	0	0

APPENDIX C: RESIDENT FISH POPULATION AND CONDITION DATA

Table C1.—East Fork and Upper Slate Creek resident fish capture data and population estimates by reach near Kensington Gold Mine, 2011–2012.

				Number of Fish Captured							
Site	Year	Species	FL (mm)	Set 1	Set 2	Set 3	Total	MLE	95% CI	Precision	Power
East Fork Slate Creek	2011	DV	105-140	6	2	2	10	40	---	n/a	---
	2012	DV	165-175	2	1	2	5	20	---	n/a	n/a
Upper Slate Creek	2011	DV	35-145	14	12	2	28	120	104-136	13%	---
	2012	DV	60-164	23	14	6	43	192	156-228	17%	0.44

Note*:* Precision and power of the East Fork Slate Creek population estimates could not calculated due to small sample size.

Table C2.—East Fork and Upper Slate Creek resident fish capture data and population estimates by habitat type and by reach near Kensington Gold Mine, 2011–2012.

			Habitat	Number of Fish Captured					
Site	Year	Species	Type	Set 1	Set 2	Set 3	Total	MLE	95% CI
East Fork Slate Creek	2011	DV	Riffle	3	0	0	3	12	---
East Fork Slate Creek	2011	DV	Pool	3	1	2	6	24	---
East Fork Slate Creek	2011	DV	Glide	0	1	0	1	4	---
East Fork Slate Creek	2012	DV	Riffle	0	0	1	1	4	---
East Fork Slate Creek	2012	DV	Pool	2	1	1	4	16	---
East Fork Slate Creek	2012	DV	Glide	0	0	0	0	0	---
Upper Slate Creek	2011	DV	Riffle	2	2	0	4	16	---
Upper Slate Creek	2011	DV	Pool	11	9	1	22	88	76-100
Upper Slate Creek	2011	DV	Glide	1	1	1	3	12	---
Upper Slate Creek	2012	DV	Riffle	2	4	4	10	40	---
Upper Slate Creek	2012	DV	Pool	20	3	2	25	100	100-100
Upper Slate Creek	2012	DV	Glide	1	7	0	8	36	---

Table C3.—Fork length, weight and mean condition factor (K) of resident fish captured in East Fork and Upper Slate Creek near Kensington Gold Mine, 2011–2012.

East Slate Creek				
Pass #	Species	FL (mm)	Weight (g)	K
1	DV	166	58.2	1.27
1	DV	165	n/a	n/a
2	DV	165	44.5	0.99
3	DV	165	46.4	1.03
3	DV	175	55.6	1.04
			Mean K =	1.08

Upper Slate Creek				
Pass #	Species	FL (mm)	Weight (g)	K
1	DV	94	9.1	1.10
1	DV	96	9.7	1.10
1	DV	105	15.6	1.35
1	DV	97	13.9	1.52
1	DV	100	10.2	1.02
1	DV	86	6.35	1.00
1	DV	87	6.5	0.99
1	DV	92	8	1.03
1	DV	155	36.5	0.98
1	DV	96	8.8	0.99
1	DV	65	2.6	0.95
1	DV	68	2.9	0.92
1	DV	65	2.7	0.98
1	DV	66	3.7	1.29
1	DV	68	3.6	1.14
1	DV	66	2.3	0.80
1	DV	72	3.8	1.02
1	DV	71	2.7	0.75
1	DV	69	2.4	0.73
1	DV	68	3.1	0.99
1	DV	65	2	0.73
1	DV	70	3.4	0.99
1	DV	60	2.3	1.06
2	DV	134	23.9	0.99
2	DV	124	17	0.89
2	DV	114	12.6	0.85
2	DV	115	16	1.05
2	DV	90	6.7	0.92
2	DV	112	14.2	1.01
2	DV	118	15.7	0.96
2	DV	62	2.5	1.05
2	DV	60	2.1	0.97
2	DV	60	2.2	1.02
2	DV	60	2	0.93
2	DV	65	2.8	1.02
2	DV	70	2.7	0.79
2	DV	70	2.7	0.79
3	DV	164	43.4	0.98
3	DV	113	10.6	0.73
3	DV	70	3.8	1.11
3	DV	102	12.4	1.17
3	DV	98	9.8	1.04
3	DV	80	5.2	1.02
			Mean K =	0.99

APPENDIX D: RESIDENT FISH METALS CONCENTRATIONS LAB REPORT

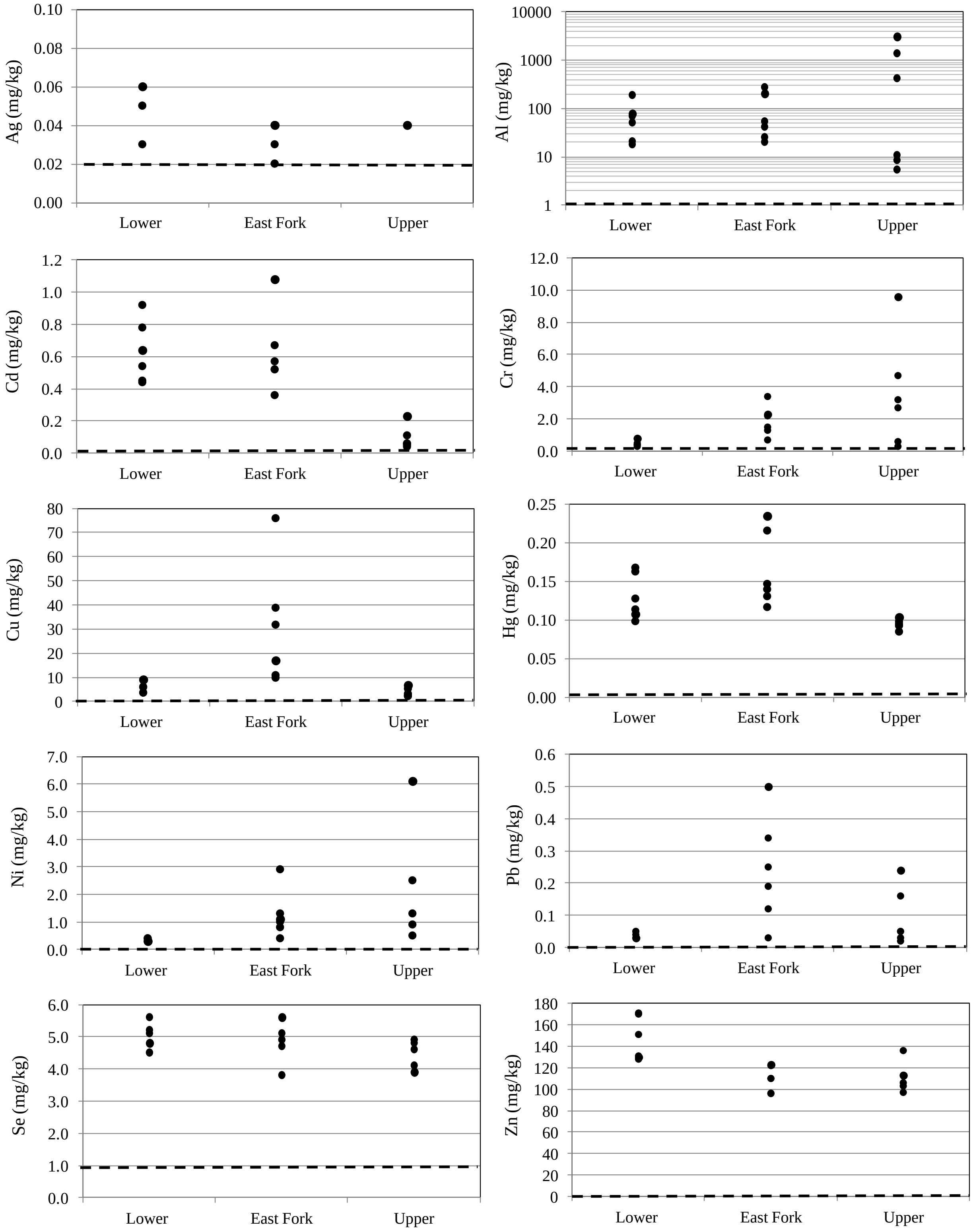

Figure D1.—Whole body metals concentrations for Dolly Varden char collected in Lower, East Fork, and Upper Slate Creek near Kensington Gold Mine in 2012.

Table D1.—Whole body metals concentrations data for Dolly Varden char collected in Lower, East Fork, and Upper Slate Creek near Kensington Gold Mine, 2011–2012.

Date Collected	Sample Site	FL (mm)	Mass (g)	Ag (mg/kg)	Al (mg/kg)	Cd (mg/kg)	Cr (mg/kg)	Cu (mg/kg)	Hg (mg/kg)	Ni (mg/kg)	Pb (mg/kg)	Se (mg/kg)	Zn (mg/kg)
	Method Reporting Limit			0.02	2.0	0.02	0.2	0.10	0.005	0.2	0.02	1.0	0.5
10/11/11	Lower Slate Creek	110-130	14.9-23.2	0.05	2430.0	0.72	17.3	15.5	0.0674	6.2	0.50	3.8	195
8/20/12	Lower Slate Creek	95	7.7	ND	50.9	0.45	0.5	3.5	0.167	0.3	0.05	5.6	128
8/20/12	Lower Slate Creek	115	15.5	0.06	78.0	0.64	0.8	9.0	0.107	0.3	0.03	4.8	130
8/20/12	Lower Slate Creek	110	14.2	0.05	20.8	0.54	0.4	6.0	0.162	ND	0.03	4.5	171
8/20/12	Lower Slate Creek	115	17.6	0.05	69.3	0.78	0.4	8.9	0.113	0.4	0.03	5.1	170
8/20/12	Lower Slate Creek	90	9.6	ND	18.0	0.44	0.3	3.6	0.0977	ND	0.04	4.5	131
8/20/12	Lower Slate Creek	105	12.7	0.03	189	0.92	0.8	5.8	0.127	0.4	0.05	5.2	151
9/13/11	East Fork Slate Creek	115-125	13.4-19.5	0.02	46.3	1.99	1.3	14.6	0.107	1.1	0.04	4.6	133
8/1/12	East Fork Slate Creek	166	58.2	0.04	53.8	0.57	1.5	75.8	0.130	1.0	0.03	5.1	96.3
8/1/12	East Fork Slate Creek	165	44.5	0.04	204	1.08	2.3	16.9	0.234	1.1	0.50	5.6	123
8/1/12	East Fork Slate Creek	165	46.4	0.02	20.2	0.52	0.7	10.8	0.116	0.4	0.12	4.9	95.9
8/1/12	East Fork Slate Creek	175	55.6	0.04	25.4	0.67	1.3	31.7	0.215	0.8	0.19	4.9	110
8/1/12	East Fork Slate Creek	163	56.4	0.02	275	0.52	3.4	9.7	0.146	2.9	0.25	4.7	122
8/1/12	East Fork Slate Creek	165	62.7	0.03	41.6	0.36	2.2	38.7	0.139	1.3	0.34	3.8	110
8/10/11	Upper Slate Creek	55-125	5-21.6	ND	1630	0.14	13.5	11.3	0.112	5.5	0.20	4.4	115
8/2/12	Upper Slate Creek	94	9.1	ND	1380	0.11	4.7	5.2	0.0919	2.5	0.16	4.8	103
8/2/12	Upper Slate Creek	96	9.7	0.04	3080	0.23	9.6	6.7	0.103	6.1	0.24	3.9	113
8/2/12	Upper Slate Creek	105	15.6	ND	421	0.06	2.7	3.1	0.0938	0.9	0.05	4.6	106
8/2/12	Upper Slate Creek	97	13.9	ND	5.4	0.05	0.6	2.1	0.102	ND	0.02	4.9	97.0
8/2/12	Upper Slate Creek	100	10.2	ND	10.8	0.04	0.3	2.2	0.0972	0.5	0.03	4.1	113
8/2/12	Upper Slate Creek	86	6.5	ND	8.5	0.06	3.2	2.6	0.0842	1.3	0.05	4.9	136

November 8, 2012 Analytical Report for Service Request No: K1209738

Ben Brewster
Alaska Department of Fish and Game
Division of Habitat
P.O. Box 110024
Juneau, AK 99811

RE: Kensington Gold Mine Whole Fish Analysis/Coeur Alaska Mining Company

Dear Ben:

Enclosed are the results of the samples submitted to our laboratory on September 28, 2012. For your reference, these analyses have been assigned our service request number K1209738.

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. dba ALS Environmental (ALS) 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 3363. You may also contact me via Email at Lisa.Domenighini@alsglobal.com.

Respectfully submitted,

Columbia Analytical Services, Inc. dba ALS Environmental

Lisa and Domenighini

Lisa Domenighini
Project Manager

LD/jw

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 4.2 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 4.2 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 4.2 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. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2286
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L12-28
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Georgia DNR	http://www.gaepd.org/Documents/techguide_pcb.html#cel	881
Hawaii DOH	Not available	-
Idaho DHW	http://www.healthandwelfare.idaho.gov/Health/Labs/CertificationDrinkingWaterLabs/tabid/1833/Default.aspx	-
Indiana DOH	http://www.in.gov/isdh/24859.htm	C-WA-01
ISO 17025	http://www.pjlabs.com/	L12-27
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	3016
Louisiana DHH	Not available	LA110003
Maine DHS	Not available	WA0035
Michigan DEQ	http://www.michigan.gov/deq/0,1607,7-135-3307_4131_4156---,00.html	9949
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-368
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA35
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
New Mexico ED	http://www.nmenv.state.nm.us/dwb/Index.htm	-
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA200001
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	4704427-08-TX
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C1203
Wisconsin DNR	http://dnr.wi.gov/	998386840
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.caslab.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.caslab.com or at the accreditation bodies web site

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

ALS ENVIRONMENTAL

Client:	Alaska Department of Fish and Game	**Service Request No.:**	K1209738
Project:	Coeur Alaska Mining Company	**Date Received:**	9/28/12-10/9/12
Sample Matrix:	Tissue		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. 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: Matrix/Duplicate Matrix Spike (MS/DMS), and Laboratory/Duplicate Laboratory Control Sample (LCS/DLCS).

Sample Receipt

Eighteen tissue samples were received for analysis at ALS Environmental on 9/28/12-10/9/12. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4ºC and frozen at –20ºC upon receipt at the laboratory.

Total Metals

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) for the replicate analysis of Aluminum in sample East Fork Slate Creek #1 was outside the project specified control limits. 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____

Columbia Analytical Services℠
An Employee - Owned Company

CHAIN OF CUSTODY

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

SR#: K1209738

PAGE 1 OF 1 COC #: ____

PROJECT NAME: Kensington Gold Mine Whole Fish Analysis
PROJECT NUMBER: Coeur Alaska Mining Company
PROJECT MANAGER: Kate Kanouse / ADFG / Habitat
COMPANY/ADDRESS: Alaska Dept. Fish and Game
802 West 3rd St.
CITY/STATE/ZIP: Juneau AK, 99801
E-MAIL ADDRESS: benjamin.brewster@alaska.gov
PHONE #: 907-465-6160
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☐	Hydrocarbons (*see below) Gas☐ Diesel☐ Oil☐ 8021☐ BTEX☐	☐ 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, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, Total-P, TKN, TOC, DOC (circle) NO2+NO3	TOX 9020☐ AOX 1650☐ 506☐	Total Mercury 1631				REMARKS
See attached list				tissue	18										X					X				
of resident fish, whole																								
body Samples																								

REPORT REQUIREMENTS

- ___ I. Routine Report: Method Blank, Surrogate, as required
- X 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: Coeur Alaska
3031 Clinton Dr.
Ste 202

TURNAROUND REQUIREMENTS

- ___ 24 hr.
- ___ 48 hr.
- ___ 5 Day
- X 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:

Dry wgt basis - Report % moisture

Send e copy and hardcopy to Benjamin Brewster
ADFG, Habitat
802 West 3rd St.
Juneau AK, 99801

RELINQUISHED BY:
Signature: Benjamin Brewster
Date/Time:
Printed Name: Benjamin Brewster
Firm: ADFG

RECEIVED BY:
Signature: Karla Smith
Date/Time: 9/28/12 0940
Printed Name: Karla Smith
Firm: ALS

RELINQUISHED BY:
Signature:
Date/Time:
Printed Name:
Firm:

RECEIVED BY:
Signature:
Date/Time:
Printed Name:
Firm:

K1209738

Kensington Gold Mine Biomonitoring - 2012							
Resident Fish for Whole Body Metals				COOLER 1/1			
Basis, all samples: Dry Weight, Report %Moisture							
No preservative added; all fish frozen							
Requested Analyses: Al,Ag,Cd,Cr,Cu,Pb,Ni,Ag,Se,Zn,Total Hg							
Matrix	**Collector**	**Date Collected**	**Sample Number**	**Sample Location**	**Analysis Requested**	**Fk Length (mm)**	**Weight (g)**
Whole Body	ADF&G	7/21/2012	East Fork Slate Creek Sample #1	East Fork Slate Creek (EFSC)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	166	58.2
Whole Body	ADF&G	7/21/2012	East Fork Slate Creek Sample #2	East Fork Slate Creek (EFSC)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	165	44.5
Whole Body	ADF&G	7/21/2012	East Fork Slate Creek Sample #3	East Fork Slate Creek (EFSC)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	165	46.4
Whole Body	ADF&G	7/21/2012	East Fork Slate Creek Sample #4	East Fork Slate Creek (EFSC)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	175	55.6
Whole Body	ADF&G	7/21/2012	East Fork Slate Creek Sample #5	East Fork Slate Creek (EFSC)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	163	56.4
Whole Body	ADF&G	7/21/2012	East Fork Slate Creek Sample #6	East Fork Slate Creek (EFSC)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	165	62.7
Whole Body	ADF&G	8/2/2012	Upper Slate Creek Sample #1	Upper Slate Creek(USL)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	94	9.1
Whole Body	ADF&G	8/2/2012	Upper Slate Creek Sample #2	Upper Slate Creek(USL)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	96	9.7
Whole Body	ADF&G	8/2/2012	Upper Slate Creek Sample #3	Upper Slate Creek(USL)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	105	15.6
Whole Body	ADF&G	8/2/2012	Upper Slate Creek Sample #4	Upper Slate Creek(USL)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	97	13.9
Whole Body	ADF&G	8/2/2012	Upper Slate Creek Sample #5	Upper Slate Creek(USL)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	100	10.2
Whole Body	ADF&G	8/2/2012	Upper Slate Creek Sample #6	Upper Slate Creek(USL)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	86	6.5
Whole Body	ADF&G	7/22/2012	Lower Slate Creek Sample #1	Lower Slate Creek(LSC)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	95	7.7
Whole Body	ADF&G	7/22/2012	Lower Slate Creek Sample #2	Lower Slate Creek(LSC)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	115	15.5
Whole Body	ADF&G	7/22/2012	Lower Slate Creek Sample #3	Lower Slate Creek(LSC)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	110	14.2
Whole Body	ADF&G	7/22/2012	Lower Slate Creek Sample #4	Lower Slate Creek(LSC)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	115	17.6
Whole Body	ADF&G	7/22/2012	Lower Slate Creek Sample #5	Lower Slate Creek(LSC)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	90	9.6
Whole Body	ADF&G	7/22/2012	Lower Slate Creek Sample #6	Lower Slate Creek(LSC)	Al,Ag, Cd, Cr,Cu, Pb, Ni,Se, Zn,Hg	105	12.7

ALS

PC Sue

Cooler Receipt and Preservation Form

Client / Project: Coeur

Service Request K12 09738

Received: 9/28/12 Opened: 9/28/12 By: KD Unloaded: 9/28/12 By: KD

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
5.9	—	318		8015 3750 0702		

7. Packing material: Inserts [✓ Baggies] Bubble Wrap [✓ Gel Packs] Wet Ice Dry Ice Sleeves
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 ____ *of* ____

COLUMBIA ANALYTICAL SERVICES, INC.
Now part of the ALS Group
Analytical Report

Client: Alaska Department of Fish and Game
Project: Kensington Gold Mine Whole Fish Analysis/Coeur Alaska Mining Company
Sample Matrix: Tissue

Service Request: K1209738
Date Collected: 07/21-08/02/12
Date Received: 09/28/12

Moisture

Prep Method: NONE
Analysis Method: Freeze Dry
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Date Analyzed	Result	Result Notes
East Fork Slate Creek Sample #1	K1209738-001	10/24/12	73.9	
East Fork Slate Creek Sample #2	K1209738-002	10/24/12	74.3	
East Fork Slate Creek Sample #3	K1209738-003	10/24/12	71.2	
East Fork Slate Creek Sample #4	K1209738-004	10/24/12	74.5	
East Fork Slate Creek Sample #5	K1209738-005	10/24/12	74.6	
East Fork Slate Creek Sample #6	K1209738-006	10/24/12	73.7	
Upper State Creek Sample #1	K1209738-007	10/24/12	75.6	
Upper State Creek Sample #2	K1209738-008	10/24/12	75.4	
Upper State Creek Sample #3	K1209738-009	10/24/12	76.5	
Upper State Creek Sample #4	K1209738-010	10/24/12	78.1	
Upper State Creek Sample #5	K1209738-011	10/24/12	75.9	
Upper State Creek Sample #6	K1209738-012	10/24/12	76.7	
Lower Slate Creek Sample #1	K1209738-013	10/24/12	75.5	
Lower Slate Creek Sample #2	K1209738-014	10/24/12	75.8	
Lower Slate Creek Sample #3	K1209738-015	10/24/12	77.2	
Lower Slate Creek Sample #4	K1209738-016	10/24/12	78.5	
Lower Slate Creek Sample #5	K1209738-017	10/24/12	74.9	
Lower Slate Creek Sample #6	K1209738-018	10/24/12	75.6	

COLUMBIA ANALYTICAL SERVICES, INC.
Now part of the ALS Group
QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1209738
Project:	Kensington Gold Mine Whole Fish Analysis/Coeur Alaska Mining Company	**Date Collected:**	07/21/12
Sample Matrix:	Tissue	**Date Received:**	09/28/12
		Date Extracted:	NA
		Date Analyzed:	10/24/12

Duplicate Summary

Sample Name:	East Fork Slate Creek Sample #1	Units:	PERCENT
Lab Code:	K1209738-001D	Basis:	Wet
Test Notes:			

Analyte	**Prep Method**	**Analysis Method**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Moisture	NA	Freeze Dry	73.9	72.8	73.4	1	

COLUMBIA ANALYTICAL SERVICES, INC.

Now part of the ALS Group

- Cover Page -
INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Game

Service Request: K1209738

Project Name: Kensington Gold Mine Whole Fish Analysis

Project No.: Coeur Alaska Mining Company

Sample Name:	Lab Code:
East Fork Slate Creek Sample #1	K1209738-001
East Fork Slate Creek Sample #1D	K1209738-001D
East Fork Slate Creek Sample #1S	K1209738-001S
East Fork Slate Creek Sample #2	K1209738-002
East Fork Slate Creek Sample #3	K1209738-003
East Fork Slate Creek Sample #4	K1209738-004
East Fork Slate Creek Sample #5	K1209738-005
East Fork Slate Creek Sample #6	K1209738-006
Upper State Creek Sample #1	K1209738-007
Upper State Creek Sample #2	K1209738-008
Upper State Creek Sample #3	K1209738-009
Upper State Creek Sample #4	K1209738-010
Upper State Creek Sample #5	K1209738-011
Upper State Creek Sample #6	K1209738-012
Lower Slate Creek Sample #1	K1209738-013
Lower Slate Creek Sample #2	K1209738-014
Lower Slate Creek Sample #3	K1209738-015
Lower Slate Creek Sample #4	K1209738-016
Lower Slate Creek Sample #5	K1209738-017
Lower Slate Creek Sample #6	K1209738-018
Method Blank	K1209738-MB

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1209738
Project No.: Coeur Alaska Mining Company
Date Collected: 07/21/12
Project Name: Kensington Gold Mine Whole Fish
Date Received: 09/28/12
Matrix: TISSUE
Units: mg/Kg
Basis: DRY

Sample Name: **East Fork Slate Creek Sample #1** **Lab Code:** **K1209738-001**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	53.8		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.57		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	1.5		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	75.8		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.03		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	1.0		
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	5.1		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.04		
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	96.3		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1209738
Project No.:	Coeur Alaska Mining Company	**Date Collected:**	07/21/12
Project Name:	Kensington Gold Mine Whole Fish	**Date Received:**	09/28/12
Matrix:	TISSUE	**Units:**	mg/Kg
		Basis:	DRY

Sample Name: **East Fork Slate Creek Sample #2** **Lab Code:** **K1209738-002**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	204		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	1.08		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	2.3		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	16.9		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.50		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	1.1		
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	5.6		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.04		
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	123		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1209738
Project No.: Coeur Alaska Mining Company
Date Collected: 07/21/12
Project Name: Kensington Gold Mine Whole Fish
Date Received: 09/28/12
Matrix: TISSUE
Units: mg/Kg
Basis: DRY

Sample Name: **East Fork Slate Creek Sample #3** **Lab Code:** **K1209738-003**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	20.2		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.52		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	0.7		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	10.8		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.12		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	0.4		
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	4.9		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.02		
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	95.9		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1209738
Project No.:	Coeur Alaska Mining Company	**Date Collected:**	07/21/12
Project Name:	Kensington Gold Mine Whole Fish	**Date Received:**	09/28/12
Matrix:	TISSUE	**Units:**	mg/Kg
		Basis:	DRY

Sample Name: **East Fork Slate Creek Sample #4** **Lab Code:** **K1209738-004**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	25.4		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.67		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	1.3		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	31.7		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.19		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	0.8		
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	4.9		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.04		
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	110		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1209738
Project No.: Coeur Alaska Mining Company
Date Collected: 07/21/12
Project Name: Kensington Gold Mine Whole Fish
Date Received: 09/28/12
Matrix: TISSUE
Units: mg/Kg
Basis: DRY

Sample Name: **East Fork Slate Creek Sample #5** **Lab Code:** **K1209738-005**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	275		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.52		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	3.4		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	9.7		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.25		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	2.9		
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	4.7		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.02		
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	122		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1209738
Project No.:	Coeur Alaska Mining Company	**Date Collected:**	07/21/12
Project Name:	Kensington Gold Mine Whole Fish	**Date Received:**	09/28/12
Matrix:	TISSUE	**Units:**	mg/Kg
		Basis:	DRY

Sample Name: **East Fork Slate Creek Sample #6** **Lab Code:** **K1209738-006**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	41.6		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.36		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	2.2		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	38.7		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.34		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	1.3		
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	3.8		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.03		
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	110		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1209738
Project No.:	Coeur Alaska Mining Company	**Date Collected:**	08/02/12
Project Name:	Kensington Gold Mine Whole Fish	**Date Received:**	09/28/12
Matrix:	TISSUE	**Units:**	mg/Kg
		Basis:	DRY

Sample Name: **Upper State Creek Sample #1** **Lab Code:** **K1209738-007**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	1380		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.11		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	4.7		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	5.2		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.16		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	2.5		
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	4.8		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.02	U	
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	103		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga

Service Request: K1209738

Project No.: Coeur Alaska Mining Company

Date Collected: 08/02/12

Project Name: Kensington Gold Mine Whole Fish

Date Received: 09/28/12

Matrix: TISSUE

Units: mg/Kg

Basis: DRY

Sample Name: **Upper State Creek Sample #2**

Lab Code: **K1209738-008**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	3080		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.23		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	9.6		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	6.7		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.24		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	6.1		
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	3.9		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.04		
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	113		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1209738
Project No.:	Coeur Alaska Mining Company	**Date Collected:**	08/02/12
Project Name:	Kensington Gold Mine Whole Fish	**Date Received:**	09/28/12
Matrix:	TISSUE	**Units:**	mg/Kg
		Basis:	DRY

Sample Name: **Upper State Creek Sample #3** **Lab Code:** **K1209738-009**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	421		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.06		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	2.7		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	3.1		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.05		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	0.9		
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	4.6		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.02	U	
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	106		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga

Service Request: K1209738

Project No.: Coeur Alaska Mining Company

Date Collected: 08/02/12

Project Name: Kensington Gold Mine Whole Fish

Date Received: 09/28/12

Matrix: TISSUE

Units: mg/Kg

Basis: DRY

Sample Name: **Upper State Creek Sample #4**

Lab Code: **K1209738-010**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	5.4		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.05		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	0.6		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	2.1		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.02		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	0.2	U	
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	4.9		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.02	U	
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	97.0		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1209738
Project No.:	Coeur Alaska Mining Company	**Date Collected:**	08/02/12
Project Name:	Kensington Gold Mine Whole Fish	**Date Received:**	09/28/12
Matrix:	TISSUE	**Units:**	mg/Kg
		Basis:	DRY

Sample Name: **Upper State Creek Sample #5** **Lab Code:** **K1209738-011**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	**200.8**	**2.0**	**5.0**	**10/23/12**	**11/05/12**	**10.8**		*****
Cadmium	**200.8**	**0.02**	**5.0**	**10/23/12**	**11/05/12**	**0.04**		
Chromium	**200.8**	**0.2**	**5.0**	**10/23/12**	**11/05/12**	**0.3**		
Copper	**200.8**	**0.1**	**5.0**	**10/23/12**	**11/05/12**	**2.2**		
Lead	**200.8**	**0.02**	**5.0**	**10/23/12**	**11/05/12**	**0.03**		
Nickel	**200.8**	**0.2**	**5.0**	**10/23/12**	**11/05/12**	**0.5**		
Selenium	**200.8**	**1.0**	**5.0**	**10/23/12**	**11/05/12**	**4.1**		
Silver	**200.8**	**0.02**	**5.0**	**10/23/12**	**11/05/12**	**0.02**	**U**	
Zinc	**200.8**	**0.5**	**5.0**	**10/23/12**	**11/05/12**	**113**		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1209738
Project No.:	Coeur Alaska Mining Company	**Date Collected:**	08/02/12
Project Name:	Kensington Gold Mine Whole Fish	**Date Received:**	09/28/12
Matrix:	TISSUE	**Units:**	mg/Kg
		Basis:	DRY

Sample Name: **Upper State Creek Sample #6** **Lab Code:** **K1209738-012**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	8.5		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.06		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	3.2		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	2.6		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.05		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	1.3		
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	4.9		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.02	U	
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	136		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1209738
Project No.:	Coeur Alaska Mining Company	**Date Collected:**	07/22/12
Project Name:	Kensington Gold Mine Whole Fish	**Date Received:**	09/28/12
Matrix:	TISSUE	**Units:**	mg/Kg
		Basis:	DRY

Sample Name: **Lower Slate Creek Sample #1** **Lab Code:** **K1209738-013**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	50.9		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.45		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	0.5		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	3.5		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.05		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	0.3		
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	5.6		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.02	U	
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	128		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1209738
Project No.:	Coeur Alaska Mining Company	**Date Collected:**	07/22/12
Project Name:	Kensington Gold Mine Whole Fish	**Date Received:**	09/28/12
Matrix:	TISSUE	**Units:**	mg/Kg
		Basis:	DRY

Sample Name: **Lower Slate Creek Sample #2** **Lab Code:** **K1209738-014**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	78.0		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.64		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	0.8		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	9.0		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.03		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	0.3		
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	4.8		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.06		
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	130		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga

Project No.: Coeur Alaska Mining Company

Project Name: Kensington Gold Mine Whole Fish

Matrix: TISSUE

Service Request: K1209738

Date Collected: 07/22/12

Date Received: 09/28/12

Units: mg/Kg

Basis: DRY

Sample Name: **Lower Slate Creek Sample #3** **Lab Code:** **K1209738-015**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	20.8		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.54		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	0.4		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	6.0		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.03		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	0.2	U	
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	4.5		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.05		
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	171		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1209738
Project No.:	Coeur Alaska Mining Company	**Date Collected:**	07/22/12
Project Name:	Kensington Gold Mine Whole Fish	**Date Received:**	09/28/12
Matrix:	TISSUE	**Units:**	mg/Kg
		Basis:	DRY

Sample Name: **Lower Slate Creek Sample #4** **Lab Code:** **K1209738-016**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	69.3		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.78		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	0.4		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	8.9		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.03		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	0.4		
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	5.1		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.05		
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	170		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1209738
Project No.:	Coeur Alaska Mining Company	**Date Collected:**	07/22/12
Project Name:	Kensington Gold Mine Whole Fish	**Date Received:**	09/28/12
Matrix:	TISSUE	**Units:**	mg/Kg
		Basis:	DRY

Sample Name: **Lower Slate Creek Sample #5** **Lab Code:** **K1209738-017**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	18.0		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.44		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	0.3		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	3.6		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.04		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	0.2	U	
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	4.5		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.02	U	
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	131		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1209738
Project No.:	Coeur Alaska Mining Company	**Date Collected:**	07/22/12
Project Name:	Kensington Gold Mine Whole Fish	**Date Received:**	09/28/12
Matrix:	TISSUE	**Units:**	mg/Kg
		Basis:	DRY

Sample Name: **Lower Slate Creek Sample #6** **Lab Code:** **K1209738-018**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	189		*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.92		
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	0.8		
Copper	200.8	0.1	5.0	10/23/12	11/05/12	5.8		
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.05		
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	0.4		
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	5.2		
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.03		
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	151		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1209738
Project No.:	Coeur Alaska Mining Company	**Date Collected:**	
Project Name:	Kensington Gold Mine Whole Fish	**Date Received:**	
Matrix:	TISSUE	**Units:**	mg/Kg
		Basis:	DRY

Sample Name: **Method Blank** **Lab Code:** **K1209738-MB**

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	10/23/12	11/05/12	2.0	U	*
Cadmium	200.8	0.02	5.0	10/23/12	11/05/12	0.02	U	
Chromium	200.8	0.2	5.0	10/23/12	11/05/12	0.2	U	
Copper	200.8	0.1	5.0	10/23/12	11/05/12	0.1	U	
Lead	200.8	0.02	5.0	10/23/12	11/05/12	0.02	U	
Nickel	200.8	0.2	5.0	10/23/12	11/05/12	0.2	U	
Selenium	200.8	1.0	5.0	10/23/12	11/05/12	1.0	U	
Silver	200.8	0.02	5.0	10/23/12	11/05/12	0.02	U	
Zinc	200.8	0.5	5.0	10/23/12	11/05/12	0.5	U	

Comments:

Metals
- 5A -
SPIKE SAMPLE RECOVERY

Client: Alaska Department of Fish and Ga **Service Request:** K1209738

Project No.: Coeur Alaska Mining Company **Units:** MG/KG

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

Matrix: TISSUE

Sample Name: **East Fork Slate Creek Samp** **Lab Code:** **K1209738-001S**

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Aluminum	70 - 130	217.5		53.8		199.3	82		200.8
Cadmium	70 - 130	5.60		0.57		4.98	101		200.8
Chromium	70 - 130	20.2		1.5		19.9	94		200.8
Copper	70 - 130	94.7		75.8		24.9	76		200.8
Lead	70 - 130	44.17		0.03		49.83	89		200.8
Nickel	70 - 130	47.2		1.0		49.8	93		200.8
Selenium	70 - 130	24.8		5.1		16.6	119		200.8
Silver	70 - 130	4.95		0.04		4.98	99		200.8
Zinc	70 - 130	137.9		96.3		49.8	84		200.8

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:** K1209738

Project No.: Coeur Alaska Mining Company **Units:** MG/KG

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

Matrix: TISSUE

Sample Name: East Fork Slate Creek Sam **Lab Code:** K1209738-001D

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Aluminum	20	53.8		32.7		48.8	*	200.8
Cadmium	20	0.57		0.59		3.4		200.8
Chromium	20	1.5		1.3		14.3		200.8
Copper	20	75.8		73.6		2.9		200.8
Lead		0.03		0.03		0.0		200.8
Nickel		1.0		1.0		0.0		200.8
Selenium	20	5.1		5.2		1.9		200.8
Silver		0.04		0.03		28.6		200.8
Zinc	20	96.3		98.2		2.0		200.8

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:** K1209738

Project No.: Coeur Alaska Mining Company

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	1860.0	93					
Cadmium	50.0	49.1	98					
Chromium	200.0	195.2	98					
Copper	250.0	235.5	94					
Lead	500.0	480.6	96					
Nickel	500.0	484.0	97					
Selenium	167.0	176.1	105					
Silver	50.0	52.3	105					
Zinc	500.0	453.7	91					

COLUMBIA ANALYTICAL SERVICES, INC.

Now part of the ALS Group

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1209738
Project:	Kensington Gold Mine Whole Fish Analysis/Coeur Alaska Mining Co.	**Date Collected:**	NA
LCS Matrix:	Tissue	**Date Received:**	NA
		Date Extracted:	10/23/12
		Date Analyzed:	11/05/12

Standard Reference Material Summary
Total Metals

Sample Name:	Standard Reference Material	Units:	mg/Kg (ppm)
Lab Code:	K1209738-SRM	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	200.8	0.29	0.30	103	0.216 - 0.372	
Chromium	PSEP Tissue	200.8	1.89	1.61	85	1.38 - 2.47	
Copper	PSEP Tissue	200.8	15.5	14.2	92	11.9 - 19.4	
Lead	PSEP Tissue	200.8	0.395	0.296	75	0.276 - 0.534	
Nickel	PSEP Tissue	200.8	1.28	1.18	92	0.83 - 1.82	
Zinc	PSEP Tissue	200.8	51.3	47.8	93	38.6 - 65.3	

COLUMBIA ANALYTICAL SERVICES, INC.

Now part of the ALS Group

QA/QC Report

Client: Alaska Department of Fish and Game
Project: Kensington Gold Mine Whole Fish Analysis/Coeur Alaska Mining Co.
LCS Matrix: Tissue

Service Request: K1209738
Date Collected: NA
Date Received: NA
Date Extracted: 10/23/12
Date Analyzed: 11/05/12

Standard Reference Material Summary
Total Metals

Sample Name: Standard Reference Material
Lab Code: K1209738-SRM
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Source: N.R.C.C. Tort-2

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**Control Limits**	**Result Notes**
Cadmium	PSEP Tissue	200.8	26.7	28.8	108	20.9-32.8	
Chromium	PSEP Tissue	200.8	0.77	0.69	90	0.5-1.1	
Copper	PSEP Tissue	200.8	106	96.8	91	77-139	
Lead	PSEP Tissue	200.8	0.35	0.33	94	0.18-0.58	
Nickel	PSEP Tissue	200.8	2.5	2.3	92	1.85-3.23	
Selenium	PSEP Tissue	200.8	5.63	6.79	121	3.97-7.56	
Zinc	PSEP Tissue	200.8	180	180	100	139-223	

COLUMBIA ANALYTICAL SERVICES, INC.

Now part of the ALS Group

Analytical Report

Client: Alaska Department of Fish and Game
Project: Kensington Gold Mine Whole Fish Analysis/Coeur Alaska Mining Company
Sample Matrix: Animal tissue

Service Request: K1209738
Date Collected: 07/21-08/02/2012
Date Received: 09/28/12

Mercury, Total

Prep Method: METHOD
Analysis Method: 1631E
Test Notes:

Units: ng/g
Basis: Dry

Sample Name	**Lab Code**	**MRL**	**Dilution Factor**	**Date Extracted**	**Date Analyzed**	**Result**	**Result Notes**
East Fork Slate Creek Sample #1	K1209738-001	5.0	100	10/22/12	10/23/12	130	
East Fork Slate Creek Sample #2	K1209738-002	4.9	100	10/22/12	10/23/12	234	
East Fork Slate Creek Sample #3	K1209738-003	4.9	100	10/22/12	10/23/12	116	
East Fork Slate Creek Sample #4	K1209738-004	5.0	100	10/22/12	10/23/12	215	
East Fork Slate Creek Sample #5	K1209738-005	5.0	100	10/22/12	10/23/12	146	
East Fork Slate Creek Sample #6	K1209738-006	4.8	100	10/22/12	10/23/12	139	
Upper State Creek Sample #1	K1209738-007	5.0	100	10/22/12	10/23/12	91.9	
Upper State Creek Sample #2	K1209738-008	5.0	100	10/22/12	10/23/12	103	
Upper State Creek Sample #3	K1209738-009	5.0	100	10/22/12	10/23/12	93.8	
Upper State Creek Sample #4	K1209738-010	5.0	100	10/22/12	10/23/12	102	
Upper State Creek Sample #5	K1209738-011	5.0	100	10/22/12	10/23/12	97.2	
Upper State Creek Sample #6	K1209738-012	5.0	100	10/22/12	10/23/12	84.2	
Lower Slate Creek Sample #1	K1209738-013	4.9	100	10/22/12	10/23/12	167	
Lower Slate Creek Sample #2	K1209738-014	5.0	100	10/22/12	10/23/12	107	
Lower Slate Creek Sample #3	K1209738-015	4.9	100	10/22/12	10/23/12	162	
Lower Slate Creek Sample #4	K1209738-016	4.8	100	10/22/12	10/23/12	113	
Lower Slate Creek Sample #5	K1209738-017	4.9	100	10/22/12	10/23/12	97.7	
Lower Slate Creek Sample #6	K1209738-018	5.0	100	10/22/12	10/23/12	127	
Method Blank 1	K1209738-MB1	1.0	100	10/22/12	10/23/12	ND	
Method Blank 2	K1209738-MB2	1.0	100	10/22/12	10/23/12	ND	
Method Blank 3	K1209738-MB3	1.0	100	10/22/12	10/23/12	ND	

Client:	Alaska Department of Fish and Game	**Service Request:**	K1209738
Project:	Kensington Gold Mine Whole Fish Analysis/Coeur Alaska Mining Company	**Date Collected:**	07/21/12
Sample Matrix:	Animal tissue	**Date Received:**	09/28/12
		Date Extracted:	10/22/12
		Date Analyzed:	10/23/12

Matrix Spike/Duplicate Matrix Spike Summary
Total Metals

Sample Name:	East Fork Slate Creek Sample #1	Units:	ng/g
Lab Code:	K1209738-001MS, K1209738-001DMS	Basis:	Dry
Test Notes:			

									Percent Recovery				
				Spike Level			Spike Result				CAS	Relative	
Analyte	**Prep Method**	**Analysis Method**	**MRL**	**MS**	**DMS**	**Sample Result**	**MS**	**DMS**	**MS**	**DMS**	**Acceptance Limits**	**Percent Difference**	**Result Notes**
Mercury	METHOD	1631E	5.0	249	249	130	360	347	92	87	70-130	6	

COLUMBIA ANALYTICAL SERVICES, INC.
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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1209738
Project:	Kensington Gold Mine Whole Fish Analysis/Coeur Alaska Mining Company	**Date Collected:**	07/21/12
Sample Matrix:	Animal tissue	**Date Received:**	09/28/12
		Date Extracted:	10/22/12
		Date Analyzed:	10/23/12

Matrix Spike/Duplicate Matrix Spike Summary
Total Metals

Sample Name:	East Fork Slate Creek Sample #5		Units:	ng/g
Lab Code:	K1209738-005MS	K1209738-005DMS	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	5.0	249	247	146	397	365	101	89	70-130	13	

COLUMBIA ANALYTICAL SERVICES, INC.

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1209738
Project:	Kensington Gold Mine Whole Fish Analysis/Coeur Alaska Mining Company	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	10/23/12

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name:	Ongoing Precision and Recovery (Initial)	Units:	ng/g
		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	5.30	106	70-130	

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1209738
Project:	Kensington Gold Mine Whole Fish Analysis/Coeur Alaska Mining Company	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	10/23/12

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Final)

Units: ng/g
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	4.10	82	70-130	

QA/QC Report

Client: Alaska Department of Fish and Game
Project: Kensington Gold Mine Whole Fish Analysis/Coeur Alaska Mining Company
LCS Matrix: Animal tissue

Service Request: K1209738
Date Collected: NA
Date Received: NA
Date Extracted: 10/22/12
Date Analyzed: 10/23/12

Quality Control Sample (QCS) Summary
Total Metals

Sample Name: Quality Control Sample
Lab Code:
Test Notes:

Units: ng/g
Basis: Dry

Source: TORT

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	270.0	278	103	70-130	

APPENDIX E: SEDIMENT METALS CONCENTRATIONS & TOXICITY LAB REPORTS

Table E1.—Sediment compositions for stream sediments sampled near Kensington Gold Mine, 2011–2012.

		Particle Size Data[a]								
Site	Sample Date	% Sand	% Silt	% Clay	% Course material (> 2 mm)	Texture	% Total Solids	% Total Volitile Solids	Acid Volitile Sulfide (µmoles/g)	% Total Organic Carbon[b]
Lower Slate Creek	10/03/11	94.0	4.0	2.0	0.44	sand	78.00	3.38	ND	2.04
East Fork Slate Creek	10/03/11	86.0	4.0	10.0	1.65	loamy sand	60.17	7.81	ND	11.00
Upper Slate Creek	10/06/11	94.0	2.0	4.0	ND	sand	72.10	4.12	1.39	5.46
Lower Johnson Creek	10/03/11	96.0	2.0	2.0	ND	sand	74.28	2.01	ND	0.89
Lower Sherman Creek	10/04/11	96.0	2.0	2.0	0.11	sand	73.15	2.75	1.50	0.54
Middle Sherman Creek	10/03/11	96.0	2.0	2.0	0.22	sand	72.45	2.82	1.01	1.17
Lower Slate Creek	07/03/12	98.0	ND	2.0	0.13	sand	79.22	3.37	0.99	1.67
East Fork Slate Creek	07/10/12	26.0	34.0	40.0	ND	clay	23.72	28.54	1.10	16.70
Upper Slate Creek	07/02/12	98.0	ND	2.0	0.32	sand	79.58	2.90	1.35	3.74
Lower Johnson Creek	07/02/12	92.0	ND	8.0	ND	sand	77.67	2.55	1.05	1.19
Lower Sherman Creek	07/03/12	96.0	ND	4.0	0.09	sand	78.55	3.05	ND	0.82
Middle Sherman Creek	07/03/12	96.0	ND	4.0	0.44	sand	77.09	4.10	0.93	1.05

[a] Particle size determined by using ASTM Method D422 and Modified ASA 15-5.

[b] Total organic carbon (dry) determined by using the Walkley Black Method.

ND = not detected at the method detection limit.

Table E2.—Sediment metallic and semi-metallic concentrations for stream sediments sampled near Kensington Gold Mine, 2011–2012.

		Analytical Data (mg/kg dry weight)[a]										
Site	Sample Date	Al	Ag	As	Cd	Cr	Cu	Hg	Ni	Se	Pb	Zn
Lower Slate Creek	10/03/11	13,600	0.134	16.2	1.460	29.4	56.7	0.0502	47.4	0.720	7.79	220
East Fork Slate Creek	10/03/11	20,100	0.233	30.0	**20.900**	29.5	88.4	**0.0692**	**143.0**	**1.410**	8.50	**1,360**
Upper Slate Creek	10/06/11	**22,500**	0.120	17.9	0.722	**127.0**	53.4	ND	87.5	0.809	3.37	130
Lower Johnson Creek	10/03/11	13,100	0.164	16.2	0.238	31.5	73.1	ND	27.3	ND	9.76	93.3
Lower Sherman Creek	10/04/11	18,200	0.137	28.9	0.389	46.2	94.0	ND	45.9	ND	6.70	110
Middle Sherman Creek	10/03/11	19,000	**0.633**	**55.7**	0.175	43.4	**97.1**	ND	44.0	ND	**17.30**	120
Lower Slate Creek	07/03/12	13,600	0.145	9.31	1.22	32.0	50.7	0.0994	43.2	ND	8.45	200
East Fork Slate Creek	07/10/12	15,300	**0.513**	24.0	**23.2**	38.9	**159.0**	**0.3270**	**153.0**	**0.934**	**14.20**	**1,490**
Upper Slate Creek	07/02/12	**20,300**	0.132	14.4	0.776	**125.0**	55.4	0.0625	78.4	0.606	4.05	134
Lower Johnson Creek	07/02/12	13,100	0.342	12.8	0.250	35.5	76.8	0.1190	23.4	ND	9.45	97.3
Lower Sherman Creek	07/03/12	17,900	0.289	24.3	0.578	51.4	79.1	0.0681	40.2	ND	8.43	128
Middle Sherman Creek	07/03/12	18,800	0.225	**56.1**	0.269	48.1	87.5	0.0581	39.3	ND	11.30	124

[a] As, Cd, Cr, Cu, Pb, Ni, Se and Ag by SW-846 Method 6020; Al and Zn by SW-846 Method 6010B; Hg by SW-846 7471B.

ND = not detected at the method detection limit.

Bolded values are the greatest amount observed for each analyte among sites each year.

AECOM
Environmental Toxicology
4303 West LaPorte Avenue, Fort Collins, Colorado 80521-2154
T 970.416.0916 F 970.490.2963 www.aecom.com

AECOM

September 28, 2012

Kevin Eppers
Coeur Alaska Inc.
Kensington Gold Mine
3031 Clinton Drive
Suite 202
Juneau AK 99801

Subject: Results of *Chironomus dilutus* sediment toxicity test

Dear Mr. Eppers:

Attached is a copy of the report for the sediment toxicity test conducted with *Chironomus dilutus* using sediment collected from six different sites. There were no statistically significant survival or growth (ash-free dry weight) effects in any of the six sampling sites. The analytical data including total metals, total organic carbon, and grain size determination and total solids and total suspended solids are included in this 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,

Christina Needham

Christina Needham
Data Analyst
christina.needham@aecom.com

Rami B. Naddy, Ph.D.
Study Director / Environmental Toxicologist
rami.naddy@aecom.com

Attachment:

60225262-058-(090-095)

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-(090-095)
August / September 2012

Report of Short-Term Toxicity of Whole Sediment to Chironomus dilutus

Project IDs: 60225262-058-(090-095)
August / September 2012

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 Protocol	CT3AK.TIE058.008	
Test Period	August 31, 2012 @ 1330-1730 to September 10, 2012 @ 0845-1450	
Test Length	10 days	
Species	*Chironomus dilutus*	
Test Material	Whole sediment	
Sediment ID	Sample ID	AECOM Laboratory ID
	LJH	25938, 25941
	LSH	25939, 25942
	MSH	25940, 25943
	USC	25932, 25935
	LSLA	25933, 25936
	EFSC	25934, 25937
Control Sediments	Silica Sand, Formulated Sediment	
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.[a]	Date of Receipt	Temp. at Arrival (°C)[b]
LJH	07/02/12 @ 1200	25938	07/20/12	17.1
LSH	07/03/12 @ 1100	25939	07/20/12	17.1
MSH	07/03/12 @ 1200	25940	07/20/12	17.1
USC	07/02/12 @ 0900	25932	07/20/12	19.6
LSLA	07/03/12 @ 0900	25933	07/20/12	19.6
EFSC	07/10/12 @ 1400	25934	07/20/12	19.6

[a] Upon sample receipt, each 1-gallon sample container of sediment was assigned a different sample number than the 4-oz glass jar of the same sediment sample designated for AVS analysis. The number assigned to the 1-gallon sample container used for sediment testing will be used for reporting purposes.
[b] Air temperature of cooler
Note: See Appendix A for copies of chain of custody records

Control Sediment

The primary control sediment was coarse silica sand, obtained from a local commercial supplier (manufactured by Unimin® Corporation). A second control, sediment with a smaller grain size and higher organic matter content, was prepared in the laboratory. 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)
Coarse 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

Initial Overlying Water Characterization

Batch No.	pH	Hard. (mg/L)[a]	Alk. (mg/L)[a]	Spec. Cond. (µS/cm)	TRC (mg/L)[b]	NH_3-N (mg/L)[c]	Cl^- (mg/L)
10453	8.0	88	60	464	0.02	<1.0	50.1

[a] As $CaCO_3$
[b] Total residual chlorine
[c] Measured in source water

Test Sediment Preparation

Sample ID	Date Homogenized	Time Homogenized
Sand Control	August 30, 2012	1325 – 1328
Formulated Sediment		1327 - 1330
LJH		1340 – 1343
LSH		1346 – 1349
MSH		1332 – 1335
USC		1340 – 1344
LSLA		1321 – 1324
EFSC		1352 – 1355

Note: The formulated sediment was homogenized with overlying water on August 29, 2012 from 1607 to 1611and held at 25ºC overnight prior to test setup. Sediment was re-homogenized prior to addition to test chambers.

Overlying water was added to the sand control and formulated sediment during the homogenization process to wet both controls prior to placement in test chambers. Before, during, and after homogenization, any noticeable debris (including sticks and other plant material) and large stones were removed from the test 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
Organisms per Replicate	10[c]
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 number of test organisms provided by supplier, 12 test chambers were initiated with only five organisms. No more than 2 test chambers per sediment were initiated in this manner.

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 12-026 was 0.52 mm and the range was 0.35 to 0.70 mm. The average size of the measured organisms was slightly above the upper limit of the third instar range of 0.33 to 0.45 (USEPA 2000), and some organisms fell in the fourth instar range (USEPA 2000). Discussions with the organism supplier (Aquatic BioSystems [ABS]) confirmed that the organisms used to initiate the test were within the specified age range based upon their culture records. Fourth instar chironomids generally emerge within about four days. Since emergence during the 10 day test was minimal, it is reasonable to conclude that tested organisms were generally within the acceptable age range. Since organism placement within test treatments was unbiased, some variation in organism age should not have affected test outcome.

Species and Lot Number	*Chironomus dilutus*, Lot 12-026
Age	3rd to 4th instar
Source	Aquatic BioSystems (ABS), Fort Collins, CO
Overlying Water	Moderately Hard Reconstituted Water with added chloride (50 mg/L) as NaCl, RW # 10453
Reference Toxicant Testing	Initiated August 31, 2012 using sodium chloride (NaCl)

TEST RESULTS

For each test endpoint (survival, AFDW/original organism, and AFDW/surviving organism), the sand and formulated sediment controls were compared using a T-test. If there was not a significant difference between the two, the controls were pooled and comparisons were made against the pooled control data. Since there wasn’t a significant difference between the two controls for any of the endpoints, all comparisons were made against the pooled control data. None of the test sediments had a significant reduction relative to the pooled control data for any of the three test endpoints.

Biological Data – Survival and Ash-Free Dry Weights

Sample ID	Percent Survival	Ash-Free Dry Weight (mg)	
		Per original organism	Per surviving organism
Sand Control	75.0	0.718	0.905
Formulated Sediment	70.0	0.647	1.024
LJH	77.9	0.861	1.122
LSH	66.2	0.699	1.060
MSH	70.8	0.802	1.211
USC	67.5	0.777	1.228
LSLA	71.2	0.872	1.243
EFSC	66.2	0.634	0.955

Note: None of the test sediments had any statistically significant reductions in survival or AFDW relative to the pooled control data. Analyses were completed using Toxstat Version 3.5 (WEST, Inc. and Gulley 1996). See Appendix B for test data sheets

Analytical Data

Parameter	Sample Identification							
	Sand	Form. Sed.	LJH	LSH	MSH	USC	LSLA	EFSC[a]
Metals (mg/kg-dry)[b]								
Aluminum	181	609	13,100	17,900	18,800	20,300	13,600	15,300
Chromium	4.25	8.25	35.5	51.4	48.1	125	32.0	38.9
Zinc	ND	ND	97.3	128	124	134	200	1,490
Arsenic	ND	ND	12.8	24.3	56.1	14.4	9.31	24.0
Cadmium	0.073	0.072	0.250	0.578	0.269	0.776	1.22	23.2
Copper	0.324	0.783	76.8	79.1	87.5	55.4	50.7	159
Lead	0.165	0.380	9.45	8.43	11.3	4.05	8.45	14.2
Nickel	0.511	0.820	23.4	40.2	39.3	78.4	43.2	153
Selenium	ND	ND	ND	ND	ND	0.606	ND	0.934 J
Silver	ND	ND	0.342	0.289	0.225 J	0.132 J	0.145 J	0.513 J
Mercury	ND	ND	0.119 J	0.0681 J	0.0581 J	0.0625 J	0.0994 J	0.327 J
Particle Size (%)[c]								
Clay	ND	10.0	8.0	4.0	4.0	2.0	2.0	40.0
Sand	96.0	86.0	92.0	96.0	96.0	98.0	98.0	26.0
Silt	4.0	4.0	ND	ND	ND	ND	ND	34.0
Texture	Sand	Loamy Sand	Sand	Sand	Sand	Sand	Sand	Clay
Coarse Material (2 mm)	ND	ND	ND	0.09 J	0.44	0.32	0.13	ND
TOC (%-dry)[d]	ND	28.7	1.19	0.82	1.05	3.74	1.67	16.7
Acid Volatile Sulfide (µmoles/g)	NM	NM	1.05 J	ND	0.93 J	1.35 J	0.99 J	1.10 J

[a] On one analytical report included in Appendix C, the sample ID for this site is labeled as "EFSA"; however, the correct sample ID is "EFSC".

[b] As, Cd, Cr, Cu, Pb, Ni, Se, and Ag by SW-846 Method 6020; Al and Zn by SW-846 Method 6010B; Hg by SW-846 7471B (USEPA 1986)

[c] Particle size was determined using ASTM Method D422 and Modified ASA 15-5

[d] 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

NM = Parameter not measured for this sample

Note: See Appendix C for a copy of the reports 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]
Sand	95.90	0.108
Formulated Sediment	86.96	6.97
LJH	77.67	2.55
LSH	78.55	3.05
MSH	77.09	4.10
USC	79.58	2.90
LSLA	79.22	3.37
EFSC	23.72	28.54

[a] Total solids were determined using Standard Methods 2540B (APHA 1998)

[b] Total volatile solids were determined using Standard Methods 2540E (APHA 1998)

Note: All values are means of duplicate analyses and determined at AECOM/FCETL. See Appendix C for data sheets.

Physical and Chemical Data (Min/Max)

Sample ID	pH (s.u.)	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	7.8-8.1	5.5-6.5	448-527	22-24	<1.0-2.2	94-104	61-72
Formulated Sediment	7.8-8.1	4.6-6.5	479-577	22-24	<1.0	96-130	63-103
LJH	7.6-7.8	4.7-6.9	461-513	22-24	<1.0	94-102	62-64
LSH	7.7-8.1	4.5-6.4	456-521	22-24	<1.0	114	72-77
MSH	7.8-8.0	4.5-6.4	460-520	22-24	<1.0	94-106	60-65
USC	7.7-8.0	5.5-6.5	475-548	22-24	<1.0-2.1	112-120	71-85
LSLA	7.7-7.9	4.5-6.1	463-524	22-24	<1.0	114-116	65-71
EFSC	7.6-8.1	4.4-6.3	486-615	22-24	<1.0-3.9	120-172	92-128

[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
12-026	08/31/12-09/04/12	3,486	2,621	6,723

Note: All values are expressed as mg/L chloride. This test did not meet the test acceptability criterion of ≥90% survival in the control; however, due to insufficient number of test organisms, this study could not be reset.

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.

September 28, 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 B. Rehner

September 28, 2012

Quality Assurance Unit

Date

APPENDIX A

Chain of Custody

AECOM

CHAIN OF CUSTODY RECORD

084-089

6·6·2012

Page 1 of 1

Client/Project Name: Coeur Alaska

Project Location: FCETL

Project Number: 60225202-0588

Field Logbook No.:

Sampler (Print Name)/(Affiliation): Ben Brewster ADF+G

Chain of Custody Tape Nos.: 42700 (intact)

Signature: Benjamin Brewster

Send Results/Report to:

TAT:

Container Type
P – Plastic
A – Amber Glass
C – 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
① ~~L – Liquid~~
P – Product

Field Sample No./Identification	Date	Time	COMP	GRAB	Sample Container (Size/Mat'l)	Matrix	Preserv.	Field Filtered	Analysis Requested										Lab I.D.	Remarks
Sediment LJH	7/2/12	1200			1 gal	① ~~L~~ SD	ICE		X										25938	
" LSH	7/3/12	1100			1 gal	① ~~L~~ SD	ICE		X										25939	
" MSH	7/3/12	1200			1 gal	① ~~L~~ SD	ICE		X										25940	
" LJH	7/2/12	1200			4oz	① ~~L~~ SD	ICE		X										25941	
" LSH	7/3/12	1100			4oz	① ~~L~~ SD	ICE		X										25942	
" MSH	7/3/12	1200			4oz	① ~~L~~ SD	ICE		X										25943	
																				(D69)

Relinquished by: (Print Name)/(Affiliation)	Date/Time	Received by: (Print Name)/(Affiliation)	Date/Time
Ben Brewster ADFG Signature: Benjamin Brewster	Date: Time:	Amber Potts/AECOM Signature: Amber Potts	Date: 7/20/12 Time: 1015
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):
rec. via FedEx @ 17.1 Δ
AECOM Toxicology Lab
4303 W. Laporte Avenue
Fort Collins, CO 80521
(970) 416-0916
(970) 490-2963 (FAX)
Δ cooler temperature

Sample Shipped Via: UPS [✓ FedEx] Courier Other

Temp blank: Yes [✓ No]

① W 6·5·2012 Er.

O:\GRAPHICS\FORMS\Chain of Custody (COC)\Chain-of-Custody_Ft. Collins_10_07.doc

Serial No. № 52344

AECOM

CHAIN OF CUSTODY RECORD

084-089

6.6.2012

Page 1 of 1

Client/Project Name: Coeur Alaska

Project Location: FCEIC

Project Number: 60225262-058

Field Logbook No.:

Sampler (Print Name)/(Affiliation): ADFG Ben Brewster

Chain of Custody Tape Nos.: 42588 *intact*

Signature: Ben Brewster

Send Results/Report to:

TAT:

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
① ~~L – Liquid~~
P – Product

Field Sample No./Identification	Date	Time	COMP	GRAB	Sample Container (Size/Mat'l)	Matrix	Preserv.	Field Filtered	Analysis Requested										Lab I.D.	Remarks
Sediment (USC)	7/2/12	0900	X		1 gal	① ~~L~~ SD	ICE		X										25932	
" " LSLA	7/3/12	0900	X		1 gal	① ~~L~~ SD	ICE		X										25933	
" " EFSC	7/10/12	1400	X		1 gal	① ~~L~~ SD	ICE		X										25934	
" " USC	7/2/12	0900	X		4oz	① ~~L~~ SD	ICE		X										25935	
" " LSLA	7/3/12	0900	X		4oz	① ~~L~~ SD	ICE		X										25936	
" " EFSC	7/10/12	1400	X		4oz	① ~~L~~ SD	ICE		X										25937	

Relinquished by: (Print Name)/(Affiliation) Ben Brewster ADFG Signature:	Date: Time:	Received by: (Print Name)/(Affiliation) Amber Potts/AECOM Signature: Amber Potts	Date: 7/20/12 Time: 1015
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): (D69)
rec. via FedEx @ 19.6°C △

AECOM Toxicology Lab
4303 W. Laporte Avenue
Fort Collins, CO 80521
(970) 416-0916
(970) 490-2963 (FAX)

△ cooler temp

Sample Shipped Via: UPS [✓ FedEx] Courier Other

Temp blank: Yes [✓ No]

① ω 6.5.2012 Er.

O:\GRAPHICS\FORMS\Chain of Custody (COC)\Chain-of-Custody_Ft. Collins_10_07.doc

Serial No. № 52343

APPENDIX B

Data Sheets

Page 1 of 35
CW 9/19/12
QA: AR 09/27/12

② ~~H. azteca~~
C. dilutus

10-day Survival and Growth, Testing Cover Page

Project Number: 60225262-058-(090-095)

Protocol #: ③ ~~CT3AK.TIE058.008~~ USEPA (2000) + ASTM (2009)
CT3AK.TIE058.008 (Protocol)

Test Substance: Sediment

Test Species: *C. dilutus** Lot #: 12-026

Age: 2nd Instar Supplier: ABS

Test Type: Chronic, Static-Renewal

Overlying Water: Reconstituted Fresh Water (Smith et al., 1997) (RW# 10453)

Investigators: ~~AMC~~/MT/AG/AS/AD/KB/CW

Sampling Date(s): 07/02/12, 07/03/12, 07/10/12 (see COC)

Sampling Time(s): ④ ~~0900-1200, 0900-1200, 1400~~
1200, 1100, 1200, 0900, 0900, 1400

FCETL Sample #(s): 25938, 25939, 25940, 25932, 25933, 25934

Test Initiation Date/Time: 8/31/12 @ 1330 - ~~1530~~ ① 1730

Test Termination Date/Time: 9/10/12 @ 0845-1450

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

Test Duration: 10 days # Org.'s/Repl: 10 / 5 ▲ Env. Chmb/[✓ 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) Form Sed. (Cont.)
3) LJH
4) LSH
5) MSH
6) USC
7) LSLA
8) EFSC
9)
10)
11)

⊛ Reference Tox. Dates: 8/31/12 - 9/4/12 LC50: ③ 3486 ~~3896~~ mg/L Cl⁻ Hist. Limits: ③ ~~1189~~ ~~2959-6567~~ ⑤ 2621-6723 Method: S-K

Study Director Initials: CW for RBN Date: August 28, 2012

⊛ This ref tox study did not meet the minimum survival requirement in the control (90%); however, there were not enough organisms to re-run the study.

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*

① AB 8/31/12
② CW 9/19/12 CF
③ CW 9/26/12 E
④ AR 09/27/12 CF
⑤ AR 09/28/12 E (corrected ref tox database)

▲ due to insufficient # of organisms, some beakers were initiated with only 5 organisms. See biological page for specific test chambers initiated in this manner.

SEDIMENT/SOIL PREPARATION

Project Number: 60225262-058-(090-095)

cu 9/19/12

Artificial soil	QA: AR 09/27/12
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

See TIE Sheet Daily Log for notes on the preparation of the formulated sediment

Form sed was homogenized with overlying water on 8/29/12 and placed in 25°C chamber until test setup (day -1). Form sed was re-homogenized for at least 3 minutes on 8/30/12 prior to placing in beakers.

Soil/sediment	FCETL#	Homogenization			
		Date	From	To	Analyst
Sand (Cont.) ▲	NA	8/30/12	1325	1328	Am
Form Sed. (Cont.)	NA	8/29/12	16 ~~0~~ 407 ①	16 ~~8~~ 411 ①	AB
LJH	25938	8/30/12	1340	1343	Am
LSH	25939	8/30/12	1346	1349	mt
MSH	25940	8/30/12	1332	1335	mt
USC	25932	8/30/12	1340	1344	Am
LSLA	25933	8/30/12	1321	1324	mt
EFSC	25934	8/30/12	1352	1355	Am
Form Sed. (Cont.)	NA	8/30/12	1327	1330	AB

① AB 8/29/12 4

▲ Added overlying water during homogenization process to wet the sand.

cw 9/19/12
QA: AR 09/27/12

This page is an exact copy of the page from studies 084-089 w/ H. azteca, except for last notation on page.

SUBJECT: DAILY LOG

ALL ENTRIES MUST BE INITIALLED WITH DATE AND TIME:

60225262-058 H. azteca | C. dilutus

Preparation of Formulated Sediment

- Combined the following ingredients together in a 4-L glass Jar:

  - 3105 g Coarse Silica Sand (washed w/ DI + baked until dry)
  - 547.5 g Silt/Clay (ASP400)
  - 18.75 g Dolomite
  - 193.25 g α-cellulose (C09-054 (end), C12-087 (start))
  - 0.375 g Humic Acid (Lot# C10-034)

Total = 3864.875 g

- Mixed Ingredients together on 8/6/12 @ 1110 - 1130 cw
- Placed Jar In ①~~tumbeler~~ tumbler from 1145 - 1450 cw

(- Homogenized ~1/2 of the formulated sediment with a small amount of Mod Hard + 50 mg/L Cl^- to wet the sediment from 1459 to 1502. AB
↳ Placed the wet sediment @ 4°C in the dark. cw

8/8/12 - Pulled wet formulated sediment out of 4°C chamber and placed it in the 25°C chamber @ 0815 cw.)

Applies only to study 60225262-058-(084-089) H. azteca

①cw 8/6/12 E

BIOLOGICAL DATA C. *dilutus** Chronic, Static-Renewal Project No. 60225262-058-(090-095) QA: AR 9/27/12
CW 9/19/12

Sediment	Test Termination	A	B	C	D	E	F	G	H	Remarks: % Survival
Sand (cont)	# Surviving	2 ☐	9	7	9	4 ☐	9	8	6	75%
	# Observed Dead	1	0	0	0	0	0	0	1	
	# Not Found	2	1	3	1	1	1	2	3	
	Initials	KB	AB	AB	KB	CW			CW	
Form Sed. (Cont.)	# Surviving	7	7	7~~6~~* ②	4	4 ☐	5 ☐	7	6	70% ~~68.8%~~ ③
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	3	3	① ~~4~~ 3	6	1	0	3	4	
	Initials	AB	AB		KB	KB	CW		CW	
LJH	# Surviving	9	6	8	8	5 ☐	3Δ	4 ☐	8	77.9%
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	1	4	2	2	0	6	2	2	
	Initials	Am	AB	CW	KB	KB	AB	AB		
LSH	# Surviving	7	5	7~~6~~* ②	8	5 ☐	7	2 ☐	5	66.2% ~~65%~~ ⑤
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	3	5	3 ~~4~~ ②	2	0	3	3	5	
	Initials	Am	Am	KB	Am	CW	CW	KB	KB	
MSH	# Surviving	9	9	7	4*	7*	6Δ	4	5 ☐	70.8%
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	1	1	3	6	3	3	6	0	
	Initials	Am	AB		KB	CW	CW		Am	
USC	# Surviving	6	6	7*	3	8	9	7	8	67.5%
	# Observed Dead	0	0	1	0	0	0	0	0	
	# Not Found	4	4	2	7	2	1	3	2	
	Initials	Am	Am	CW	KB	KB		AB	CW	
LSLA	# Surviving	6	7	8	9	7	7	4 ☐	5	71.2%
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	4	3	2	1	3	3	1	5	
	Initials	CW	AB		Am	Am	KB		CW	
EFSC	# Surviving	5	5	6	7	8	8	3 ☐	4 ☐	66.2%
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	5	5	4	3	2	2	2	1	
	Initials	AB	Am	AB		KB	CW	CW	Am	
	# Surviving									
	# Observed Dead									
	# Not Found									
	Initials									
										Key:
	Date/Time:	09/10/12 @ 0845 - 1450								Δ Emerged (Excluded from Surv. and growth)
										* = Pupa (Included in Survival count,
										but excluded from growth analysis)

☐ 5 original organisms ① KB 9/14/12 E ③ CW 9/14/12 C

② 9/14/12 E

CU 9/19/12
QA: AR 09/27/12

CHEMICAL DATA (Composite of Overlying Water) *C. dilutus** Chronic, Static Renewal Project No. 60225262-058-(090-095)

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 Oxygen (mg/l)	Sand (cont)	6.2	6.4	5.5	6.5	6.4	6.2	6.3	6.3	6.3	6.0	6.2	0	6	8/31/12	1315	mt
	Form Sed. (Cont.)	6.2	6.4	4.6	5.8	6.1	5.9	5.8	5.2	5.6	6.0	6.5	1	6	9/1/12	1615	AB
	LJH	6.2	6.2	4.7	6.2	5.7	6.3	6.5	5.8	6.9	5.3	5.9	2	5	9/2/12	0930	AB
	LSH	6.2	6.4	4.5	6.2	6.2	5.8	5.5	6.0	6.4	6.2	6.2	3	5	9/3/12	1540	AB
	MSH	6.2	6.2	4.5	6.3	6.2	6.2	6.4	5.9	6.2	5.9	6.4	4	5	9/4/12	1430	AD
	USC	6.1	6.2	6.5	6.2	5.8	5.7	6.3	5.5	5.9	5.9	6.1	5	5	9/5/12	1440	AD
	LSLA	6.0	6.0	4.5	6.1	5.7	5.9	5.7	5.4	5.7	6.0	6.0	6	5	9/6/12	0905	AD
	EFSC	6.0	6.0	4.4	6.1	6.8	4.9	6.3	5.6	6.2	5.3	6.0	7	5	9/7/12	1505	mt
													8	5	9/8/12	1125	mt
													9	5	9/9/12	1310	mt
													10	5	9/10/12	0940	cw
	Replicate	A	B	C	D	E	F	G	H	A	B	C					
Temp (deg C)	Sand (cont)	24	22	24	22	22	23	22	22	22	23	22	0	D40	8/31/12	1315	mt
	Form Sed. (Cont.)	23	22	24	22	23	23①	22	22	22	22	22	1	D40	9/1/12	1615	AB
	LJH	23	22	24	22	22	22	22	22	23	23	22	2	D40	9/2/12	0925	AB
	LSH	23	23	24	22	23	22	22	22	22	23	22	3	D40	9/3/12	1540	AB
	MSH	23	23	24	22	23	22	22	22	23	23	22	4	D40	9/4/12	1420	AD
	USC	24	23	24	22	22	22	22	22	23	23	22	5	D40	9/5/12	1440	AD
	LSLA	23	23	24	22	22	23	22	22	22	23	22	6	D40	9/6/12	0905	AD
	EFSC	23	23	24	22	22	22	22	22	22	22	22	7	D40	②9/7/12	1505	mt
													8	D40	9/8/12	1125	mt
													9	D40	9/9/12	1310	mt
													10	D63	9/10/12	0830	KR
	Replicate	A	B	C	D	E	F	G	H	A	B	C					
pH (s.u.)	Sand (cont)	8.1	8.0	8.0	8.0	7.9	7.9	7.9	7.8	8.0	8.0	7.9	0	16	8/31/12	1315	mt
	Form Sed. (Cont.)	8.1	7.9	7.9	7.8	7.9	7.8	7.8	7.8	7.9	8.0	8.1	1	16	9/1/12	1615	AB
	LJH	7.7	7.7	7.8	7.7	7.6	7.7	7.7	7.6	7.8	7.7	7.7	2	16	9/2/12	0925	AB
	LSH	8.0	8.1	7.7	8.0	7.9	7.9	7.8	7.9	8.0	8.0	8.0	3	16	9/3/12	1540	AB
	MSH	8.0	7.8	7.8	8.0	7.9	7.8	7.8	7.8	7.8	7.8	7.9	4	16	9/4/12	1430	AD
	USC	8.0	7.9	7.8	7.9	7.8	7.7	7.9	7.7	7.8	7.9	8.0	5	16	9/5/12	1440	AD
	LSLA	7.9	7.9	7.7	7.8	7.7	7.8	7.7	7.7	7.7	7.9	7.9	6	16	9/6/12	0905	AD
	EFSC	7.8	8.0	7.6	8.1	8.0	8.0	8.1	7.9	8.0	8.0	8.0	7	16	9/7/12	1505	mt
													8	16	9/8/12	1125	mt
													9	16	9/9/12	1310	mt
	Replicate	A	B	C	D	E	F	G	H	A	B	C	10	FM20	9/10/12	0935	cw

① AD 9/5/12 CF; 23

② mt 9/7/12 E

Page 6 of 35
cw 9/19/12

OVERLYING WATER CHARACTERIZATION *C. dilutus** Chronic, Static-Renewal Project No. 60225262-058-(090-095)

QA: AR 09/27/12

	Conductivity (µs/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)	448	527	94	104	61	72	<1.0	<1.0	② ~~2.0~~ 2.2▲	2.1▲
Form Sed. (Cont.)	479	577	96	130	63	103	<1.0	<1.0	<1.0	<1.0
LJH	461	513 ~~521~~①	94	102	64	62	<1.0	<1.0	<1.0	<1.0
LSH	456	521	114	114	72	77	<1.0	<1.0	<1.0	<1.0
MSH	460	520	94	106	60	65	<1.0	<1.0	<1.0	<1.0
USC	475	548	112	120	71	85	<1.0	<1.0	<1.0	2.1▲
LSLA	463	524	114	116	65	71	<1.0	<1.0	<1.0	<1.0
EFSC	486	615	120	172	92	128	② ~~1.4~~ 1.6▲	② ~~9.1~~ 3.9▲	② ~~1.9~~ 1.6▲	<1.0▲
Overlying water										
(RW 10453) 8/29/12	464		88		60		<1.0⊛			
TRC=0.02 pH-8.0										
Cl⁻=30.1										
Meter #	15	15	Titr	Titr	Titr	Titr	HA#1	HA 1	HA#1	HA#1
Date:	8/31/12	9/10/12	8/31/12	9/10/12	8/31/12	9/10/12	8/31/12	9/3/12	9/7/12	9/10/12
Time:	1315	1340	1150	1340	1150	1340	1700	1770	1530	1420
Initials:	nt	cw for ANP	nt for KB①	cw for ANP	nt for DM	cw for ANP	nt for KB		nt	cw for DM

① nt 9/8/12 cf, DM

② cw for (7) 9/19/12 cf; value measured on meter #4

▲ measured 9/13/12 on preserved samples (meter #4)

⊛ measured in source water

Page 7 of 35
cw 9/19/12

DAILY TESTING LOG *C. dilutus** Chronic, Static-Renewal Project No. 60225262-058-(090-095) AA:AR 09/27/12

Day -1	Sediment Homogenized @ 1321-1355 Overlying water added to chambers @ 1400			RM/AB Initials/Date: 8/30/12
Day 0	Bath CT = 22.8 °C Test organisms added to chambers @ 1330-1730	Range = 20.6 - 23.8 °C	Feeding: 1736	AB/ / Initials/Date: 8/31/12
	Due to insufficient chironomid numbers, some replicates have only 5 organisms			
Day 1	Bath CT = 22.8°C	Range = 22.4 – 23.4°C	Feeding: 1625 AS	Initials/Date: AS 9/1/12
Day 2	Bath CT = 22.4°C	Range = 22.4 – 22.6°C	Feeding: 1455 AS	Initials/Date: 9/2/12 AS
Day 3	Bath CT = 22.4°C	Range = 22.4 - 22.6 °C	Feeding: 1730 AS	Initials/Date: 9/3/12 AS
Day 4	Bath CT = 22.4 °C	Range = 22.4 - 22.6°C	Feeding: 1430 AD	Initials/Date: 9/4/12 AD
Day 5	Bath CT = 22.4 °C	Range = 22.0 - 22.6 °C	Feeding: 1445 AD	Initials/Date: AD 9/5/12
Day 6	Bath CT = 22.2 °C	Range = 22.0 - 22.6 °C	Feeding: 1550 mt	Initials/Date: AD 9/6/12
Day 7	Bath CT = 22.4 °C	Range = 22.0-22.6 °C	Feeding: 1545 mt	Initials/Date: mt 9/7/12
Day 8	Bath CT = 22.4°C	Range = 22.0 - 23.0 °C	Feeding: 1400 mt	Initials/Date: mt 9/8/12
Day 9	Bath CT = 22.2 °C	Range = 22.0 - 22.6 °C	Feeding: 1325 mt	Initials/Date: mt 9/9/12
Day 10	Bath CT = 22.4°C	Range = 22.0 - 22.6 °C	Feeding: N/A	Initials/Date: cw/RS 9/10/12 AM/AB

Length/Width of Objects Using a Micrometer

AB: AR09/27/12
CW 9/10/12

Project/Study Number: 60225262-058-(090-095)	**Project Name:** Coeur 2012
Study Initiation Date: 08/31/12	**Species:** Chironomus dilutus
Source of Organisms: ABS	**Organism Batch/[✓ Lot] #:** 12-026
Collected by: AB	**Date Collected:** 08/31/12
Analyzed by: CW	**Date Analyzed:** 09/10/12

Specimen Number	Magnif.	# of Squares	Length of One Square (mm)	Total (mm)	Remarks
1	100X	6	0.07	0.42	
2	100X	9	0.07	0.63	
3	100X	9	0.07	0.63	
4	100X	6	0.07	0.42	
5	100X	9	0.07	0.63	
6	100X	10	0.07	0.70	
7	100X	7.5	0.07	0.52	
8	100X	5.5	0.07	0.38	
9	100X	5	0.07	0.35	
10	100X	8	0.07	0.56	
11	100X	5.5	0.07	0.38	
12	40X	4	0.175	0.70	
13	100X	5	0.07	0.35	
14	100X	10	0.07	0.70	
15	100X	9	0.07	0.63	
16	100X	9	0.07	0.63	
17	100X	6	0.07	0.42	
18	100X	5	0.07	0.35	
19	100X	5.5	0.07	0.38	
20	100X	8.5	0.07	0.60	
Total		142.5		10.38	
Mean		7.12		0.52	

3rd Instar = 0.33 to 0.45 mm

FCETL QA Form No.108
Revision 0
Effective 08/99

TEST ORGANISM DRY WEIGHT AND ASH-FREE DRY WEIGHT (AFDW)

QA: PR 9/27/12
BS 9/14/12

Project No: 60225262-058-(090-095)
Species: Chironomus dilutus
[✓ Lot]/Batch No.: 12-026
Analytical Balance ID: Sort #1

TARE: Date/time: 9/12/12 @ 1130-1230 Analyst: cw
DRY GROSS: Date/time: 9/13/12 @ 0915-1030 Analyst: cw
ASHED GROSS: Date/time: 9/14/12 @ 0915-1015 Analyst: cw

Dried in Oven # 3 from Date: 9/12/12 Time: 1415
Oven °C: 60-90 to Date: 9/13/12 Time: 0825

Ashed in Furnace from Date: 9/13/12 Time: 1100
Furnace °C: 500-550 to Date: 9/13/12 Time: 1550

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	1.98756	1.99077	0.00321		1.98791	0.00286 ~~1.98791~~ ②	5			2		
2		B	2.20278	2.21517	0.01239		2.20784	0.00733	10			9		
3		C	1.88501	1.89180	0.00679		1.88723	0.00457	10			7		
4		D	1.89544	1.90275	0.00731		1.89667	0.00608	10			9		
5		E	2.35705	2.36483	0.00778		2.35980	0.00503	5			4		
6		F	1.95055	1.95962	0.00907		1.95331	0.00631	10			9		
7		G	2.03168	2.03826	0.00658		2.03240	0.00586	10			8		
8		H	2.22210	2.22930	0.00720		2.22315	0.00615	10			6		
9	Form Sed	A	1.94347	1.95557	0.01210		1.94803	0.00754	10			7		
10		B	2.21541	2.22572	0.01031		2.21922	0.00650	10			7		
11		C	2.26877	2.27663	0.00786		2.27169	0.00494	9			~~9~~ ① ~~8~~ 6 ③		
12		D	2.35656	2.36347	0.00691		2.35918	0.00429	10			4		
13		E	2.17949	2.18759	0.00810		2.18200	0.00559	5			4		
A Blank			2.35279	2.35274	-0.00005		2.35271	-0.00003						

① NB 9/12/12 ε ② cw 9/14/12 wp ③ cw 9/14/12 cf; 6 organisms in crucible

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[1] Add in weight loss of blank boat, if appropriate.

FCETL QA Form No.108
Revision 0
Effective 08/99

QA: AR09/27/12
AS 9/14/12

TEST ORGANISM DRY WEIGHT AND ASH-FREE DRY WEIGHT (AFDW)

Project No: 60225262-058 (090-095)	TARE: Date/time: 9/12/12@1130-1230 Analyst: CW	Dried in Oven # 3 from Date: 9/12/12 Time: 1415 Oven °C: 60-90 to Date: 9/13/12 Time: 0825
Species: Chironomus dilutus [✓ Lot]/Batch No.: 12-026	DRY GROSS: Date/time: 9/13/12@0915-1030 Analyst: CW	Ashed in Furnace from Date: 9/13/12 Time: 1100 Furnace °C: 500-550 to Date: 9/13/12 Time: 1550
Analytical Balance ID: Sart #1	ASHED GROSS: Date/time: 9/14/12@0915-1015 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)
14	Form Sed	F	2.21723	2.22731	0.01008		2.22233	①~~2~~0.00498	5			5		
15		G	2.29085	2.30258	0.01173		2.29476	0.00782	10			7		
16		H	1.96478	1.97220	0.00742		1.96728	0.00492	10			6		
17	LJH	A	2.29303	2.30837	0.01534		2.29925	0.00912	10			9		
18		B	2.236689	2.24753	0.01064		2.24092	0.00661	10			6		
19		C	2.11464	2.12834	0.01370		2.12061	0.00773	10			8		
20		D	2.37652	2.38894	0.01242		2.38155	0.00739	10			8		
21		E	1.87370	1.88519	0.01149		1.87858	0.00661	5			5		
22		F	1.82782	1.83526	0.00744		1.83082	0.00444	9			3		
23		G	2.07917	2.09101	0.01184		2.08475	0.00626	5			5		
24		H	2.32530	2.33960	0.01430		2.33195	0.00765	10			8		
25	LSH	A	2.20604	2.21994	0.01390		2.21273	0.00721	10			7		
26		B	2.27462	2.28379	0.00917		2.27808	0.00571	10			5		
Blank														

①CW 9/14/12 wp

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[1] Add in weight loss of blank boat, if appropriate.

FCETL QA Form No.108
Revision 0
Effective 08/99

QA: AR 09/27/12
Ag 9/14/12

TEST ORGANISM DRY WEIGHT AND ASH-FREE DRY WEIGHT (AFDW)

Project No: 60225262-058-(090.095)
TARE: Date/time: 9/12/12 @ 1130-1230 Analyst: cw
Dried in Oven # 3 from Date: 9/12/12 Time: 1415
Oven °C: 60-90 to Date: 9/13/12 Time: 0825

Species: Chironomus dilutus
[✓ Lot]/Batch No.: 12-026
DRY GROSS: Date/time: 9/13/12 @ 0915-1030 Analyst: cw

Analytical Balance ID: Sart #1
ASHED GROSS: Date/time: 9/14/12 @ 0915-1015 Analyst: cw
Ashed in Furnace from Date: 9/13/12 Time: 1100
Furnace °C: 500-550 to Date: 9/13/12 Time: 1550

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)
27	LSH	C	1.98080	1.99208	0.01128		1.98557	0.00651	9			6		
28		D	2.20957	2.22405	0.01448		2.21663	0.00742	10			8		
29		E	2.24449	2.25467	0.01018		2.24893	0.00574	5			5		
30		F	2.05890	2.07054	0.01164		2.06362	0.00692	10			7		
31		G	2.23133	2.23391	0.00258		2.23234	0.00157	5			2		
32		H	2.30198	2.31323	0.01125		2.30611	0.00712	10			5		
33	MSH	A	2.24650	2.26156	0.01506		2.25383	0.00773	10			9		
34		B	1.82239	1.83549	0.01310		1.82778	0.00771	10			9		
35		C	2.08130	2.09439	0.01309		2.08716	0.00723	10			7		
36		D	2.02149	2.02861	0.00712		2.02413	0.00448	9			3		
37		E	1.87732	1.89018	0.01286		1.88244	0.00774	9			6		
38		F	2.24643	2.25856	0.01213		2.25164	0.00692	9			6		
39		G	1.94711	1.95797	0.01086		1.95132	0.00665	10			4		
Blank														

[1] Add in weight loss of blank boat, if appropriate.

TEST ORGANISM DRY WEIGHT AND ASH-FREE DRY WEIGHT (AFDW)

QA: AR09/27/12
AS 9/14/12

Project No: 60225262.038 (090.095)
Species: Chironomus dilutus
[✓ Lot]/Batch No.: 12-026
Analytical Balance ID: Sart #1

TARE: Date/time: 9/12/12 @1130-1230 Analyst: cu
DRY GROSS: Date/time: 9/13/12 @0915-1030 Analyst: cu
ASHED GROSS: Date/time: 9/14/12 @0915-1015 Analyst: cu

Dried in Oven # 3 from Date: 9/12/12 Time: 1415
Oven °C: 60-90 to Date: 9/13/12 Time: 0825

Ashed in Furnace from Date: 9/13/12 Time: 1100
Furnace °C: 500-550 to Date: 9/13/12 Time: 1550

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)
40	MSH	H	1.75885	1.77139	0.01254		1.76447	0.00692	5			5		
41	USC	A	1.88188	1.89160	0.00972		1.88452	0.00708	10			6		
42		B	1.93583	1.94754	0.01171		1.93983	0.00771	10			6		
43		C	2.21730	2.22704	0.00974		2.21981	0.00723	9			6		
44		D	2.24505	2.25303	0.00798		2.24706	0.00597	10			3		
45		E	2.24056	2.25283	0.01227		2.24468	0.00815	10			8		
46		F	1.87051	1.88372	0.01321		1.87399	0.00973	10			9		
47		G	1.87599	1.88581	0.00982		1.87827	0.00754	10			7		
48		H	1.98057	1.99141	0.01084		1.98322	0.00819	10			8		
49	LSLA	A	2.12128	2.13411	0.01283		2.12684	0.00727	10			6		
50		B	2.12989	2.14410	0.01421		2.13546	0.00864	10			7		
51		C	2.22980	2.24498	0.01518		2.23561	0.00937	10			8		
52		D	2.03553	2.05163	0.01610		2.04247	0.00916	10			9		
Blank														

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[1] Add in weight loss of blank boat, if appropriate.

TEST ORGANISM DRY WEIGHT AND ASH-FREE DRY WEIGHT (AFDW)

QA: AR 09/27/12
AS 9/14/12

Project No: 60225262.058-(090.095)
Species: Chironomus dilutus
[✓ Lot]/Batch No.: 12-026
Analytical Balance ID: Sart #1

TARE: Date/time: 9/12/12 @ 1130-1230 Analyst: CW
DRY GROSS: Date/time: 9/13/12 @ 0915-1030 Analyst: CW
ASHED GROSS: Date/time: 9/14/12 @ 0915-1015 Analyst: CW

Dried in Oven # 3 from Date: 9/12/12 Time: 1415
Oven °C: 60-90 to Date: 9/13/12 Time: 0825

Ashed in Furnace from Date: 9/13/12 Time: 1100
Furnace °C: 500-550 to Date: 9/13/12 Time: 1550

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)
53	LSLA	E	2.03753	2.05100	0.01347		2.04255	0.00845	10			7		
54		F	2.22819	2.24175	0.01356		2.23268	0.00907	10			7		
55		G	1.85794	1.86489	0.00695		1.85971	0.00518	5			4		
56		H	2.56437	2.57765	0.01328		2.56990	0.00775	10			5		
57	EFSC	A	1.93448	1.94146	0.00698		① 1.93606 ~~2.3~~	0.00540	10			5		
58		B	2.06912	2.07440	0.00528		2.07054	0.00386	10			5		
59		C	1.93999	1.94572	0.00573		1.94130	0.00442	10			6		
60		D	2.06067	2.06908	0.00841		2.06250	0.00658	10			7		
61		E	2.14745	2.15603	0.00858		2.14940	0.00663	10			8		
62		F	1.85407	1.86264	0.00857		1.85608	0.00656	10			8		
63		G	2.33456	2.33925	0.00469		2.33553	0.00372	5			3		
64		H	2.15885	2.16546	0.00661		2.16038	0.00508	5			4		
Blank														

①CW 9/14/12 WP

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[1] Add in weight loss of blank boat, if appropriate.

QA: AR 09/27/12
QA: ew 09/14/12
08 9/14/12

Spreadsheet for AFDW

Test Start Date:	8/31/2012			Test End Date:	9/10/2012
Test Number(s):	60225262-058-(090-095)			Test Material:	Sediment
Species:	*C. dilutus*			Entered by:	Andrea Sternenberger

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)	Mean wt per treatment (orig) (mg)	Number surviving	Mean wt per surviving	Mean wt per treatment (surv) (mg)
1	Sand Control	A	1.98756	1.99077	0.00321	0.00326	1.98791	0.00286	0.00283	5	0.5660	0.6473	2	1.4150	0.9054
2	Sand Control	B	2.20278	2.21517	0.01239	0.01244	2.20784	0.00733	0.00730	10	0.7300		9	0.8111	
3	Sand Control	C	1.88501	1.89180	0.00679	0.00684	1.88723	0.00457	0.00454	10	0.4540		7	0.6486	
4	Sand Control	D	1.89544	1.90275	0.00731	0.00736	1.89667	0.00608	0.00605	10	0.6050		9	0.6722	
5	Sand Control	E	2.35705	2.36483	0.00778	0.00783	2.35980	0.00503	0.00500	5	1.0000		4	1.2500	
6	Sand Control	F	1.95055	1.95962	0.00907	0.00912	1.95331	0.00631	0.00628	10	0.6280		9	0.6978	
7	Sand Control	G	2.03168	2.03826	0.00658	0.00663	2.03240	0.00586	0.00583	10	0.5830		8	0.7288	
8	Sand Control	H	2.22210	2.22930	0.00720	0.00725	2.22315	0.00615	0.00612	10	0.6120		6	1.0200	
9	Form Sed Control	A	1.94347	1.95557	0.01210	0.01215	1.94803	0.00754	0.00751	10	0.7510	0.7174	7	1.0729	1.0235
10	Form Sed Control	B	2.21541	2.22572	0.01031	0.01036	2.21922	0.00650	0.00647	10	0.6470		7	0.9243	
11	Form Sed Control	C	2.26877	2.27663	0.00786	0.00791	2.27169	0.00494	0.00491	9	0.5456		6	0.8183	
12	Form Sed Control	D	2.35656	2.36347	0.00691	0.00696	2.35918	0.00429	0.00426	10	0.4260		4	1.0650	
13	Form Sed Control	E	2.17949	2.18759	0.00810	0.00815	2.18200	0.00559	0.00556	5	1.1120		4	1.3900	
14	Form Sed Control	F	2.21723	2.22731	0.01008	0.01013	2.22233	0.00498	0.00495	5	0.9900		5	0.9900	
15	Form Sed Control	G	2.29085	2.30258	0.01173	0.01178	2.29476	0.00782	0.00779	10	0.7790		7	1.1129	
16	Form Sed Control	H	1.96478	1.97220	0.00742	0.00747	1.96728	0.00492	0.00489	10	0.4890		6	0.8150	
17	LJH	A	2.29303	2.30837	0.01534	0.01539	2.29925	0.00912	0.00909	10	0.9090	0.8609	9	1.0100	1.1217
18	LJH	B	2.23689	2.24753	0.01064	0.01069	2.24092	0.00661	0.00658	10	0.6580		6	1.0967	
19	LJH	C	2.11464	2.12834	0.01370	0.01375	2.12061	0.00773	0.00770	10	0.7700		8	0.9625	
20	LJH	D	2.37652	2.38894	0.01242	0.01247	2.38155	0.00739	0.00736	10	0.7360		8	0.9200	
21	LJH	E	1.87370	1.88519	0.01149	0.01154	1.87858	0.00661	0.00658	5	1.3160		5	1.3160	
22	LJH	F	1.82782	1.83526	0.00744	0.00749	1.83082	0.00444	0.00441	9	0.4900		3	1.4700	
23	LJH	G	2.07917	2.09101	0.01184	0.01189	2.08475	0.00626	0.00623	5	1.2460		5	1.2460	
24	LJH	H	2.32530	2.33960	0.01430	0.01435	2.33195	0.00765	0.00762	10	0.7620		8	0.9525	
25	LSH	A	2.20604	2.21994	0.01390	0.01395	2.21273	0.00721	0.00718	10	0.7180	0.6991	7	1.0257	1.0600
26	LSH	B	2.27462	2.28379	0.00917	0.00922	2.27808	0.00571	0.00568	10	0.5680		5	1.1360	
27	LSH	C	1.98080	1.99208	0.01128	0.01133	1.98557	0.00651	0.00648	9	0.7200		6	1.0800	
28	LSH	D	2.20957	2.22405	0.01448	0.01453	2.21663	0.00742	0.00739	10	0.7390		8	0.9238	
29	LSH	E	2.24449	2.25467	0.01018	0.01023	2.24893	0.00574	0.00571	5	1.1420		5	1.1420	
30	LSH	F	2.05890	2.07054	0.01164	0.01169	2.06362	0.00692	0.00689	10	0.6890		7	0.9843	
31	LSH	G	2.23133	2.23391	0.00258	0.00263	2.23234	0.00157	0.00154	5	0.3080		2	0.7700	
32	LSH	H	2.30198	2.31323	0.01125	0.01130	2.30611	0.00712	0.00709	10	0.7090		5	1.4180	

QA: CW 09/14/12

AS 9/14/12

Spreadsheet for AFDW

Test Start Date:	8/31/2012			**Test End Date:**	9/10/2012
Test Number(s):	60225262-058-(090-095)			**Test Material:**	Sediment
Species:	*C. dilutus*			**Entered by:**	Andrea Sternenberger

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)	Mean wt per treatment (orig) (mg)	Number surviving	Mean wt per surviving	Mean wt per treatment (surv) (mg)
33	MSH	A	2.24650	2.26156	0.01506	0.01511	2.25383	0.00773	0.00770	10	0.7700	0.8018	9	0.8556	1.2109
34	MSH	B	1.82239	1.83549	0.01310	0.01315	1.82778	0.00771	0.00768	10	0.7680		9	0.8533	
35	MSH	C	2.08130	2.09439	0.01309	0.01314	2.08716	0.00723	0.00720	10	0.7200		7	1.0286	
36	MSH	D	2.02149	2.02861	0.00712	0.00717	2.02413	0.00448	0.00445	9	0.4944		3	1.4833	
37	MSH	E	1.87732	1.89018	0.01286	0.01291	1.88244	0.00774	0.00771	9	0.8567		6	1.2850	
38	MSH	F	2.24643	2.25856	0.01213	0.01218	2.25164	0.00692	0.00689	9	0.7656		6	1.1483	
39	MSH	G	1.94711	1.95797	0.01086	0.01091	1.95132	0.00665	0.00662	10	0.6620		4	1.6550	
40	MSH	H	1.75885	1.77139	0.01254	0.01259	1.76447	0.00692	0.00689	5	1.3780		5	1.3780	
41	USC	A	1.88188	1.89160	0.00972	0.00977	1.88452	0.00708	0.00705	10	0.7050	0.7770	6	1.1750	1.2276
42	USC	B	1.93583	1.94754	0.01171	0.01176	1.93983	0.00771	0.00768	10	0.7680		6	1.2800	
43	USC	C	2.21730	2.22704	0.00974	0.00979	2.21981	0.00723	0.00720	9	0.8000		6	1.2000	
44	USC	D	2.24505	2.25303	0.00798	0.00803	2.24706	0.00597	0.00594	10	0.5940		3	1.9800	
45	USC	E	2.24056	2.25283	0.01227	0.01232	2.24468	0.00815	0.00812	10	0.8120		8	1.0150	
46	USC	F	1.87051	1.88372	0.01321	0.01326	1.87399	0.00973	0.00970	10	0.9700		9	1.0778	
47	USC	G	1.87599	1.88581	0.00982	0.00987	1.87827	0.00754	0.00751	10	0.7510		7	1.0729	
48	USC	H	1.98057	1.99141	0.01084	0.01089	1.98322	0.00819	0.00816	10	0.8160		8	1.0200	
49	LSLA	A	2.12128	2.13411	0.01283	0.01288	2.12684	0.00727	0.00724	10	0.7240	0.8725	6	1.2067	1.2430
50	LSLA	B	2.12989	2.14410	0.01421	0.01426	2.13546	0.00864	0.00861	10	0.8610		7	1.2300	
51	LSLA	C	2.22980	2.24498	0.01518	0.01523	2.23561	0.00937	0.00934	10	0.9340		8	1.1675	
52	LSLA	D	2.03553	2.05163	0.01610	0.01615	2.04247	0.00916	0.00913	10	0.9130		9	1.0144	
53	LSLA	E	2.03753	2.05100	0.01347	0.01352	2.04255	0.00845	0.00842	10	0.8420		7	1.2029	
54	LSLA	F	2.22819	2.24175	0.01356	0.01361	2.23268	0.00907	0.00904	10	0.9040		7	1.2914	
55	LSLA	G	1.85794	1.86489	0.00695	0.00700	1.85971	0.00518	0.00515	5	1.0300		4	1.2875	
56	LSLA	H	2.56437	2.57765	0.01328	0.01333	2.56990	0.00775	0.00772	10	0.7720		5	1.5440	
57	EFSC	A	1.93448	1.94146	0.00698	0.00703	1.93606	0.00540	0.00537	10	0.5370	0.6344	5	1.0740	0.9551
58	EFSC	B	2.06912	2.07440	0.00528	0.00533	2.07054	0.00386	0.00383	10	0.3830		5	0.7660	
59	EFSC	C	1.93999	1.94572	0.00573	0.00578	1.94130	0.00442	0.00439	10	0.4390		6	0.7317	
60	EFSC	D	2.06067	2.06908	0.00841	0.00846	2.06250	0.00658	0.00655	10	0.6550		7	0.9357	
61	EFSC	E	2.14745	2.15603	0.00858	0.00863	2.14940	0.00663	0.00660	10	0.6600		8	0.8250	
62	EFSC	F	1.85407	1.86264	0.00857	0.00862	1.85608	0.00656	0.00653	10	0.6530		8	0.8163	
63	EFSC	G	2.33456	2.33925	0.00469	0.00474	2.33553	0.00372	0.00369	5	0.7380		3	1.2300	
64	EFSC	H	2.15885	2.16546	0.00661	0.00666	2.16038	0.00508	0.00505	5	1.0100		4	1.2625	
Blank	A		2.35279	2.35274	-0.00005		2.35271	-0.00003							

```
Toxstat Version 3.5, Study #60225262-058-(090-095)                Page 16 of 35
Coeur Alaska, Inc.
C. dilutus Chronic Study
List Data and Summary Statistics for Growth (AFDW) PER ORIGINAL (CONTROLS ONLY)
```

QA: AR 09/27/12
QA:OW 9/19/12
AS 9/17/12

```
  Title:  60225262-058-(090-095) C.dilutus-Growth PO-controls
  File:       058cgpo.dat             Transform:             NO TRANSFORMATION
  Number of Groups:  2
  ----------------------------------------------------------------------------

     GRP  IDENTIFICATION   REP        VALUE          TRANS VALUE
     ---  ---------------  -----   -------------   -------------
      1         Form Sed    1            0.7510           0.7510
      1         Form Sed    2            0.6470           0.6470
      1         Form Sed    3            0.5456           0.5456
      1         Form Sed    4            0.4260           0.4260
      1         Form Sed    5            1.1120           1.1120
      1         Form Sed    6            0.9900           0.9900
      1         Form Sed    7            0.7790           0.7790
      1         Form Sed    8            0.4890           0.4890
      2             Sand    1            0.5660           0.5660
      2             Sand    2            0.7300           0.7300
      2             Sand    3            0.4540           0.4540
      2             Sand    4            0.6050           0.6050
      2             Sand    5            1.0000           1.0000
      2             Sand    6            0.6280           0.6280
      2             Sand    7            0.5830           0.5830
      2             Sand    8            0.6120           0.6120
  ----------------------------------------------------------------------------


  Title:  60225262-058-(090-095) C.dilutus-Growth PO-controls
  File:       058cgpo.dat             Transform:             NO TRANSFORMATION

            Summary Statistics on Data               TABLE 1 of 2
  ----------------------------------------------------------------------------

        GRP  IDENTIFICATION    N       MIN         MAX         MEAN
        ---  ---------------  ----  ----------  ----------  ----------
         1         Form Sed    8      0.4260      1.1120      0.7175
         2             Sand    8      0.4540      1.0000      0.6472
  ----------------------------------------------------------------------------


  Title:  60225262-058-(090-095) C.dilutus-Growth PO-controls
  File:       058cgpo.dat             Transform:             NO TRANSFORMATION

            Summary Statistics on Data               TABLE 2 of 2
  ----------------------------------------------------------------------------

     GRP  IDENTIFICATION     VARIANCE       SD         SEM          C.V. %
     ---  ---------------  ------------  ---------  ----------  ----------
      1         Form Sed       0.0581      0.2410     0.0852      33.5882
      2             Sand       0.0261      0.1616     0.0571      24.9639
  ----------------------------------------------------------------------------
```

```
Toxstat Version 3.5, Study #60225262-058-(090-095)                 Page 17 of 35
Coeur Alaska, Inc.
C. dilutus Chronic Study
Analysis of Growth PER ORIGINAL (CONTROLS ONLY) - AFDW


Title:  60225262-058-(090-095) C.dilutus-Growth PO-controls
  File:        058cgpo.dat                Transform:            NO TRANSFORMATION

                    Shapiro - Wilk's Test for Normality
  -----------------------------------------------------------------------------

       D =    0.5892
       W =    0.9262

       Critical W  = 0.8440 (alpha = 0.01 , N = 16)
                W  = 0.8870 (alpha = 0.05 , N = 16)

  -----------------------------------------------------------------------------

  Data PASS normality test (alpha = 0.01). Continue analysis.


  Title:  60225262-058-(090-095) C.dilutus-Growth PO-controls
  File:        058cgpo.dat                Transform:            NO TRANSFORMATION

                    F-Test for Equality of Two Variances
  -----------------------------------------------------------------------------
           GROUP   IDENTIFICATION           VARIANCE           F
           -----   --------------         ------------     ---------
             1          Form Sed             0.0581
             2              Sand             0.0261          2.2243
  -----------------------------------------------------------------------------
                                                        (p-value = 0.3135)
     Critical F = 8.8854    (P=0.01,  7,  7)
                  4.9949    (P=0.05,  7,  7)

     Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).
```

QA: AR 09/27/12
DS 9/17/12
QA: cw 9/19/12

```
Toxstat Version 3.5, Study #60225262-058-(090-095)
Coeur Alaska, Inc.
C. dilutus Chronic Study
Analysis of Growth PER ORIGINAL (CONTROLS ONLY) -AFDW

Title:  60225262-058-(090-095) C.dilutus-Growth PO-controls
  File:       058cgpo.dat             Transform:           NO TRANSFORMATION

                            ANOVA Table
  ------------------------------------------------------------------------------
     SOURCE              DF              SS                MS            F
  ------------------------------------------------------------------------------
     Between              1             0.0197            0.0197       0.4683
     Within (Error)      14             0.5892            0.0421
  ------------------------------------------------------------------------------
     Total               15             0.6090
  ------------------------------------------------------------------------------
                                                          (p-value = 0.5049)
     Critical F  = 8.8616  (alpha = 0.01, df = 1,14)
                 = 4.6001  (alpha = 0.05, df = 1,14)
     Since  F < Critical F  FAIL TO REJECT  Ho: All equal (alpha = 0.05)

  Title:  60225262-058-(090-095) C.dilutus-Growth PO-controls
  File:       058cgpo.dat             Transform:           NO TRANSFORMATION

         2 Sample t-Test   -   TABLE 1 OF 2          Ho: Control<Treatment
  ------------------------------------------------------------------------------
                                   TRANSFORMED    MEAN CALCULATED IN        SIG
  GROUP    IDENTIFICATION             MEAN         ORIGINAL UNITS     t STAT  0.05
  -----  --------------------    -----------   ------------------   ------  ---
    1              Form Sed         0.7175             0.7175
    2                  Sand         0.6472             0.6472         0.6844
  ------------------------------------------------------------------------------
    Equal Var: t critical value = 1.7613    (1 Tailed, alpha = 0.05, df = 14)
                                                     (p-value = 0.2525)

                                   TRANSFORMED    MEAN CALCULATED IN        SIG
  GROUP    IDENTIFICATION             MEAN         ORIGINAL UNITS     T STAT  0.05
  -----  --------------------    -----------   ------------------   ------  ---
    1              Form Sed         0.7175             0.7175
    2                  Sand         0.6472             0.6472         0.6844
  ------------------------------------------------------------------------------
  Unequal Var: t critical value = 1.7823    (1 Tailed, alpha = 0.05, df = 12)
                                                     (p-value = 0.2534)

         2 Sample t-Test   -   TABLE 2 OF 2          Ho: Control<Treatment
  ------------------------------------------------------------------------------
   Equal Variances:
  ------------------------------------------------------------------------------
                                NUM OF    MIN SIG DIFF     % OF     DIFFERENCE
  GROUP    IDENTIFICATION        REPS    (IN ORIG. UNITS)  CONTROL  FROM CONTROL
  -----  --------------------   -------  ----------------  -------  ------------
    1              Form Sed        8
    2                  Sand        8           0.1807        25.2       0.0702
  ------------------------------------------------------------------------------
    Unequal Variances:
  ------------------------------------------------------------------------------
                                NUM OF    MIN SIG DIFF     % OF     DIFFERENCE
  GROUP    IDENTIFICATION        REPS    (IN ORIG. UNITS)  CONTROL  FROM CONTROL
  -----  --------------------   -------  ----------------  -------  ------------
    1              Form Sed        8
    2                  Sand        8           0.1828        25.5       0.0702
  ------------------------------------------------------------------------------
```

QA: AR 09/27/12
OB 9/17/12
QA: CW 9/19/12

← no difference statistically so controls can be pooled together

```
Toxstat Version 3.5, Study #60225262-058-(090-095)               Page 19 of 35
Coeur Alaska, Inc.
C. dilutus Chronic Study
List Data for Growth PER ORIGINAL (All sites and pooled controls)-AFDW

  Title:  60225262-058-(090-095) C.dilutus-Growth PO-pooled&sites
  File:       058PGPO.DAT            Transform:             NO TRANSFORMATION
  Number of Groups:  7
  ----------------------------------------------------------------------------

     GRP  IDENTIFICATION   REP        VALUE          TRANS VALUE
     ---  ---------------- -----  -------------    -------------
      1    Form Sed\Sand    1           0.7510           0.7510
      1    Form Sed\Sand    2           0.6470           0.6470
      1    Form Sed\Sand    3           0.5456           0.5456
      1    Form Sed\Sand    4           0.4260           0.4260
      1    Form Sed\Sand    5           1.1120           1.1120
      1    Form Sed\Sand    6           0.9900           0.9900
      1    Form Sed\Sand    7           0.7790           0.7790
      1    Form Sed\Sand    8           0.4890           0.4890
      1    Form Sed\Sand    9           0.5660           0.5660
      1    Form Sed\Sand   10           0.7300           0.7300
      1    Form Sed\Sand   11           0.4540           0.4540
      1    Form Sed\Sand   12           0.6050           0.6050
      1    Form Sed\Sand   13           1.0000           1.0000
      1    Form Sed\Sand   14           0.6280           0.6280
      1    Form Sed\Sand   15           0.5830           0.5830
      1    Form Sed\Sand   16           0.6120           0.6120
      2              LJH    1           0.9090           0.9090
      2              LJH    2           0.6580           0.6580
      2              LJH    3           0.7700           0.7700
      2              LJH    4           0.7360           0.7360
      2              LJH    5           1.3160           1.3160
      2              LJH    6           0.4900           0.4900
      2              LJH    7           1.2460           1.2460
      2              LJH    8           0.7620           0.7620
      3              LSH    1           0.7180           0.7180
      3              LSH    2           0.5680           0.5680
      3              LSH    3           0.7200           0.7200
      3              LSH    4           0.7390           0.7390
      3              LSH    5           1.1420           1.1420
      3              LSH    6           0.6890           0.6890
      3              LSH    7           0.3080           0.3080
      3              LSH    8           0.7090           0.7090
      4              MSH    1           0.7700           0.7700
      4              MSH    2           0.7680           0.7680
      4              MSH    3           0.7200           0.7200
      4              MSH    4           0.4944           0.4944
      4              MSH    5           0.8567           0.8567
      4              MSH    6           0.7656           0.7656
      4              MSH    7           0.6620           0.6620
      4              MSH    8           1.3780           1.3780
      5              USC    1           0.7050           0.7050
      5              USC    2           0.7680           0.7680
      5              USC    3           0.8000           0.8000
      5              USC    4           0.5940           0.5940
      5              USC    5           0.8120           0.8120
      5              USC    6           0.9700           0.9700
      5              USC    7           0.7510           0.7510
      5              USC    8           0.8160           0.8160
      6             LSLA    1           0.7240           0.7240
      6             LSLA    2           0.8610           0.8610
      6             LSLA    3           0.9340           0.9340
```

AS 9/17/12
QA: CW 9/19/12
QA: AC 09/27/12

AB 9/17/12
QA:CW 9/19/12
QA: AR 09/27/12

```
   6             LSLA    4          0.9130           0.9130
   6             LSLA    5          0.8420           0.8420
   6             LSLA    6          0.9040           0.9040
   6             LSLA    7          1.0300           1.0300
   6             LSLA    8          0.7720           0.7720
   7             EFSC    1          0.5370           0.5370
   7             EFSC    2          0.3830           0.3830
   7             EFSC    3          0.4390           0.4390
   7             EFSC    4          0.6550           0.6550
   7             EFSC    5          0.6600           0.6600
   7             EFSC    6          0.6530           0.6530
   7             EFSC    7          0.7380           0.7380
   7             EFSC    8          1.0100           1.0100
 ---------------------------------------------------------------------------


 Title:  60225262-058-(090-095) C.dilutus-Growth PO-pooled&sites
 File:       058PGPO.DAT           Transform:            NO TRANSFORMATION

            Summary Statistics on Data              TABLE 1 of 2
 ---------------------------------------------------------------------------

         GRP  IDENTIFICATION     N       MIN         MAX         MEAN
         ---  ---------------- ----  ----------  ----------  ----------
          1   Form Sed\Sand     16    0.4260      1.1120      0.6824
          2             LJH      8    0.4900      1.3160      0.8609
          3             LSH      8    0.3080      1.1420      0.6991
          4             MSH      8    0.4944      1.3780      0.8018
          5             USC      8    0.5940      0.9700      0.7770
          6            LSLA      8    0.7240      1.0300      0.8725
          7            EFSC      8    0.3830      1.0100      0.6344
 ---------------------------------------------------------------------------


 Title:  60225262-058-(090-095) C.dilutus-Growth PO-pooled&sites
 File:       058PGPO.DAT           Transform:            NO TRANSFORMATION

            Summary Statistics on Data              TABLE 2 of 2
 ---------------------------------------------------------------------------

    GRP  IDENTIFICATION      VARIANCE       SD         SEM          C.V. %
    ---  ----------------  -------------  ---------  ----------   ----------
     1   Form Sed\Sand        0.0406     0.2015     0.0504       29.5285
     2             LJH        0.0814     0.2854     0.1009       33.1505
     3             LSH        0.0527     0.2296     0.0812       32.8357
     4             MSH        0.0656     0.2561     0.0906       31.9428
     5             USC        0.0114     0.1069     0.0378       13.7547
     6            LSLA        0.0092     0.0959     0.0339       10.9964
     7            EFSC        0.0377     0.1942     0.0687       30.6191
 ---------------------------------------------------------------------------
```

```
Toxstat Version 3.5, Study #60225262-058-(090-095)
Coeur Alaska, Inc.
C. dilutus Chronic Study
Analysis of Growth PER ORIGINAL (All sites and pooled controls)-AFDW
```

Note: Shapiro-Wilk's test cannot be run b/c # of replicates is >50

OS 9/17/12
QA: cw 9/19/12
QA: AR09/27/12

```
Title:  60225262-058-(090-095) C.dilutus-Growth PO-pooled&sites
  File:        058PGPO.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     4.2880         15.4880           24.4480         15.4880      4.2880
  OBSERVED     3              15                34              3            9

  ---------------------------------------------------------------------------

       Chi-Square =  19.3813               (p-value = 0.0007)

       Critical Chi-Square     = 13.277  (alpha = 0.01 , df = 4)
                               =  9.488  (alpha = 0.05 , df = 4)

  ---------------------------------------------------------------------------

  Data FAIL normality test (alpha = 0.01). Try another transformation.

  Warning    -  The first three homogeneity tests are sensitive to non-normality
                and should not be performed with this data as is.

  Title:  60225262-058-(090-095) C.dilutus-Growth PO-pooled&sites
  File:        058PGPO.DAT              Transform:            NO TRANSFORMATION

                    Bartlett's Test for Homogeneity of Variance
  ---------------------------------------------------------------------------

  Calculated B1 statistic = 11.5850              (p-value = 0.0719)

  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     9.14)

  Calculated B2 statistic = 13.2653              (p-value = 0.0390)

  Data PASS B2 homogeneity test at 0.01 level. Continue analysis.
```

```
Toxstat Version 3.5, Study #60225262-058-(090-095)
Coeur Alaska, Inc.
C. dilutus Chronic Study
Analysis of Growth PER ORIGINAL AFDW (All sites and pooled controls)

  Title:  60225262-058-(090-095) C.dilutus-Growth PO-pooled&sites
  File:       058PGPO.DAT              Transform:          NO TRANSFORMATION

  Wilcoxon's Rank Sum Test w/ Bonferroni Adjustment     Ho: Control<Treatment
  ----------------------------------------------------------------------------
                                  MEAN IN       RANK    CRIT.           SIG
  GROUP   IDENTIFICATION     ORIGINAL UNITS     SUM     VALUE    REPS   0.05
  -----  --------------------  -----------   -------   ------   -----   ---
    1        Form Sed\Sand        0.6824
    2                  LJH        0.8609      129.00     60       8
    3                  LSH        0.6991      108.00     60       8
    4                  MSH        0.8018      124.00     60       8
    5                  USC        0.7770      127.50     60       8
    6                 LSLA        0.8725      138.00     60       8
    7                 EFSC        0.6344       96.00     60       8
  ----------------------------------------------------------------------------
  Critical values are 1 tailed ( k = 6 )
```

AS 9/17/12
QA: CW 9/19/12
QA: MR09/27/12

```
Toxstat Version 3.5, Study #60225262-058-(090-095)                Page 23 of 35
Coeur Alaska, Inc.
C. dilutus Chronic Study
List Data and Summary Statistics for Growth PER SURVIVING (CONTROLS ONLY)-AFDW

  Title:  60225262-058-(090-095) C.dilutus-Growth PS-controls
  File:       058cgps.dat            Transform:            NO TRANSFORMATION
  Number of Groups:  2
  ------------------------------------------------------------------------------

     GRP  IDENTIFICATION   REP        VALUE         TRANS VALUE
     ---  ---------------- -----   -------------   -------------
      1              Sand   1           1.4150          1.4150
      1              Sand   2           0.8111          0.8111
      1              Sand   3           0.6486          0.6486
      1              Sand   4           0.6722          0.6722
      1              Sand   5           1.2500          1.2500
      1              Sand   6           0.6978          0.6978
      1              Sand   7           0.7288          0.7288
      1              Sand   8           1.0200          1.0200
      2          Form Sed   1           1.0729          1.0729
      2          Form Sed   2           0.9243          0.9243
      2          Form Sed   3           0.8183          0.8183
      2          Form Sed   4           1.0650          1.0650
      2          Form Sed   5           1.3900          1.3900
      2          Form Sed   6           0.9900          0.9900
      2          Form Sed   7           1.1129          1.1129
      2          Form Sed   8           0.8150          0.8150
  ------------------------------------------------------------------------------


  Title:  60225262-058-(090-095) C.dilutus-Growth PS-controls
  File:       058cgps.dat            Transform:            NO TRANSFORMATION

             Summary Statistics on Data              TABLE 1 of 2
  ------------------------------------------------------------------------------

          GRP  IDENTIFICATION    N      MIN         MAX         MEAN
          ---  ---------------- ----  ----------  ----------  ----------
           1              Sand   8     0.6486      1.4150      0.9054
           2          Form Sed   8     0.8150      1.3900      1.0235
  ------------------------------------------------------------------------------


  Title:  60225262-058-(090-095) C.dilutus-Growth PS-controls
  File:       058cgps.dat            Transform:            NO TRANSFORMATION

             Summary Statistics on Data              TABLE 2 of 2
  ------------------------------------------------------------------------------

     GRP  IDENTIFICATION     VARIANCE        SD         SEM         C.V. %
     ---  ---------------- -------------  ----------  ----------  ----------
      1              Sand        0.0850     0.2916      0.1031     32.2018
      2          Form Sed        0.0347     0.1863      0.0659     18.2038
  ------------------------------------------------------------------------------
```

AR 9/17/12
QA:CW 9/19/12
QA: AR 09/27/12

```
Toxstat Version 3.5, Study #60225262-058-(090-095)                Page 24 of 35
Coeur Alaska, Inc.
C. dilutus Chronic Study
Analysis of Growth PER SURVIVING AFDW (CONTROLS ONLY)

  Title:  60225262-058-(090-095) C.dilutus-Growth PS-controls
  File:        058cgps.dat               Transform:          NO TRANSFORMATION

                     Shapiro - Wilk's Test for Normality
  -----------------------------------------------------------------------------

       D =    0.8381
       W =    0.8857

       Critical W  = 0.8440 (alpha = 0.01 , N = 16)
                W  = 0.8870 (alpha = 0.05 , N = 16)

  -----------------------------------------------------------------------------

  Data PASS normality test (alpha = 0.01). Continue analysis.


  Title:  60225262-058-(090-095) C.dilutus-Growth PS-controls
  File:        058cgps.dat               Transform:          NO TRANSFORMATION

                     F-Test for Equality of Two Variances
  -----------------------------------------------------------------------------
           GROUP   IDENTIFICATION          VARIANCE          F
           -----   --------------        ------------    ---------
             1               Sand           0.0850
             2           Form Sed           0.0347          2.4487
  -----------------------------------------------------------------------------
                                                    (p-value = 0.2603)
    Critical F = 8.8854    (P=0.01, 7, 7)
                 4.9949    (P=0.05, 7, 7)

    Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).
```

DS 9/17/12
QA: CW 9/19/12
QA: AR09/27/12

```
Toxstat Version 3.5, Study #60225262-058-(090-095)                Page 25 of 35
Coeur Alaska, Inc.
C. dilutus Chronic Study
Analysis of Growth PER SURVIVING (CONTROLS ONLY)

  Title:  60225262-058-(090-095) C.dilutus-Growth PS-controls
  File:       058cgps.dat              Transform:             NO TRANSFORMATION
                                   ANOVA Table
  ------------------------------------------------------------------------------
     SOURCE             DF               SS                MS            F
  ------------------------------------------------------------------------------
     Between             1             0.0558            0.0558        0.9321
     Within (Error)     14             0.8381            0.0599
  ------------------------------------------------------------------------------
     Total              15             0.8939
  ------------------------------------------------------------------------------
                                                            (p-value = 0.3507)
     Critical F  = 8.8616  (alpha = 0.01, df = 1,14)
                 = 4.6001  (alpha = 0.05, df = 1,14)

     Since  F < Critical F  FAIL TO REJECT  Ho: All equal (alpha = 0.05)


  Title:  60225262-058-(090-095) C.dilutus-Growth PS-controls
  File:       058cgps.dat              Transform:             NO TRANSFORMATION

        2 Sample t-Test    -   TABLE 1 OF 2           Ho: Control>Treatment
  ------------------------------------------------------------------------------
                                 TRANSFORMED    MEAN CALCULATED IN         SIG
  GROUP    IDENTIFICATION           MEAN          ORIGINAL UNITS    t STAT  0.05
  -----  ------------------     -----------   ------------------  ------  ---
    1                  Sand       0.9054            0.9054
    2              Form Sed       1.0235            1.0235          0.9655
  ------------------------------------------------------------------------------
   Equal Var: t critical value = 1.7613    (1 Tailed, alpha = 0.05, df = 14)
                                                  (p-value = 0.1753)

                                 TRANSFORMED    MEAN CALCULATED IN         SIG
  GROUP    IDENTIFICATION           MEAN          ORIGINAL UNITS    T STAT  0.05
  -----  ------------------     -----------   ------------------  ------  ---
    1                  Sand       0.9054            0.9054
    2              Form Sed       1.0235            1.0235          0.9655
  ------------------------------------------------------------------------------
  Unequal Var: t critical value = 1.7823    (1 Tailed, alpha = 0.05, df = 12)
                                                  (p-value = 0.1767)
         2 Sample t-Test    -   TABLE 2 OF 2          Ho: Control>Treatment
  ------------------------------------------------------------------------------
   Equal Variances:
  ------------------------------------------------------------------------------
                               NUM OF    MIN SIG DIFF     % OF     DIFFERENCE
  GROUP    IDENTIFICATION       REPS   (IN ORIG. UNITS)  CONTROL  FROM CONTROL
  -----  ------------------   -------  ---------------- -------   ------------
    1                  Sand      8
    2              Form Sed      8          0.2155         23.8       0.1181
  ------------------------------------------------------------------------------
   Unequal Variances:
  ------------------------------------------------------------------------------
                               NUM OF    MIN SIG DIFF     % OF     DIFFERENCE
  GROUP    IDENTIFICATION       REPS   (IN ORIG. UNITS)  CONTROL  FROM CONTROL
  -----  ------------------   -------  ---------------- -------   ------------
    1                  Sand      8
    2              Form Sed      8          0.2180         24.1       0.1181
  ------------------------------------------------------------------------------
```

QA: AR 09/27/12
QA: CW 09/27/12
AS 9/27/12

hypothesis is reversed to detect difference

← no difference statistically so control data can be pooled together

```
Toxstat Version 3.5, Study #60225262-058-(090-095)                Page 26 of 35
Coeur Alaska, Inc.
C. dilutus Chronic Study
List Data for Growth PER SURVIVING (All sites and pooled controls)-AFDW

  Title:  60225262-058-(090-095) C.dilutus-Growth PS-pooled&sites
  File:        058pgps.dat             Transform:            NO TRANSFORMATION
  Number of Groups:  7
  ----------------------------------------------------------------------------

     GRP  IDENTIFICATION   REP       VALUE            TRANS VALUE
     ---  ---------------  -----  -------------     -------------
      1    Form Sed/Sand     1          1.4150            1.4150
      1    Form Sed/Sand     2          0.8111            0.8111
      1    Form Sed/Sand     3          0.6486            0.6486
      1    Form Sed/Sand     4          0.6722            0.6722
      1    Form Sed/Sand     5          1.2500            1.2500
      1    Form Sed/Sand     6          0.6978            0.6978
      1    Form Sed/Sand     7          0.7288            0.7288
      1    Form Sed/Sand     8          1.0200            1.0200
      1    Form Sed/Sand     9          1.0729            1.0729
      1    Form Sed/Sand    10          0.9243            0.9243
      1    Form Sed/Sand    11          0.8183            0.8183
      1    Form Sed/Sand    12          1.0650            1.0650
      1    Form Sed/Sand    13          1.3900            1.3900
      1    Form Sed/Sand    14          0.9900            0.9900
      1    Form Sed/Sand    15          1.1129            1.1129
      1    Form Sed/Sand    16          0.8150            0.8150
      2              LJH     1          1.0100            1.0100
      2              LJH     2          1.0967            1.0967
      2              LJH     3          0.9625            0.9625
      2              LJH     4          0.9200            0.9200
      2              LJH     5          1.3160            1.3160
      2              LJH     6          1.4700            1.4700
      2              LJH     7          1.2460            1.2460
      2              LJH     8          0.9525            0.9525
      3              LSH     1          1.0257            1.0257
      3              LSH     2          1.1360            1.1360
      3              LSH     3          1.0800            1.0800
      3              LSH     4          0.9238            0.9238
      3              LSH     5          1.1420            1.1420
      3              LSH     6          0.9843            0.9843
      3              LSH     7          0.7700            0.7700
      3              LSH     8          1.4180            1.4180
      4              MSH     1          0.8556            0.8556
      4              MSH     2          0.8533            0.8533
      4              MSH     3          1.0286            1.0286
      4              MSH     4          1.4833            1.4833
      4              MSH     5          1.2850            1.2850
      4              MSH     6          1.1483            1.1483
      4              MSH     7          1.6550            1.6550
      4              MSH     8          1.3780            1.3780
      5              USC     1          1.1750            1.1750
      5              USC     2          1.2800            1.2800
      5              USC     3          1.2000            1.2000
      5              USC     4          1.9800            1.9800
      5              USC     5          1.0150            1.0150
      5              USC     6          1.0778            1.0778
      5              USC     7          1.0729            1.0729
      5              USC     8          1.0200            1.0200
      6             LSLA     1          1.2067            1.2067
      6             LSLA     2          1.2300            1.2300
      6             LSLA     3          1.1675            1.1675
```

AS 9/17/12
QA: CW 9/19/12
QA: AR 09/27/12

Toxstat Version 3.5, Study #60225262-058-(090-095)

Page 27 of 35

Coeur Alaska, Inc.

C. dilutus Chronic Study

List Data and Summary Statistics for Growth PER SURVIVING – AFDW

(All sites and pooled controls)

AS 9/17/12
QA:CW 9/19/12
QA: AR 09/27/12

```
   6             LSLA    4        1.0144          1.0144
   6             LSLA    5        1.2029          1.2029
   6             LSLA    6        1.2914          1.2914
   6             LSLA    7        1.2875          1.2875
   6             LSLA    8        1.5440          1.5440
   7             EFSC    1        1.0740          1.0740
   7             EFSC    2        0.7660          0.7660
   7             EFSC    3        0.7317          0.7317
   7             EFSC    4        0.9357          0.9357
   7             EFSC    5        0.8250          0.8250
   7             EFSC    6        0.8163          0.8163
   7             EFSC    7        1.2300          1.2300
   7             EFSC    8        1.2625          1.2625
---------------------------------------------------------------------------


Title:  60225262-058-(090-095) C.dilutus-Growth PS-pooled&sites
File:      058pgps.dat              Transform:           NO TRANSFORMATION

           Summary Statistics on Data             TABLE 1 of 2
---------------------------------------------------------------------------

       GRP  IDENTIFICATION    N      MIN         MAX         MEAN
       ---  ---------------- ---- ----------  ----------  ----------
        1    Form Sed/Sand    16    0.6486      1.4150      0.9645
        2              LJH     8    0.9200      1.4700      1.1217
        3              LSH     8    0.7700      1.4180      1.0600
        4              MSH     8    0.8533      1.6550      1.2109
        5              USC     8    1.0150      1.9800      1.2276
        6             LSLA     8    1.0144      1.5440      1.2431
        7             EFSC     8    0.7317      1.2625      0.9552
---------------------------------------------------------------------------


Title:  60225262-058-(090-095) C.dilutus-Growth PS-pooled&sites
File:      058pgps.dat              Transform:           NO TRANSFORMATION

           Summary Statistics on Data             TABLE 2 of 2
---------------------------------------------------------------------------

   GRP  IDENTIFICATION       VARIANCE         SD         SEM         C.V. %
   ---  ----------------  --------------  ----------  ----------  ----------
    1    Form Sed/Sand         0.0596      0.2441      0.0610      25.3105
    2              LJH         0.0403      0.2008      0.0710      17.9021
    3              LSH         0.0358      0.1892      0.0669      17.8511
    4              MSH         0.0852      0.2918      0.1032      24.0996
    5              USC         0.1010      0.3178      0.1124      25.8895
    6             LSLA         0.0223      0.1493      0.0528      12.0086
    7             EFSC         0.0438      0.2092      0.0740      21.9053
---------------------------------------------------------------------------
```

Coeur Alaska, Inc.
C. dilutus Chronic Study
Analysis of Growth PER SURVIVING (All sites and pooled controls)-AFDW

AS 9/17/12
QA: CW 9/19/12
QP: AR09/27/12

```
  Title:  60225262-058-(090-095) C.dilutus-Growth PS-pooled&sites
  File:        058pgps.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     4.2880       15.4880           24.4480         15.4880      4.2880
  OBSERVED      2            22                 24               9            7

  ----------------------------------------------------------------------------

       Chi-Square =    8.4001              (p-value = 0.0780)

       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.
```

Note: shapiro-wilk's test cannot be run because # of replicates is > 50

```
  Title:  60225262-058-(090-095) C.dilutus-Growth PS-pooled&sites
  File:        058pgps.dat              Transform:            NO TRANSFORMATION

                 Bartlett's Test for Homogeneity of Variance
  ----------------------------------------------------------------------------

  Calculated B1 statistic =  5.3461              (p-value = 0.5003)

  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     9.14)

  Calculated B2 statistic =  6.1056              (p-value = 0.4115)

  Data PASS B2 homogeneity test at 0.01 level. Continue analysis.
```

Toxstat Version 3.5, Study #60225262-058-(090-095)
Coeur Alaska, Inc.
C. dilutus Chronic Study
Analysis of Growth PER SURVIVING (All sites and pooled controls)-AFDW

AS 9/17/12
QA:CW 9/19/12
QA: AR09/27/12

```
Title:  60225262-058-(090-095) C.dilutus-Growth PS-pooled&sites
File:       058pgps.dat              Transform:            NO TRANSFORMATION

                             ANOVA Table
--------------------------------------------------------------------------
   SOURCE               DF             SS                 MS           F
--------------------------------------------------------------------------
   Between               6            0.8678            0.1446       2.5823
   Within (Error)       57            3.1924            0.0560
--------------------------------------------------------------------------
   Total                63            4.0601
--------------------------------------------------------------------------
                                                      (p-value = 0.0278)

   Critical F  = 3.1364  (alpha = 0.01, df = 6,57)
               = 2.2625  (alpha = 0.05, df = 6,57)

   Since  F > Critical F  REJECT  Ho: All equal (alpha = 0.05)


Title:  60225262-058-(090-095) C.dilutus-Growth PS-pooled&sites
File:       058pgps.dat              Transform:            NO TRANSFORMATION

     Bonferroni t-Test   -   TABLE 1 OF 2          Ho: Control<Treatment
--------------------------------------------------------------------------
                                 TRANSFORMED   MEAN CALCULATED IN       SIG
GROUP   IDENTIFICATION              MEAN        ORIGINAL UNITS    t STAT  0.05
-----  --------------------     -----------   ------------------  ------  ---
  1          Form Sed/Sand        0.9645           0.9645
  2                    LJH        1.1217           1.1217        -1.5342
  3                    LSH        1.0600           1.0600        -0.9317
  4                    MSH        1.2109           1.2109        -2.4044
  5                    USC        1.2276           1.2276        -2.5674
  6                   LSLA        1.2431           1.2431        -2.7183
  7                   EFSC        0.9552           0.9552         0.0912
--------------------------------------------------------------------------
Bonferroni t critical value = 2.4667   (1 Tailed, alpha = 0.05, df = 6,57)


Title:  60225262-058-(090-095) C.dilutus-Growth PS-pooled&sites
File:       058pgps.dat              Transform:            NO TRANSFORMATION

     Bonferroni t-Test   -   TABLE 2 OF 2          Ho: Control<Treatment
--------------------------------------------------------------------------
                               NUM OF    MIN SIG DIFF    % OF   DIFFERENCE
GROUP   IDENTIFICATION          REPS   (IN ORIG. UNITS) CONTROL FROM CONTROL
-----  --------------------   -------  ---------------- ------- ------------
  1          Form Sed/Sand       16
  2                    LJH        8         0.2528        26.2     -0.1572
  3                    LSH        8         0.2528        26.2     -0.0955
  4                    MSH        8         0.2528        26.2     -0.2464
  5                    USC        8         0.2528        26.2     -0.2631
  6                   LSLA        8         0.2528        26.2     -0.2786
  7                   EFSC        8         0.2528        26.2      0.0093
--------------------------------------------------------------------------
```

```
Toxstat version 3.5, Study #60225262-058-(090-095)
Coeur Alaska, Inc.
Chironomus dilutus 10-day Chronic Study
Summary and Analysis of Control Survival
```

AR 09/28/12
QA:cw 09/28/12

```
File:      058chcon.dat            Transform:            NO TRANSFORMATION

           Summary Statistics on Data             TABLE 1 of 2
-----------------------------------------------------------------------------

        GRP  IDENTIFICATION    N     MIN         MAX         MEAN
        ---  ---------------  ----  ----------  ----------  ----------
         1            Sand     8    0.4000      0.9000      0.7500
         2        Form Sed     8    0.4000      1.0000      0.7000
-----------------------------------------------------------------------------


File:      058chcon.dat            Transform:            NO TRANSFORMATION

           Summary Statistics on Data             TABLE 2 of 2
-----------------------------------------------------------------------------

   GRP  IDENTIFICATION      VARIANCE        SD         SEM         C.V. %
   ---  ---------------  -------------  ----------  ----------  ----------
    1            Sand         0.0314     0.1773      0.0627     23.6375
    2        Form Sed         0.0286     0.1690      0.0598     24.1473
-----------------------------------------------------------------------------


File:      058chcon.dat            Transform:      ARC SINE(SQUARE ROOT(Y))

                  Shapiro - Wilk's Test for Normality
-----------------------------------------------------------------------------

     D =    0.5808
     W =    0.9651

     Critical W  = 0.8440 (alpha = 0.01 , N = 16)
              W  = 0.8870 (alpha = 0.05 , N = 16)

-----------------------------------------------------------------------------

Data PASS normality test (alpha = 0.01). Continue analysis.

File:      058chcon.dat            Transform:      ARC SINE(SQUARE ROOT(Y))

                  F-Test for Equality of Two Variances
-----------------------------------------------------------------------------
          GROUP    IDENTIFICATION          VARIANCE            F
          -----    ---------------       ------------      ---------
            1                Sand          0.0410
            2            Form Sed          0.0419            1.0220
-----------------------------------------------------------------------------
                                                  (p-value = 0.9779)
  Critical F = 8.8854   (P=0.01, 7, 7)
               4.9949   (P=0.05, 7, 7)

  Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).
```

Toxstat version 3.5, Study #60225262-058-(090-095)
Coeur Alaska, Inc.
Chironomus dilutus 10-day Chronic Study
Summary and Analysis of Control Survival

AR 09/28/12
QA:CU 09/28/12

```
   File:   058chsur.dat          Transform:  ARC SINE(SQUARE ROOT(Y))

       t-Test of Solvent and Blank Controls         Ho: GRP1 Mean = GRP2 Mean
 ==============================================================================
 GRP1 (Solvent cntl) Mean =      1.0654     Calculated t value =     0.5754
 GRP2 (Blank cntl) Mean   =      1.0068     Degrees of freedom =    14
 Difference in means      =      0.0586
 ==============================================================================
 2-sided t value (0.05,14) = 2.1448  No significant difference at alpha=0.05
 2-sided t value (0.01,14) = 2.9768  No significant difference at alpha=0.01

     WARNING:  This procedure assumes normality and equal variances!
```

Since no difference between controls, control data were pooled for further analysis

```
Toxstat version 3.5, Study #60225262-058-(090-095)
Coeur Alaska, Inc.
Chironomus dilutus 10-day Chronic Study
List Data for Survival (all treatments)
```

AR 09/28/12
QA:CU 09/28/12

```
 File:      058chsur.dat          Transform:            NO TRANSFORMATION
 Number of Groups:  8
 -------------------------------------------------------------------------

   GRP  IDENTIFICATION   REP       VALUE           TRANS VALUE
   --- ---------------- -----   -------------     -------------
    1             Sand    1           0.4000            0.4000
    1             Sand    2           0.9000            0.9000
    1             Sand    3           0.7000            0.7000
    1             Sand    4           0.9000            0.9000
    1             Sand    5           0.8000            0.8000
    1             Sand    6           0.9000            0.9000
    1             Sand    7           0.8000            0.8000
    1             Sand    8           0.6000            0.6000
    2         Form Sed    1           0.7000            0.7000
    2         Form Sed    2           0.7000            0.7000
    2         Form Sed    3           0.7000            0.7000
    2         Form Sed    4           0.4000            0.4000
    2         Form Sed    5           0.8000            0.8000
    2         Form Sed    6           1.0000            1.0000
    2         Form Sed    7           0.7000            0.7000
    2         Form Sed    8           0.6000            0.6000
    3              LJH    1           0.9000            0.9000
    3              LJH    2           0.6000            0.6000
    3              LJH    3           0.8000            0.8000
    3              LJH    4           0.8000            0.8000
    3              LJH    5           1.0000            1.0000
    3              LJH    6           0.3330            0.3330
    3              LJH    7           1.0000            1.0000
    3              LJH    8           0.8000            0.8000
    4              LSH    1           0.7000            0.7000
    4              LSH    2           0.5000            0.5000
    4              LSH    3           0.7000            0.7000
    4              LSH    4           0.8000            0.8000
    4              LSH    5           1.0000            1.0000
    4              LSH    6           0.7000            0.7000
    4              LSH    7           0.4000            0.4000
    4              LSH    8           0.5000            0.5000
    5              MSH    1           0.9000            0.9000
    5              MSH    2           0.9000            0.9000
    5              MSH    3           0.7000            0.7000
    5              MSH    4           0.4000            0.4000
    5              MSH    5           0.7000            0.7000
    5              MSH    6           0.6660            0.6660
    5              MSH    7           0.4000            0.4000
    5              MSH    8           1.0000            1.0000
    6              USC    1           0.6000            0.6000
    6              USC    2           0.6000            0.6000
    6              USC    3           0.7000            0.7000
    6              USC    4           0.3000            0.3000
    6              USC    5           0.8000            0.8000
    6              USC    6           0.9000            0.9000
    6              USC    7           0.7000            0.7000
    6              USC    8           0.8000            0.8000
    7             LSLA    1           0.6000            0.6000
    7             LSLA    2           0.7000            0.7000
    7             LSLA    3           0.8000            0.8000
    7             LSLA    4           0.9000            0.9000
    7             LSLA    5           0.7000            0.7000
    7             LSLA    6           0.7000            0.7000
    7             LSLA    7           0.8000            0.8000
    7             LSLA    8           0.5000            0.5000
```

Toxstat version 3.5, Study #60225262-058-(090-095)
Coeur Alaska, Inc.
Chironomus dilutus 10-day Chronic Study
List Data and Summary Statistics for Survival (all treatments)

AR 09/28/12
QA:CN 09/28/12

```
8               EFSC      1         0.5000            0.5000
8               EFSC      2         0.5000            0.5000
8               EFSC      3         0.6000            0.6000
8               EFSC      4         0.7000            0.7000
8               EFSC      5         0.8000            0.8000
8               EFSC      6         0.8000            0.8000
8               EFSC      7         0.6000            0.6000
8               EFSC      8         0.8000            0.8000
--------------------------------------------------------------------------


File:      058chsur.dat          Transform:             NO TRANSFORMATION

           Summary Statistics on Data              TABLE 1 of 2
--------------------------------------------------------------------------

        GRP  IDENTIFICATION     N      MIN        MAX        MEAN
        --- ---------------- ---- ---------- ---------- ----------
         1             Sand     8    0.4000     0.9000     0.7500
         2         Form Sed     8    0.4000     1.0000     0.7000
         3              LJH     8    0.3330     1.0000     0.7791
         4              LSH     8    0.4000     1.0000     0.6625
         5              MSH     8    0.4000     1.0000     0.7083
         6              USC     8    0.3000     0.9000     0.6750
         7             LSLA     8    0.5000     0.9000     0.7125
         8             EFSC     8    0.5000     0.8000     0.6625
--------------------------------------------------------------------------


Title:   60225262-058 Chironomus survival
File:      058chsur.dat          Transform:             NO TRANSFORMATION

           Summary Statistics on Data              TABLE 2 of 2
--------------------------------------------------------------------------

   GRP  IDENTIFICATION      VARIANCE        SD         SEM         C.V. %
   --- ---------------- -------------- ---------- ----------- -----------
    1             Sand         0.0314     0.1773     0.0627     23.6375
    2         Form Sed         0.0286     0.1690     0.0598     24.1473
    3              LJH         0.0492     0.2219     0.0784     28.4776
    4              LSH         0.0370     0.1923     0.0680     29.0205
    5              MSH         0.0501     0.2238     0.0791     31.5993
    6              USC         0.0336     0.1832     0.0648     27.1445
    7             LSLA         0.0155     0.1246     0.0441     17.4937
    8             EFSC         0.0170     0.1302     0.0460     19.6599
--------------------------------------------------------------------------
```

QA:cw 09/28/12
AR09/28/12

```
Toxstat version 3.5, Study #60225262-058-(090-095)
Coeur Alaska, Inc.
Chironomus dilutus 10-day Chronic Study
Analysis of Survival (all treatments, pooled controls)

  File:      058cpool.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 =   64
  ---------------------------------------------------------------------------

 File:      058cpool.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    4.2880       15.4880          24.4480        15.4880     4.2880
  OBSERVED     5             13               25             18          3
  ---------------------------------------------------------------------------

       Chi-Square =   1.3247              (p-value = 0.8572)

       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.

  File:      058cpool.dat             Transform:      ARC SINE(SQUARE ROOT(Y))

                   Bartlett's Test for Homogeneity of Variance
  ---------------------------------------------------------------------------
  Calculated B1 statistic =  4.8448                  (p-value = 0.5639)

  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    9.14)

  Calculated B2 statistic =  5.5015                  (p-value = 0.4813)

  Data PASS B2 homogeneity test at 0.01 level. Continue analysis.
```

AR 09/28/12
QA:cw 09/28/12

```
Toxstat version 3.5, Study #60225262-058-(090-095)
Coeur Alaska, Inc.
Chironomus dilutus 10-day Chronic Study
Analysis of Survival (all treatments, pooled controls)


   File:      058cpool.dat             Transform:     ARC SINE(SQUARE ROOT(Y))

                                  ANOVA Table
   ----------------------------------------------------------------------------

      SOURCE              DF              SS                 MS           F
   ----------------------------------------------------------------------------
      Between              6            0.1408             0.0235      0.5331

      Within (Error)      57            2.5086             0.0440
   ----------------------------------------------------------------------------
      Total               63            2.6494
   ----------------------------------------------------------------------------
                                                          (p-value = 0.7808)

      Critical F   = 3.1364  (alpha = 0.01, df = 6,57)
                   = 2.2625  (alpha = 0.05, df = 6,57)

      Since  F < Critical F  FAIL TO REJECT  Ho: All equal (alpha = 0.05)


   File:      058cpool.dat             Transform:     ARC SINE(SQUARE ROOT(Y))

        Bonferroni t-Test    -    TABLE 1 OF 2           Ho: Control<Treatment
   ----------------------------------------------------------------------------
                                   TRANSFORMED   MEAN CALCULATED IN  TRANS   SIG
   GROUP    IDENTIFICATION            MEAN        ORIGINAL UNITS     t STAT  0.05
   ----- --------------------    -----------   ------------------  ------  ---
     1        GRPS 1&2 POOLED       1.0361           0.7250
     2                    LJH       1.1120           0.7791        -0.8349
     3                    LSH       0.9685           0.6625         0.7442
     4                    MSH       1.0271           0.7083         0.0998
     5                    USC       0.9747           0.6750         0.6764
     6                   LSLA       1.0135           0.7125         0.2487
     7                   EFSC       0.9569           0.6625         0.8716
   ----------------------------------------------------------------------------
   Bonferroni t critical value = 2.4667   (1 Tailed, alpha = 0.05, df = 6,57)


   File:      058cpool.dat             Transform:     ARC SINE(SQUARE ROOT(Y))

        Bonferroni t-Test    -    TABLE 2 OF 2           Ho: Control<Treatment
   ----------------------------------------------------------------------------
                                 NUM OF    MIN SIG DIFF     % OF    DIFFERENCE
   GROUP    IDENTIFICATION        REPS    (IN ORIG. UNITS)  CONTROL  FROM CONTROL
   ----- --------------------   -------  ---------------- -------  ------------
     1        GRPS 1&2 POOLED     16
     2                    LJH      8          0.2137         28.9      -0.0541
     3                    LSH      8          0.2137         28.9       0.0625
     4                    MSH      8          0.2137         28.9       0.0167
     5                    USC      8          0.2137         28.9       0.0500
     6                   LSLA      8          0.2137         28.9       0.0125
     7                   EFSC      8          0.2137         28.9       0.0625
   ----------------------------------------------------------------------------
```

APPENDIX C

Analytical Data

Page ___ of ___
FCETL QA Form No.131
Revision 0
Effective 10/06
cw 09/13/12
aps AB 09/25/12

PERCENT TOTAL SOLIDS AND PERCENT TOTAL VOLATILE SOLIDS (TVS)

Project No: 60225262-058-(084-089) + (090-095)

Analytical Balance ID: AND #2

TARE: Date/time: 8/30/12 @ 1440-1515 Analyst: cc

DRY GROSS: Date/time: 8/31/12 @ 0840-0850 Analyst: cc

ASHED GROSS: Date/time: 9/4/12 @ 0830-0840 Analyst: cc

Dried in Oven # 1 from Date: 8/30/12 Time: 1520
Oven °C: 104 to Date: 8/31/12 Time: 0735

Ashed in Furnace from Date: 8/31/12 Time: 0855
Furnace °C: 550 to Date: 8/31/12 Time: 1550

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)
10	Sand	A	18.0146	28.2266	27.8082		27.7974	
8		B	12.0275	23.2549	22.7950		22.7835	
21	Form Sed	A	19.9277	29.1327	27.9679		27.4246	
9A		B	12.3792	22.3766	21.0345		20.4131	
3A	LJH	A	10.4477	21.1086	18.7410		18.5258	
6A		B	12.1577	21.2732	19.2273		19.0506	
14A	LSH	A	12.3597	22.0940	20.0165		$19.78\overset{2}{\underset{0}{\cancel{7}}}9$	
10A		B	12.0625	22.0877	19.9266		19.6866	
20A	USC	A	11.2564	21.4682	19.1632		18.8393	
7A		B	12.0204	22.2977	19.9080		19.5836	
19A	MSH	A	10.7019	20.5502	18.5951		18.3622	
18A		B	10.6860	21.1700	18.9697		18.7328	
Blank			20.2110	N/A	20.2112		20.2115	

[1] Add in weight loss of blank boat, if appropriate.

① cc 09/04/12 CC

Page ___ of ___
FCETL QA Form No.131
Revision 0
Effective 10/06
cw 09/13/12
QA: AR 09/25/12

PERCENT TOTAL SOLIDS AND PERCENT TOTAL VOLATILE SOLIDS (TVS)

Project No: 60225262.058 - (084-089) + (090-095)

Analytical Balance ID: A+D #2

TARE: Date/time: 08/30/12 @ 1440-1515 Analyst: cw

DRY GROSS: Date/time: 8/31/12 @ 0840-0850 Analyst: cw

ASHED GROSS: Date/time: 9/4/12 @ 0830-0840 Analyst: cw

Dried in Oven # 1 from Date: 8/30/12 Time: 1520
Oven °C: 104 to Date: 8/31/12 Time: 0735

Ashed in Furnace from Date: 8/31/12 Time: 0855
Furnace °C: 550 to Date: 8/31/12 Time: 1550

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)
17	LSLA	A	11.9310	21.4140	19.4808		19.2242	
5A		B	12.0068	22.6386	20.3870		20.1074	
4A	EFSC	A	10.7730	20.3986	13.0271		12.3821	
12A		B	10.7977	21.2387	13.3044		12.5907	
Blank								

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[1] Add in weight loss of blank boat, if appropriate.

Page __ of __
FCETL QA Form No. 132
Revision 0
Effective 10/09

QA: CJ 09/13/12
QA: AR 09/25/12

Percent Total Solids and Percent Total Volatile Solids

Project Number: 60225262-058-(084-089), (090-095)

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
Sand	A		18.0146	28.2266	27.8082	95.9029	95.9033	27.7974	0.1103	0.1085
	B		12.0275	23.2549	22.7950	95.9038		22.7835	0.1068	
Form Sed	A		19.9277	29.1327	27.9679	87.3460	86.9608	27.4246	6.7573	6.9684
	B		12.3792	22.3766	21.0345	86.5755		20.4131	7.1794	
LJH	A		10.4477	21.1086	18.7410	77.7917	77.6738	18.5258	2.5949	2.5471
	B		12.1577	21.2732	19.2273	77.5558		19.0506	2.4994	
LSH	A		12.3597	22.0940	20.0165	78.6579	78.5506	19.7829	3.0509	3.0514
	B		12.0625	22.0877	19.9266	78.4433		19.6866	3.0518	
USC	A		11.2564	21.4682	19.1632	77.4281	77.0879	18.8393	4.0965	4.1046
	B		12.0204	22.2977	19.9080	76.7478		19.5836	4.1128	
MSH	A		10.7019	20.5502	18.5951	80.1478	79.5803	18.3622	2.9506	2.9052
	B		10.6860	21.1700	18.9697	79.0128		18.7328	2.8598	
LSLA	A		11.9310	21.4140	19.4808	79.6140	79.2180	19.2242	3.3988	3.3676
	B		12.0068	22.6386	20.3870	78.8220		20.1074	3.3364	
EFSC	A		10.7730	20.3986	13.0271	23.4178	23.7164	12.3821	28.6145	28.5431
	B		10.7977	21.2357	13.3044	24.0151		12.5907	28.4717	
Blank			20.2110		20.2112			20.2115		

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

MSE Lab Services

Date: *02-Dec-11*

CLIENT: AECOM
Lab Order: 1111062
Project: FCETL/AECOM
Lab ID: 1111062-001A

Client Sample ID: FORM SED
Tag Number:
Collection Date: 11/10/2011 11:00:00 AM
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)

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)

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
Lab Order: 1111062
Project: FCETL/AECOM
Lab ID: 1111062-006A

Client Sample ID: LOWER SHERMAN
Tag Number:
Collection Date: 11/10/2011 11:00:00 AM
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)

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
Lab Order: 1111062
Project: FCETL/AECOM
Lab ID: 1111062-007A

Client Sample ID: LOWER JOHNSON
Tag Number:
Collection Date: 11/10/2011 11:00:00 AM
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)

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

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

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

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

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

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

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM
Work Order: 1111062
BatchID: R18203

Sample ID: ***1111062-004A-D*** *Method:* ***MSA15-5*** *Batch ID:* ***R18203*** *Analysis Date: 11/17/2011 5:50:00 PM*

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
% 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

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

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

CHAIN OF CUSTODY RECORD

1111062-

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: Romi.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
Forra 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) Christina Needham / AECOM

Signature: Christina Needham

Date: 11/14/11

Time: 1300

Received by: (Print Name)/(Affiliation) 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

G:\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

Tuesday, September 25, 2012

MSE
Analytical Laboratory

Rami Naddy
AECOM
4303 W Laporte Ave
Fort Collins, CO 80521

RE: 60225262-058

Work Order: 1207139

Dear Rami Naddy:

MSE Lab Services received 6 sample(s) on 7/25/2012 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

MSE Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

9/26/12 SW

MSE Lab Services

Date: *25-Sep-12*

CLIENT: AECOM
Lab Order: 1207139
Project: 60225262-058
Lab ID: 1207139-001

Client Sample ID: LSH (#25942)
Collection Date: 7/3/2012

Matrix: SEDIMENT

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
AVS-SEM METALS			**AVS-SEM**	**SW3005A**			Analyst: **tj**
Cadmium	0.00137	0.00002	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Copper	0.2112	0.00020	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
Lead	0.01701	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Nickel	0.04684	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Simultaneously Extracted Metal:	0.6375	0.00051	0.00191		µmoles/g	1	9/13/2012 12:12:08 PM
Zinc	0.3611	0.00050	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
PERCENT SOLIDS			**A2540G**				Analyst: **dk/jr**
Percent Solids	79.6	0.01	0.1		%	1	8/21/2012 3:40:00 PM
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**				Analyst: **jo**
Sulfide	ND	0.55	1.50		µmoles/g	1	8/29/2012 8:00:00 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: *25-Sep-12*

CLIENT: AECOM
Lab Order: 1207139
Project: 60225262-058
Lab ID: 1207139-002

Client Sample ID: MSH (#25943)
Collection Date: 7/3/2012

Matrix: SEDIMENT

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
AVS-SEM METALS			**AVS-SEM**	**SW3005A**			Analyst: **tj**
Cadmium	0.00070	0.00002	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Copper	0.2810	0.00020	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
Lead	0.03112	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Nickel	0.05961	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Simultaneously Extracted Metal:	0.6320	0.00051	0.00191		µmoles/g	1	9/13/2012 12:12:08 PM
Zinc	0.2595	0.00050	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
PERCENT SOLIDS			**A2540G**				Analyst: **dk/jr**
Percent Solids	84.8	0.01	0.1		%	1	8/21/2012 3:40:00 PM
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**				Analyst: **jo**
Sulfide	0.93	0.55	1.50	J	µmoles/g	1	8/29/2012 8:00:00 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)

CLIENT: AECOM
Lab Order: 1207139
Project: 60225262-058
Lab ID: 1207139-003

Client Sample ID: USC (#25935)
Collection Date: 7/2/2012
Matrix: SEDIMENT

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
AVS-SEM METALS			**AVS-SEM**	**SW3005A**			Analyst: **tj**
Cadmium	0.00192	0.00002	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Copper	0.08115	0.00020	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
Lead	0.00379	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Nickel	0.05206	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Simultaneously Extracted Metal:	0.4368	0.00051	0.00191		µmoles/g	1	9/13/2012 12:12:08 PM
Zinc	0.2979	0.00050	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
PERCENT SOLIDS			**A2540G**				Analyst: **dk/jr**
Percent Solids	78.8	0.01	0.1		%	1	8/21/2012 3:40:00 PM
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**				Analyst: **jo**
Sulfide	1.35	0.55	1.50	J	µmoles/g	1	8/29/2012 8:00:00 AM

Qualifiers:

E	Value above quantitation range
J	Analyte detected below the Reporting Limit
MDL	Method Detection Limit
H	Holding times for preparation or analysis exceeded
Limit	Reporting Limit
ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *25-Sep-12*

CLIENT: AECOM
Lab Order: 1207139
Project: 60225262-058
Lab ID: 1207139-004

Client Sample ID: EFSC (#25937)
Collection Date:

Matrix: SEDIMENT

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
AVS-SEM METALS			**AVS-SEM**	**SW3005A**			Analyst: **tj**
Cadmium	0.06460	0.00002	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Copper	0.3021	0.00020	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
Lead	0.00944	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Nickel	0.5195	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Simultaneously Extracted Metal:	7.827	0.00051	0.00191		µmoles/g	1	9/13/2012 12:12:08 PM
Zinc	6.931	0.00050	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
PERCENT SOLIDS			**A2540G**				Analyst: **dk/jr**
Percent Solids	72.3	0.01	0.1		%	1	8/21/2012 3:40:00 PM
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**				Analyst: **jo**
Sulfide	1.10	0.55	1.50	J	µmoles/g	1	8/29/2012 8:00:00 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: *25-Sep-12*

CLIENT: AECOM
Lab Order: 1207139
Project: 60225262-058
Lab ID: 1207139-005

Client Sample ID: LJH (#25941)
Collection Date: 7/2/2012

Matrix: SEDIMENT

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
AVS-SEM METALS			**AVS-SEM**	**SW3005A**			Analyst: **tj**
Cadmium	0.00101	0.00002	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Copper	0.3437	0.00020	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
Lead	0.02664	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Nickel	0.03198	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Simultaneously Extracted Metal:	0.6427	0.00051	0.00191		µmoles/g	1	9/13/2012 12:12:08 PM
Zinc	0.2393	0.00050	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
PERCENT SOLIDS			**A2540G**				Analyst: **dk/jr**
Percent Solids	80.8	0.01	0.1		%	1	8/21/2012 3:40:00 PM
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**				Analyst: **jo**
Sulfide	1.05	0.55	1.50	J	µmoles/g	1	8/29/2012 8:00:00 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: *25-Sep-12*

CLIENT: AECOM
Lab Order: 1207139
Project: 60225262-058
Lab ID: 1207139-006

Client Sample ID: LSLA (#25936)
Collection Date: 7/3/2012
Matrix: SEDIMENT

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
AVS-SEM METALS			**AVS-SEM**	**SW3005A**			Analyst: **tj**
Cadmium	0.00573	0.00002	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Copper	0.1204	0.00020	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
Lead	0.01162	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Nickel	0.07371	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Simultaneously Extracted Metal:	1.049	0.00051	0.00191		µmoles/g	1	9/13/2012 12:12:08 PM
Zinc	0.8376	0.00050	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
PERCENT SOLIDS			**A2540G**				Analyst: **dk/jr**
Percent Solids	77.4	0.01	0.1		%	1	8/21/2012 3:40:00 PM
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**				Analyst: **jo**
Sulfide	0.99	0.55	1.50	J	µmoles/g	1	8/29/2012 8:00:00 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)

QA/QC SUMMARY REPORT

Client: AECOM
Project: 60225262-058
Work Order: 1207139
BatchID: 5937

Sample ID: ***X-PB-5937*** *Method:* ***AVS-SEM*** *Batch ID:* ***5937*** *Analysis Date: 9/13/2012 12:12:08 PM*

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Cadmium	ND	0.00010	µmoles/g							
Copper	0.00079	0.00100	µmoles/g							J
Lead	0.00009	0.00010	µmoles/g							J
Nickel	0.00074	0.00010	µmoles/g							
Simultaneously Extract	0.05240	0.00191	µmoles/g							
Zinc	0.05076	0.00100	µmoles/g							

Sample ID: ***PB-5937*** *Method:* ***AVS-SEM*** *Batch ID:* ***5937*** *Analysis Date: 9/13/2012 12:12:08 PM*

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Cadmium	ND	0.00010	µmoles/g							
Copper	0.00050	0.00100	µmoles/g							J
Lead	0.00001	0.00010	µmoles/g							J
Nickel	0.00055	0.00010	µmoles/g							
Simultaneously Extract	0.00500	0.00191	µmoles/g							
Zinc	0.00393	0.00100	µmoles/g							

Sample ID: ***LCS-5937*** *Method:* ***AVS-SEM*** *Batch ID:* ***5937*** *Analysis Date: 9/13/2012 12:12:08 PM*

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Cadmium	0.08513	0.00010	µmoles/g	0.08900	95.7	80	120			
Copper	0.1891	0.00100	µmoles/g	0.1570	120	80	120			
Lead	0.05578	0.00010	µmoles/g	0.04800	116	80	120			
Nickel	0.2018	0.00010	µmoles/g	0.1700	119	80	120			
Simultaneously Extract	0.7109	0.00191	µmoles/g	0.6170	115	80	120			
Zinc	0.1790	0.00100	µmoles/g	0.1530	117	80	120			

Sample ID: ***1207139-002A-D*** *Method:* ***AVS-SEM*** *Batch ID:* ***5937*** *Analysis Date: 9/13/2012 12:12:08 PM*

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Cadmium	0.00081	0.00010	µmoles/g					15.7	20	
Copper	0.2736	0.00100	µmoles/g					2.68	20	
Lead	0.02635	0.00010	µmoles/g					16.6	20	
Nickel	0.04883	0.00010	µmoles/g					19.9	20	
Simultaneously Extract	0.5976	0.00191	µmoles/g					5.60	20	
Zinc	0.2480	0.00100	µmoles/g					4.56	20	

Sample ID: ***1207139-002A-MS*** *Method:* ***AVS-SEM*** *Batch ID:* ***5937*** *Analysis Date: 9/13/2012 12:12:08 PM*

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Cadmium	0.06259	0.00010	µmoles/g	0.08278	74.8	75	125			
Copper	0.4461	0.00100	µmoles/g	0.1460	113	75	125			
Lead	0.07930	0.00010	µmoles/g	0.04464	108	75	125			
Nickel	0.2381	0.00010	µmoles/g	0.1581	113	75	125			
Simultaneously Extract	1.244	0.00191	µmoles/g	0.5739	107	75	125			
Zinc	0.4176	0.00100	µmoles/g	0.1423	111	75	125			

Sample ID: ***1207139-002A-MSD*** *Method:* ***AVS-SEM*** *Batch ID:* ***5937*** *Analysis Date: 9/13/2012 12:12:08 PM*

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Cadmium	0.06279	0.00010	µmoles/g	0.08278	75.0	75	125	0.327	20	
Copper	0.4282	0.00100	µmoles/g	0.1460	101	75	125	4.09	20	
Lead	0.07550	0.00010	µmoles/g	0.04464	99.4	75	125	4.90	20	

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: AECOM
Project: 60225262-058
Work Order: 1207139
BatchID: 5937

Sample ID: ***1207139-002A-MSD*** *Method:* ***AVS-SEM*** *Batch ID:* ***5937*** *Analysis Date: 9/13/2012 12:12:08 PM*

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Nickel	0.2249	0.00010	µmoles/g	0.1581	105	75	125	5.73	20	
Simultaneously Extract	1.189	0.00191	µmoles/g	0.5739	97.1	75	125	4.46	20	
Zinc	0.3980	0.00100	µmoles/g	0.1423	97.3	75	125	4.81	20	

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

MSE Analytical Laboratory

P.O. Box 4078
200 Technology Way
Butte, MT 59701

Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

Date: 25-Sep-12
Report Date: 25-Sep-12

QA/QC SUMMARY REPORT

Client: AECOM
Project: 60225262-058
Work Order: 1207139
BatchID: R20694

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***1207139-001A***			*Method:* ***A2540G***		*Batch ID:* ***R20694***			*Analysis Date: 8/21/2012 3:40:00 PM*		
Percent Solids	79.4	0.1	%					0.251	35	

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

MSE Analytical Laboratory

P.O. Box 4078
200 Technology Way
Butte, MT 59701

Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

Date: 25-Sep-12
Report Date: 25-Sep-12

QA/QC SUMMARY REPORT

Client: AECOM
Project: 60225262-058
Work Order: 1207139
BatchID: R20853

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***1207139-002A-D***			*Method:* ***AVS-SEM***		*Batch ID:* ***R20853***		*Analysis Date: 8/29/2012 8:00:00 AM*			
Sulfide	0.93	1.50	µmoles/g					0	35	J
Sample ID: ***1207139-003A-S***			*Method:* ***AVS-SEM***		*Batch ID:* ***R20853***		*Analysis Date: 8/29/2012 8:00:00 AM*			
Sulfide	9.85	1.50	µmoles/g	10.64	79.9	80	120			
Sample ID: ***LCS-WC 2634***			*Method:* ***AVS-SEM***		*Batch ID:* ***R20853***		*Analysis Date: 8/29/2012 8:00:00 AM*			
Sulfide	3.63	1.50	µmoles/g	4.194	86.6	85	105			
Sample ID: ***PB***			*Method:* ***AVS-SEM***		*Batch ID:* ***R20853***		*Analysis Date: 8/29/2012 8:00:00 AM*			
Sulfide	ND	1.50	µmoles/g							

Qualifiers:
NA Sample conc. is > 4*spike level
S Spike Recovery outside accepted recovery limits

AECOM

CHAIN OF CUSTODY RECORD

1207139

Page 1 of 1

Client/Project Name: 058

Project Location: FCETL/AECOM

Project Number: 60225262-058 2012

Field Logbook No.:

Sampler (Print Name)/(Affiliation): Client

Chain of Custody Tape Nos.: 43266

Signature:

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	AVS	Lab I.D.	Remarks
LSH (#25942)	7/3/12	Unk			4oz Glass	Sed	Ice		X	001	
MSH (#25943)	7/3/12								X	002	
U3C (#25935)	7/2/12								X	003	
EFSC (#25937)	Unk								X	004	
LSH (#25941)	7/2/12								X	005	
LSLA (#25936)	7/3/12								X		

Relinquished by: (Print Name)/(Affiliation) Christina Needham (AECOM)
Signature: Christina Needham
Date: 7/24/12
Time: 1300

Received by: (Print Name)/(Affiliation) B. O'Donnell
Signature: B. O'Donnell
Date: 7/25/12
Time: 1330

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

Overnight

Temp blank Yes No

O:\GRAPHICS\FORMS\Chain of Custody (COC)\Chain-of-Custody_FL Collins_10_07.doc

Serial No. № 52449

MSE Lab Services

Sample Receipt Checklist

Client Name AECOM_INC

Date and Time Received: 7/25/2012 1:30:00 PM

Work Order Number 1207139

RcptNo: 1

Received by BO

COC_ID:

CoolerID:

Checklist completed by BoDonnell 7/25/12
Signature Date

Reviewed by JW 7/26/12
Initials Date

Matrix:

Carrier name Priority US Mail

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 7/25/12

Sediment

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 = 1.2 DEGREE C - COOLER ON ICE.

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

September 27, 2012

Kevin Eppers
Coeur Alaska Inc.
Kensington Gold Mine
3031 Clinton Drive
Suite 202
Juneau AK 99801

Subject: Results of *Hyalella azteca* sediment toxicity test

Dear Mr. Eppers:

Attached is a copy of the report for the sediment toxicity test conducted with *Hyalella azteca* using sediment collected from six different sites. There were no statistically significant survival or growth effects in any of the six sampling sites. The analytical data including total metals, total organic carbon, and grain size determination and total solids and total suspended solids are included in this 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,

Andrea Sternenberger, M.S.
Data Analyst
andrea.sternenberger@aecom.com

Rami B. Naddy, Ph.D.
Study Director / Environmental Toxicologist
rami.naddy@aecom.com

Attachment:

60225262-058-(084-089)

Coeur Alaska, Inc.
Juneau, Alaska

Report of Short-Term Chronic Toxicity of Whole Sediment to *Hyalella azteca*

Prepared by

AECOM

AECOM Environment
Environmental Toxicology
Fort Collins, CO

60225262-058-(084-089)
September 2012

Report of Short-Term Chronic Toxicity of Whole Sediment to Hyalella azteca

Project IDs: 60225262-058-(084-089)
September 2012

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	Andrea Sternenberger, M.S. (970) 416-0916 email: andrea.sternenberger@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	August 10, 2012 @ 1510-1530 to August 20, 2012 @ 0830-1215	
Test Length	10 days	
Species	*Hyalella azteca*	
Test Material	Whole sediment	
Sediment ID	Sample ID	AECOM Laboratory ID
	LJH	25938, 25941
	LSH	25939, 25942
	MSH	25940, 25943
	USC	25932, 25935
	LSLA	25933, 25936
	EFSC	25934, 25937
Control Sediments	Silica Sand, Formulated Sediment	
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.[a]	Date of Receipt	Temp. at Arrival (°C)[b]
LJH	07/02/12 @ 1200	25938	07/20/12	17.1
LSH	07/03/12 @ 1100	25939	07/20/12	17.1
MSH	07/03/12 @ 1200	25940	07/20/12	17.1
USC	07/02/12 @ 0900	25932	07/20/12	19.6
LSLA	07/03/12 @ 0900	25933	07/20/12	19.6
EFSC	07/10/12 @ 1400	25934	07/20/12	19.6

[a] Upon sample receipt, each 1-gallon sample container of sediment was assigned a different sample number than the 4-oz glass jar of the same sediment sample designated for AVS analysis. The number assigned to the 1-gallon sample container used for sediment testing will be used for reporting purposes.

[b] Air temperature of cooler

Note: See Appendix A for copies of chain of custody records

Control Sediment

The primary control sediment was coarse silica sand, obtained from a local commercial supplier (manufactured by Unimin® Corporation). A second control, sediment with a smaller grain size and higher organic matter content, was prepared in the laboratory. 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)
Coarse 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

Initial Overlying Water Characterization

Batch No.	pH	Hard. (mg/L)[a]	Alk. (mg/L)[a]	Spec. Cond. (µS/cm)	TRC (mg/L)[b]	NH_3-N (mg/L)	Cl^- (mg/L)
10425	8.1	92	60	457	0.03	<1.0	50.2

[a] As $CaCO_3$

[b] Total residual chlorine

Test Sediment Preparation

Sample ID	Date Homogenized	Time Homogenized
Sand Control	August 9, 2012	1015-1018
Formulated Sediment		1010-1013
LJH		1029-1032
LSH		1107-1110
MSH		1017-1024
USC		1102-1107
LSLA		1106-1109
EFSC		1040-1043

Note: The formulated sediment was homogenized with overlying water on August 6, 2012 from 1459 to 1502 and held at 4ºC. On August 8, 2012 the wetted control sediment was placed at 25ºC overnight prior to test setup. Sediment was re-homogenized prior to addition to test chambers.

Overlying water was added to the sand control and formulated sediment during the homogenization process to wet both controls prior to placement in test chambers. Before, during, and after homogenization, any noticeable debris (including sticks and other plant material) and large stones were removed from the test 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[b]
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] The instantaneous temperatures in overlying water fell below the lower limit of 22°C but did not exceed the 3ºC differential on Day 6 in the sand control and test sediments (USC and EFSC only), and on Days 5 and 8 in one test sediment (EFSC) (temperature measured in one replicate per treatment each day).

Test Organism

Species and Lot Number	*Hyalella azteca*, FCETL Lot 12-022
Age	9 – 11 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 (50.2 and 50.1 mg/L) as NaCl, RW # 10425 and 10438, respectively
Reference Toxicant Testing	Initiated August 10, 2012 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	97.5	0.084	0.086
Formulated Sediment	91.2	0.057	0.063
LJH	95.0	0.070	0.074
LSH	98.8	0.088	0.089
MSH	92.5	0.075	0.082
USC	98.8	0.082	0.083
LSLA	98.8	0.095	0.096
EFSC	96.2	0.060	0.062

Note: None of the test sediments had any statistically significant reductions in survival or growth relative to the formulated sediment. See Appendix B for test data sheets

Analytical Data

Parameter	Sample Identification							
	Sand	**Form. Sed.**	**LJH**	**LSH**	**MSH**	**USC**	**LSLA**	**EFSC**[a]
Metals (mg/kg-dry)[b]								
Aluminum	181	609	13,100	17,900	18,800	20,300	13,600	15,300
Chromium	4.25	8.25	35.5	51.4	48.1	125	32.0	38.9
Zinc	ND	ND	97.3	128	124	134	200	1,490
Arsenic	ND	ND	12.8	24.3	56.1	14.4	9.31	24.0
Cadmium	0.073	0.072	0.250	0.578	0.269	0.776	1.22	23.2
Copper	0.324	0.783	76.8	79.1	87.5	55.4	50.7	159
Lead	0.165	0.380	9.45	8.43	11.3	4.05	8.45	14.2
Nickel	0.511	0.820	23.4	40.2	39.3	78.4	43.2	153
Selenium	ND	ND	ND	ND	ND	0.606	ND	0.934 J
Silver	ND	ND	0.342	0.289	0.225 J	0.132 J	0.145 J	0.513 J
Mercury	ND	ND	0.119 J	0.0681 J	0.0581 J	0.0625 J	0.0994 J	0.327 J
Particle Size (%)[c]								
Clay	ND	10.0	8.0	4.0	4.0	2.0	2.0	40.0
Sand	96.0	86.0	92.0	96.0	96.0	98.0	98.0	26.0
Silt	4.0	4.0	ND	ND	ND	ND	ND	34.0
Texture	Sand	Loamy Sand	Sand	Sand	Sand	Sand	Sand	Clay
Coarse Material (2 mm)	ND	ND	ND	0.09 J	0.44	0.32	0.13	ND
TOC (%-dry)[d]	ND	28.7	1.19	0.82	1.05	3.74	1.67	16.7
Acid Volatile Sulfide (µmoles/g)	NM	NM	1.05 J	ND	0.93 J	1.35 J	0.99 J	1.10 J

[a] On one analytical report included in Appendix C, the sample ID for this site is labeled as “EFSA”; however, the correct sample ID is ”EFSC”.

[b] As, Cd, Cr, Cu, Pb, Ni, Se, and Ag by SW-846 Method 6020; Al and Zn by SW-846 Method 6010B; Hg by SW-846 7471B (USEPA 1986)

[c] Particle size was determined using ASTM Method D422 and Modified ASA 15-5

[d] 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

NM = Parameter not measured for this sample

Note: See Appendix C for a copy of the reports 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]
Sand	95.90	0.108
Formulated Sediment	86.96	6.97
LJH	77.67	2.55
LSH	78.55	3.05
MSH	77.09	4.10
USC	79.58	2.90
LSLA	79.22	3.37
EFSC	23.72	28.54

[a] Total solids were determined using Standard Methods 2540B (APHA 1998)

[b] Total volatile solids were determined using Standard Methods 2540E (APHA 1998)

Note: All values are means of duplicate analyses and determined at AECOM/FCETL. See Appendix C for data sheets.

Physical and Chemical Data

Sample ID	pH (s.u.)	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	8.0-8.3	6.3-6.9	475-496	21-23	<1.0	94-100	61-65
Formulated Sediment	8.0-8.3	5.4-6.6	512-524	22-23	<1.0	114-116	65-81
LJH	7.7-8.1	5.8-6.5	452-517	22-23	<1.0	92-106	56-61
LSH	7.8-8.2	5.9-6.6	481-580	22-23	<1.0	106-124	72-85
MSH	7.8-8.2	5.9-6.8	462-504	22-23	<1.0	98-102	62-68
USC	7.9-8.1	5.8-6.5	469-516	21-22	<1.0	98-112	68-74
LSLA	7.8-8.1	5.8-6.5	475-549	22-23	<1.0	100-112	72-74
EFSC	7.7-8.1	5.2-6.4	497-561	21-22	<1.0-1.5	128-136	93-97

[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
12-022	08/10/12 to 08/14/12	2,552	1,184	3,274

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.

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.

September 27, 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 B. Rehner

September 27, 2012

Quality Assurance Unit

Date

APPENDIX A

Chain of Custody

AECOM

CHAIN OF CUSTODY RECORD

6·6·2012

084-089

Page 1 of 1

Client/Project Name: Coeur Alaska

Project Number: 60225202-0588

Sampler (Print Name)/(Affiliation): Ben Brewster ADF+G

Signature: Benjamin Brewster

Project Location: FCETL

Field Logbook No.:

Chain of Custody Tape Nos.: 42700 (intact)

Send Results/Report to:

TAT:

Container Type
~~P~~ – Plastic
A – Amber Glass
~~C~~ – 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	S – Soil
WW – Wastewater	SL – Sludge
GW – Groundwater	~~SD~~ – Sediment
SW – Surface Water	SO – Solid
ST – Storm Water	A – Air
W – Water	① ~~L – Liquid~~
	P – Product

Field Sample No./Identification	Date	Time	COMP	GRAB	Sample Container (Size/Mat'l)	Matrix	Preserv.	Field Filtered	Analysis Requested										Lab I.D.	Remarks
Sediment LJH	7/2/12	1200			1 gal	① ~~L~~ SD	ICE		X										25938	
" LSH	7/3/12	1100			1 gal	① ~~L~~ SD	ICE		X										25939	
" MSH	7/3/12	1200			1 gal	① ~~L~~ SD	ICE		X										25940	
" LJH	7/2/12	1200			4oz	① ~~L~~ SD	ICE		X										25941	
" LSH	7/3/12	1100			4oz	① ~~L~~ SD	ICE		X										25942	
" MSH	7/3/12	1200			4oz	① ~~L~~ SD	ICE		X										25943	
																				(069)

Relinquished by: (Print Name)/(Affiliation)	Date / Time	Received by: (Print Name)/(Affiliation)	Date / Time
Ben Brewster ADFG Signature: Benjamin Brewster	Date: Time:	Amber Potts/AECOM Signature: Amber Potts	Date: 7/20/12 Time: 1015
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): rec. via Fed ex @ 17.1 Δ

AECOM Toxicology Lab
4303 W. Laporte Avenue
Fort Collins, CO 80521
(970) 416-0916
(970) 490-2963 (FAX)

Δ cooler temperature

Sample Shipped Via: UPS [✓ FedEx] Courier Other

Temp blank: Yes [✓ No]

① W 6·5·2012 Er.

Q:\GRAPHICS\FORMS\Chain of Custody (COC)\Chain-of-Custody_Ft. Collins_10_07.doc

Serial No. № 52344

AECOM

084-089

CHAIN OF CUSTODY RECORD

6.6.2012

Page 1 of 1

Client/Project Name: Coeur Alaska

Project Location: FCETC

Project Number: 60225262-058

Field Logbook No.:

Sampler (Print Name)/(Affiliation): Ben Brewster ADF&G

Chain of Custody Tape Nos.: 42588 *intact*

Signature:

Send Results/Report to:

TAT:

Analysis Requested

Container Type
- ~~P~~ – Plastic
- A – Amber Glass
- ~~C~~ – 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
- ① ~~L – Liquid~~
- P – Product

Field Sample No./Identification	Date	Time	COMP	GRAB	Sample Container (Size/Mat'l)	Matrix	Preserv.	Field Filtered	Analysis Requested										Lab I.D.	Remarks
Sediment (USC)	7/2/12	0900	X		1 gal	① ~~L~~ SD	ICE		X										25932	
" " LSLA	7/3/12	0900	X		1 gal	① ~~L~~ SD	ICE		X										25933	
" " EFSC	7/10/12	1400	X		1 gal	① ~~L~~ SD	ICE		X										25934	
" " USC	7/2/12	0900	X		4oz	① ~~L~~ SD	ICE		X										25935	
" " LSLA	7/3/12	0900	X		4oz	① ~~L~~ SD	ICE		X										25936	
" " EFSC	7/10/12	1400	X		4oz	① ~~L~~ SD	ICE		X										25937	

Relinquished by: (Print Name)/(Affiliation)	Date / Time	Received by: (Print Name)/(Affiliation)	Date / Time
Ben Brewster ADFG Signature:	Date: Time:	Amber Potts/AECOM Signature: Amber Potts	Date: 7/20/12 Time: 1015
 Signature:	Date: Time:	 Signature:	Date: Time:
 Signature:	Date: Time:	 Signature:	Date: Time:

(D69)

Analytical Laboratory (Destination):

rec. via Fedex @ 19.6°C △

AECOM Toxicology Lab
4303 W. Laporte Avenue
Fort Collins, CO 80521
(970) 416-0916
(970) 490-2963 (FAX)

△cooler temp

Sample Shipped Via: UPS [✓ FedEx] Courier Other

Temp blank: Yes [✓ No]

① w 6.5.2012 Er.

O:\GRAPHICS\FORMS\Chain of Custody (COC)\Chain-of-Custody_Ft. Collins_10_07.doc

Serial No. № 52343

APPENDIX B

Data Sheets

H. azteca 10-day Survival and Growth, Testing Cover Page

Project Number: 60225262-058-(084-089)

Protocol #: HA3AKiTE058.007

AS 9/18/12
QA: AP 09/25/12

Test Substance: Sediment

Test Species: *H. azteca*

Lot #: 12-022

Age: 9-11 days (7-14 days)

Supplier: ABS

Test Type: Chronic, Static-Renewal

Overlying Water: Reconstituted Fresh Water (Smith et al., 1997) - (RW# 10425 }+50 mg/L Cl⁻
10438 }

Investigators: CW/AB/KB/DM/AD/AM/AP/AP/mt

Sampling Date(s): 07/02/12 - 07/10/12

Sampling Time(s): LJH= 7/2/12@1200, LSH= 7/3/12@1100, MSH= 7/3/12@ 1200, USC= 7/2/12@ 0900, LSLA= 7/3/12@0900, EFSC= 7/10/12@1400

FCETL Sample #(s): 25938, 25939, 25940, 25932, 25933, 25934▲

Test Initiation Date/Time: 08/10/12 @ 1510-1530

Test Termination Date/Time: 08/20/12 @ 0820-1215

Renewal Frequency: Cont. drip, 2+ vol/day

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. Chmb/[✓ 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) Form Sed. (Cont.)
3) LJH
4) LSH
5) MSH
6) USC
7) LSLA
8) EFSC
9)
10)
11)

Reference Tox. Dates: 8/10/12 - 8/14/12

LC50: 2,552 mg/L Cl

Hist. Limits: 1184-3274

Method: Probit

Study Director Initials: CW for RBN

Date: August 8, 2012

Overlying water added at a minimum of 2 volume additions/day; equivalent to >350 ml/day or >0.24 ml/min

▲ Upon sample receipt, each container of sediment was assigned a different sample number resulting in each site having two sample ID's. Since both containers for each site contained aliquots of the same sediment, only one number will be used for reporting purposes.

⊛ started using new overlying water on 8/19/12

SEDIMENT/SOIL PREPARATION

Project Number: 60225262-058-(084-089)

QA: AR 09/25/12
OS 9/18/12

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

See TIE Sheet Daily Log for notes on the preparation of the formulated sediment (page 3)

Soil/sediment	FCETL#	Homogenization			
		Date	From	To	Analyst
Sand (Cont.)	NA	8/9/12	1015	1018	AB
Form Sed. (Cont.)*	NA	8/9/12	1010	1013	CW
LJH	25938	8/9/12	~~1015~~ ① 1029	~~1018~~ ① 1032	~~AB~~ ① CW
LSH	25939	8/9/12	1107	1110	AB
MSH	25940	8/9/12	1017	1024	KB
USC	25932	8/9/12	1102	1107	KB
LSLA	25933	8/9/12	1106	1109	CW
EFSC	25934	② 5/9/12	1040	1043	AB

* Re-homogenized form. sed. wetted on monday 8/6/12

① AB 8/9/12 WP
② OS for AB 9/18/12 CF = date = 8/9/12

08 9/18/12
QA: AR 09/25/12

SUBJECT: DAILY LOG

ALL ENTRIES MUST BE INITIALLED WITH DATE AND TIME:

602252602-058 H. azteca | C. dilutus

Preparation of formulated sediment

° Combined the following ingredients together in a 4-L glass Jar:

- 3105 g Coarse Silica Sand (washed w/ DI + baked until dry)
- 547.5 g Silt/Clay (ASP400)
- 18.75 g Dolomite
- 193.25 g α-cellulose (C09-054 (end), C12-087 (start))
- 0.375 g Humic Acid (Lot# C10-034)

Total = 3864.875 g

° Mixed Ingredients together on 8/6/12 @ 1110 - 1130 cw
° Placed Jar In ~~tumbeler~~ tumbler from 1145 - 1450 cw

- Homogenized ~1/2 of the formulated sediment with a small amount of Mod Hard + 50 mg/L Cl⁻ to wet the sediment from 1459 to 1502. ↳
↳ Placed the wet sediment @ 4°C in the dark. cw

8/8/12 - Pulled wet formulated sediment out of 4°C chamber and placed it in the 25°C chamber @ 0815 cw.

①cw 8/6/12 E

Page 4 of 33

QA: CW 09/14/12

QA: AR 09/25/12

BIOLOGICAL DATA *H. azteca* Chronic, Static-Renewal Project No, 60225262-058-(084-089)

Test terminated on 08/20/12 @ 0830 - 1215

% SURVIVAL

Sediment	Test Termination	A	B	C	D	E	F	G	H	Remarks:
Sand (cont)	# Surviving	10	10	8	10	10	10	10	10▲	97.5
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	0	0	2	0	0	0	0	0	
	Initials	AP	KB	mt	KB	cw	KB	AP	AP	
Form Sed. (Cont.)	# Surviving	10	7	7	10	10	10 AP①	9	10	(▲1 organism injured during teardown not included in growth analysis)
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	0	3	3	0	0	0	1	0	
	Initials	KB	cw	mt	KB	AP	AP	cw	AP	91.2
LJH	# Surviving	10	10	10	10	9	10	8	9	95
	# Observed Dead	0	0	0	0	1	0	0	0	
	# Not Found	0	0	0	0	0	0	2	1	
	Initials	AP	KB	KB	cw	mt	mt	KB	AP	
LSH	# Surviving	10 ~~10~~ 9①	10	10	10	10	10	9	10	98.8
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	0① ~~0~~ 1①	0	0	0	0	0	1	0	
	Initials	AP	AP	cw	cw	cw	mt	AP	AP	
MSH	# Surviving	9	10	10	8	10	10	10	7	92.5
	# Observed Dead	0	0	0	0	0	0	0	1	
	# Not Found	1	0	0	2	0	0	0	~~0~~ 2	
	Initials	KB	cw	AP	mt	cw	cw	mt	AP	
USC	# Surviving	10	10	10	9	10	10	10	10	98.8
	# Observed Dead	0	0	0	1	0	0	0	0	
	# Not Found	0	0	0	0	0	0	0	0	
	Initials	AP	KB	KB	cw	cw	AP	AP	AP	
LSLA	# Surviving	10	10	10	10	9	10	10	10	98.8
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	0	0	0	0	1	0	0	0	
	Initials	~~KB~~ AP①	AP	AP	KB	mt	cw	AP	AP	
EFSC	# Surviving	10	8	10	10	10	9	10 AP①	10	96.2
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	0	2	0	0	0	1	0	0	
	Initials	AR	AR	KB	cw	AP	mt	AP	AP	
	# Surviving									
	# Observed Dead									
	# Not Found									
	Initials									
	# Surviving									
	# Observed Dead									
	# Not Found									
	Initials									

①AP 8/20/12 E ②CW 08/20/12 WP

Page 5 of 23

QA: AR 09/25/12

~~AS~~ 9/18/12

CHEMICAL DATA (Composite of Overlying Water) *H. azteca* Chronic, Static-Renewal Project No. 60225262-058-(084-089)

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 Oxygen (mg/l)	Sand (cont)	6.6	6.6	6.5	6.3	6.5	6.7	6.6	6.4	6.6	6.9	6.7	0	5	8/10/12	1335	CW
	Form Sed. (Cont.)	6.6	6.0	6.0	5.4	5.9	6.6	6.1	5.7	5.7	6.6	6.2	1	5	8/11/12	1615	KB
	LJH	6.5	5.9	5.9	5.8	6.2	6.3	6.2	6.1	6.2	6.2	6.4	2	5	8/12/12	1620	KB
	LSH	6.2	6.0	6.0	5.9	6.3	6.6	6.2	6.2	6.1	6.1	6.5	3	5	8/13/12	1515	DM
	MSH	6.4	6.1	6.0	5.9	6.3	6.4	6.0	6.2	6.4	6.8	6.7	4	5	8/14/12	1600	AD
	USC	6.3	6.2	6.0	5.8	6.4	6.3	6.0	6.2	6.0	6.4	6.5	5	5	8/15/12	1350	DM
	LSLA	6.1	5.9	5.9	5.8	5.9	6.5	6.0	6.1	5.9	6.2	6.5	6	5	8/16/12	1350	DM
	EFSC	5.8	5.4	5.5	5.2	5.3	6.4	5.7	5.6	6.0	5.7	6.4	7	6	8/17/12	1040	AM
													8	6	8/18/12	1330	DM
													9	6	~~8/19~~ 8/19/12 ①	1510	DM
													10	5	8/20/12	1015	CW
	Replicate	A	B	C	D	E	F	G	H	A	B	C					
Temp (deg C)	Sand (cont)	22	23	22	22	23	23	21	22	22	22	22	0	D45	8/10/12	1325	CW
	Form Sed. (Cont.)	22	23	22	22	23	23	22	22	22	22	22	1	D45	8/11/12	1615	KB
	LJH	22	22	22	22	23	22	22	22	22	22	22	2	D45	8/12/12	1615	KB
	LSH	22	22	22	22	23	22	22	22	22	22	22	3	D45	8/13/12	1515	DM
	MSH	22	22	22	22	23	22	22	23	22	22	22	4	D63	8/14/12	1600	AD
	USC	22	22	22	22	22	22	21	22	22	22	22	5	D45	8/15/12	1335	DM
	LSLA	22	22	22	22	23	22	22	22	22	22	22	6	D45	8/16/12	1345	DM
	EFSC	22	22	22	22	22	21	21	22	21	22	22	7	D45	8/17/12	1030	AM
													8	D45	8/18/12	1330	DM
													9	D45	8/19/12	1510	DM
													10	D45	8/20/12	0830	CW
	Replicate	A	B	C	D	E	F	G	H	A	B	C					
pH	Sand (cont)	8.2	8.3	8.1	8.2	8.0	8.2	8.1	8.1	8.2	8.1	8.2	0	FM20	8/10/12	1335	CW
	Form Sed. (Cont.)	8.3	8.0	8.1	8.0	8.0	8.2	8.0	8.0	8.0	8.0	8.1	1	FM20	8/11/12	1615	KB
	LJH	8.1	7.8	7.8	7.7	7.7	7.8	7.9	8.0	7.9	7.8	8.0	2	FM20	8/12/12	1620	KB
	LSH	8.1	8.1	8.0	8.2	8.0	8.2	8.0	8.1	8.0	7.8	8.1	3	FM20	8/13/12	1515	DM
	MSH	8.1	7.8	7.9	8.0	7.8	8.0	7.9	8.1	8.1	8.0	8.2	4	FM20	8/14/12	1600	AD
	USC	8.0	8.0	8.0	8.0	7.9	8.0	7.9	8.1	7.9	8.0	8.1	5	FM20	8/15/12	1350	DM
	LSLA	7.9	7.9	7.9	7.9	7.8	8.1	7.9	8.0	7.9	8.0	8.1	6	FM20	8/16/12	1350	DM
	EFSC	7.9	7.9	7.8	7.8	7.7	8.1	7.7	7.9	7.9	7.8	8.0	7	FM20	8/17/12	1035	AM
													8	FM20	8/18/12	1330	DM
													9	FM20	8/19/12	1510	DM
	Replicate	A	B	C	D	E	F	G	H	A	B	C	10	FM20	8/20/12	1015	CW

① DM 8/19/12 C

OVERLYING WATER CHARACTERIZATION *H. azteca* Chronic, Static-Renewal Project No. 60225262-058-(084-089)

As 9/18/12
QA: AR 09/25/12

note: all data transcribed from WET Chemistry Log

	Conductivity (µS/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)	475	496	94	100	61	65	<1.0	<1.0	<1.0	<1.0
Form Sed. (Cont.)	512	524	114	116	65	81	<1.0	<1.0	<1.0	<1.0
LJH	452	517	92	106	56	61	<1.0	<1.0	<1.0	<1.0
LSH	481	580	106	124	72	85	<1.0	<1.0	<1.0	<1.0
MSH	462	504	98	102	62	68	<1.0	<1.0	<1.0	<1.0
USC	469	516	98	112	68	74	<1.0	<1.0	<1.0	<1.0
LSLA	475	549	100	112	74	72	<1.0	<1.0	<1.0	<1.0
EFSC	497	561	128	136	93	97	1.46 Δ	<1.0	<1.0	<1.0
Overlying Water										
RW#10425 (Cl=50.2 mg/L)	457		92		60		<1.0			
RW#10438 (Cl=50.1 mg/L)	472		90		59		<1.0*			
Meter #	15	15	TITR	TITR	TITR	TITR	HA#1	HA#1	HA#1	HA#1
Date:	8/10/12/8/19/12	8/20/12	8/10/12/8/19/12	8/20/12	8/10/12/8/19/12	8/20/12	8/10/12	8/13/12	8/17/12	8/20/12
Time:	1500/0945	1200	1430/0945	1500	1430/0945	1500	1550	1600	1100	1600
Initials:	As for ANP & AB	As for AR JC	As for ANP & AB	As for AR	As for ANP & AB	As for AR	As for ANP & AB	As for DM	As for AR	As for AR

TRC: (#21)
→ 0.03 (8/10/12) pH: 8.1 (8/8/12)
→ <0.02 (8/19/12) pH=8.0 (8/19/12)

QAs 9/18/12

*measured in source water
Δ measured in a preserved sample on 8/29/12

DAILY TESTING LOG   *H. azteca*   Chronic, Static-Renewal   Project No. 60225262-058-(084-089)

Page 7 of 33

QA: AR 09/25/12 AB 9/18/12

Day -1	Sediment Homogenized @ 1010 to 1110 Overlying water added to chambers @ 1150			Initials/Date: 8/9/12 CW/AB
Day 0	Test organisms added to chambers @ 1510-1530 Bath CT = 23.2 °C	Range = 23.0-23.4 °C	Feeding: @ 1535 AB	Initials/Date: CW/AB 08/10/12
Day 1	Bath CT = 23.2 °C	Range = 23.0-23.4 °C	Feeding: @ 1620 KB	Initials/Date: KB 8/11/12
Day 2	Bath CT = 23.2 °C	Range = 23.0-23.4 °C	Feeding: @ 1625 KB	Initials/Date: KB 8/12/12
Day 3	Bath CT = 23.2 °C	Range = 23.0-23.4 °C	Feeding: @ 1610 DM	Initials/Date: DM 8/13/12
Day 4	Bath CT = 23.2 °C	Range = 23.0-23.4 °C	Feeding: @ 1605 AD	Initials/Date: AD 8/14/12
Day 5	Bath CT = 23.2 °C	Range = 23.0-23.8 °C	Feeding: @ 1340	Initials/Date: DM 8/15/12
Day 6	Bath CT = 23.2 °C	Range = 23.0-23.4 °C	Feeding: @ 1400	Initials/Date: DM 8/16/12
Day 7	Bath CT = 23.2 °C	Range = 22.6-23.4 °C	Feeding: @ 1635	Initials/Date: AR 8/17/12
Day 8	Bath CT = 23.4 °C	Range = 22.6-23.8 °C	Feeding: @ 1335	Initials/Date: DM 8/18/12
Day 9	Bath CT = 23.4 °C	Range = 23.0-23.8 °C	Feeding: @ 1520	Initials/Date: DM 8/19/12
Day 10	Bath CT = 23.4 °C	Range = 23.0-23.8 °C	Feeding: NA	Initials/Date: CW/AP/Am/KB 8/20/12

Page 8 of 33
FCETL QA Form No. 010
Revision 5
Effective 08/99

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

cw 09/14/12
QA: MR09/25/12

Project Number: 60225262-058-(084-089)
Test Substance: Pre-weights
Species: Hyalella azteca
Analyst Tare: cw
Analyst Gross: cw
Date/Time of Tare Wt.: 8/10/12 @ 1530
Date/Time of Gross Wt.: 8/17/12 @ 0825

Comments:
Analytical Balance ID: Sart #1
Dried in Oven # 3 from Date: 8/10/12 Time: 1610
to Date: 8/17/12 Time: 0750

Boat No.	Treatment	Rep.	Length Units:	Weight Type (Circle): Wet Blot Dry [✓ Dry] 60-90°C (~~>100°C~~)① AFDW (>500°C)							[✓ Lot] or Batch Number: 12-022		
				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)
	Pre-weights	1		0.94193	0.94210	0.00017		~~15~~② 11			11 ▲		
		2		0.94450	0.94473	0.00023		15			15		
		3		0.94157	0.94186	0.00029		15			15		
		4		0.94769	0.94794	0.00025		15			15		
		5		0.93018	0.95044	0.00026		15			15		
Blank				0.94638	0.94636	-0.00002							
Range													
Mean													

Test Solution Volume:
Loading Rate:

[1] Add in weight loss of blank boat, if appropriate.

①cw 8/10/12 cf
②cw 8/17/12 E

▲Pan was knocked when moving into desiccator and 4 organisms were lost. cw

QA: AR 09/25/12
QA: CW 09/14/12
8/23/12

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(084-089)

Species: *Hyalella 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		0.94193	0.94210	0.00017	0.00019	11	0.017	0.0183	11	0.017	0.0183
	B		0.94450	0.94473	0.00023	0.00025	15	0.017		15	0.017	
	C		0.94157	0.94186	0.00029	0.00031	15	0.021		15	0.021	
	D		0.94769	0.94794	0.00025	0.00027	15	0.018		15	0.018	
	E		0.95018	0.95044	0.00026	0.00028	15	0.019		15	0.019	
Blank			0.94638	0.94636	-0.00002							

Summary Statistics for Growth Data (dry wt per original)

Treatment	N	Min	Max	Mean	SD	C.V.
Initial wts	5	0.017	0.021	0.0183	0.0015	8.459%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Initial wts	5	0.017	0.021	0.0183	0.0015	8.459%

FCETL QA Form No. 010
Revision 5
Effective 08/99

[redacted]

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

cu 09/14/12
AP: AR09/25/12

Project Number: 60225262-058-(084--089)

Test Substance: Sediment

Species: H. azteca

Analyst Tare: cu   Analyst Gross: cu

Date/Time of Tare Wt.: 08/20/12 @1230-1320

Date/Time of Gross Wt.: 08/22/12 @1115-1315

Comments:
Analytical Balance ID: Sart #1
Dried in Oven # 3 from Date: 08/20/12 Time: 1450
to Date: 08/22/12 Time: 0840

Weight Type (Circle): Wet Blot Dry [✓ Dry (~~>~~100°C)] 60-90°C AFDW (>500°C)

[✓ Lot] or Batch Number: 12-022

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)
	(control) Sand	A		0.93169	0.93246	0.00077					10		
		B		0.9375~~0~~1①	0.93848	0.00097⊛					10		
		C		0.94671	0.94735	0.00064					8		
		D		0.94757	0.94835	0.00078					10		
		E		0.94344	0.94405	0.00061		9			9▲		
		F		0.93778	0.93862	0.00084					10		
		G		0.93100	0.931~~97~~88②	0.00088					10		
		H		0.92728	0.92804	0.00076		9			9●		
	(control) Form. Sed.	A		0.92539	0.92595	0.00056⊛					10		
		B		0.94624	0.94669	0.00045					7		
		C		0.928~~19~~20①	0.92860	0.00040					7		
		D		0.94663	0.94729	0.00066⊛					10		
Blank				0.933~~61~~59①	0.93355	-0.00004							
Range													
Mean													

Test Solution Volume:

Loading Rate:

---

[1] Add in weight loss of blank boat, if appropriate.

① cu 8/20/12 E ② cu 08/22/12 E; re-weighed pan

● one organism was injured during takedown process and was excluded from dry wt. analysis

▲ one organism was lost during transfer from oven to dessicator.

⊛ removed organisms from original pan and re-weighed on a new pan and got the same net weight.

[redacted]

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

cw 09/14/12
QA: AR09/25/12

Project Number: 60225262-058-(084-089)
Test Substance: Sediment
Species: H. azteca
Analyst Tare: cw
Analyst Gross: cw
Date/Time of Tare Wt.: 08/20/12 @ 1230-1320
Date/Time of Gross Wt.: 08/22/12 @ 1115-1315

Comments:
Analytical Balance ID: Sart #1
Dried in Oven # 3 from Date: 08/20/12 Time: 1450
to Date: 08/22/12 Time: 0840

Weight Type (Circle): Wet Blot Dry [✓ Dry (60-90°C) ~~(>100°C)~~] AFDW (>500°C)

[✓ Lot] or Batch Number: 12-022

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)
	(control) Form Sed.	E		0.94365	0.94414	0.00049					10		
		F		0.94006	0.94056	0.00050					10		
		G		0.92886	0.92949	0.00063⊛					9		
		H		0.93050	0.93105	0.00055					10		
	LJH	A		0.9391~~2~~6①	0.93990	0.00074					10		
		B		0.94254	0.94323	0.00069					10		
		C		0.94702	0.94773	0.00071					10		
		D		0.94627	0.946~~88~~95②	0.000~~61~~68②					10		
		E		0.94755	0.94809	0.00054					9		
		F		0.94702	0.94769	0.00067					10		
		G		0.93450	0.93532	0.00082⊛					8Ⓐ		
		H		0.93164	0.93209	0.00045					9*		
Blank													
Range													
Mean													

Test Solution Volume:

Loading Rate:

[1] Add in weight loss of blank boat, if appropriate.

① cw 08/20/12 E
② cw 08/22/12 E; re-weighed pan

⊛ Removed organisms from original pan and weighed on a new tared pan. Net weight remained the same.
* 2 very small organisms
Ⓐ 3 Large organisms

FCETL QA Form No. 010
Revision 5
Effective 08/99

[redacted]

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

cw 09/14/12
QA: AR09/25/12

Project Number: 6022S262-088-(084-089)
Test Substance: Sediment
Species: H. azteca
Analyst Tare: cw
Analyst Gross: cw
Date/Time of Tare Wt.: 08/20/12 @1230 - 1320
Date/Time of Gross Wt.: 08/22/12 @1115 - 1315

Comments:
Analytical Balance ID: Sart #1
Dried in Oven # 3 from Date: 08/20/12 Time: 1450
to Date: 08/22/12 Time: 0840

Weight Type (Circle): Wet Blot Dry [✓ Dry (~~>100°C~~) 60-90°C] AFDW (>500°C)
[✓ Lot] or Batch Number: 12-022

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)
	LSH	A		0.94005	0.94085	0.00080					10		
		B		0.93956	0.940~~52~~47 ①	0.000~~96~~91					10		
		C		0.93512	0.93590	0.00078					10		
		D		0.94621	0.94707	0.00086					10		
		E		0.94469	0.94559	0.00090					10		
		F		0.94040	0.94113	0.00073					10*		
		G		0.92564	0.92652	0.00088 ⊛					9		
		H		0.92713	0.92795	0.00082					10		
	MSH	A		0.93101	0.93182	0.00081					9		
		B		0.92765	0.92830	0.00065 ⊛②Δ					10Δ		
		C		0.92202	0.92281	0.00079					10		
		D		0.93663	0.93730	0.00067					8		
Blank													
Range													
Mean													

Test Solution Volume:

Loading Rate:

[1] Add in weight loss of blank boat, if appropriate.

① cw 08/22/12 E; re-weighed pan
② cw 08/22/12 wp

*2 very small organisms
Δ organisms visibly smaller
⊛ Removed organisms from original pan and re-weighed in a new tared pan. Net weight did not change.

Page 13 of 33
FCETL QA Form No. 010
Revision 5
Effective 08/99

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

cw 09/14/12
QA: AR09/25/12

Project Number: 60225262-058-~~089~~ 084

Species: H. azteca

Date/Time of Tare Wt.: 08/20/12 @ 1230-1320

Test Substance: Sediment

Analyst Tare: cw Analyst Gross: cw

Date/Time of Gross Wt.: 08/22/12 @ 1115-1315

Comments:
Analytical Balance ID: Sart #1
Dried in Oven # 3 from Date: 08/20/12 Time: 1450
to Date: 08/22/12 Time: 0840

Weight Type (Circle): Wet Blot Dry [✓ Dry ~~(>100°C)~~ 60-90°C] AFDW (>500°C)

[✓ Lot] or Batch Number: 12-022

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)
	MSH	E		0.92769	0.92831	0.00062					10 *		
		F		0.92657	0.92733	0.00076					10		
		G		0.91700	0.91788	0.00088 ⊛					10		
		H		0.91740	0.91791	0.00051					7		
	USC	A		0.91800	0.91905	0.00105 ⊛					10 Ⓐ		
		B		0.92199	0.92287	0.00088 ⊛					10		
		C		0.92328	0.92404	0.00076 ⊛					10		
		D		0.92342	0.92407	0.00065					9		
		E		0.92551	0.926~~17~~19 ①	0.00068					10 ●		
		F		0.92722	0.92808	0.00086					10 ● ①		
		G		0.92905	0.92974	0.00069					10 ●		
		H		0.92489	0.92553	0.00064 ⊛					10 *		
Blank													
Range													
Mean													

Test Solution Volume:

Loading Rate:

---

[1] Add in weight loss of blank boat, if appropriate.

① cw 08/22/12 E

*3 very small organisms

Ⓐ organisms visibly large

⊛ Removed organisms from original pan and re-weighed on a new tared Pan. Net weight did not change.

● 2 very small organisms

FCETL QA Form No. 010
Revision 5
Effective 08/99

[redacted]

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

cw 09/14/12
QA: AR09/25/12

Project Number: 60025262-058-089 084
Species: H. azteca
Date/Time of Tare Wt.: 08/20/12 @ 1230-1320

Test Substance: Sediment
Analyst Tare: cw   Analyst Gross: cw
Date/Time of Gross Wt.: 08/22/12 @ 1115-1315

Comments:
Analytical Balance ID: Sart #1
Dried in Oven # 3 from Date: 08/20/12 Time: 1450
to Date: 08/22/12 Time: 0840

Weight Type (Circle): Wet Blot Dry [✓ Dry (~~>100°C~~) 60-90°C] AFDW (>500°C)

[✓ Lot] or Batch Number: 12-022

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)
	LSLA	A		0.93206	0.93315	0.00109					10 Ⓐ		
		B		0.93683	0.93764	0.00081					10		
		C		0.94179	0.94275	0.00096					10		
		D		0.94462	0.94552	0.00090					10		
		E		0.94596	0.94674	0.00078					9		
		F		0.94679	0.94771	0.00092					10		
		G		0.94089	0.94181	0.00092					10		
		H		0.93311	0.93399	0.00088					10		
	EFSC	A		0.92987	0.93048	0.00061					10		
		B		0.93466	0.93511	0.00045					8		
		C		0.93144	0.93206	0.00062					10		
		D		0.93077	0.93137	0.00060					10		
Blank													
Range													
Mean													

Test Solution Volume:

Loading Rate:

[1] Add in weight loss of blank boat, if appropriate.

Ⓐ organisms visibly very large

FCETL QA Form No. 010
Revision 5
Effective 08/99

[redacted]

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

cw 09/14/12
QA: AR 09/25/12

Project Number: 60225262-058-089 084
Test Substance: Sediment
Species: H. azteca
Analyst Tare: cw Analyst Gross: cw
Date/Time of Tare Wt.: 08/20/12 @ 1230-1320
Date/Time of Gross Wt.: 08/22/12 @ 1115-1315

Comments:
Analytical Balance ID: Sart #1
Dried in Oven # 3 from Date: 08/20/12 Time: 1450
to Date: 08/22/12 Time: 0840

Weight Type (Circle): Wet Blot Dry [✓ Dry ~~(>100°C)~~ 60-90°C] AFDW (>500°C)

[✓ Lot] or Batch Number: 12-022

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)
	EFSC	E		0.92648	0.92696	0.00048					10*		
		F		0.92586	0.92631	0.00045					9⊛		
		G		0.92668	0.92726	0.00058					10*		
		H		0.93488	0.93559	0.00071					10		
Blank													
Range													
Mean													

Test Solution Volume:
Loading Rate:

[1] Add in weight loss of blank boat, if appropriate.

*1 very small organism ⊛ 2 small organisms

QA: CW 09/14/12
QA: MR 09/25/12

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(084-089) Species: *Hyalella azteca*

AB 8/23/12

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		0.93169	0.93246	0.00077	0.00081	10	0.081		10	0.081	
	B		0.93751	0.93848	0.00097	0.00101	10	0.101		10	0.101	
	C		0.94671	0.94735	0.00064	0.00068	10	0.068		8	0.085	
	D		0.94757	0.94835	0.00078	0.00082	10	0.082		10	0.082	
	E		0.94344	0.94405	0.00061	0.00065	9	0.072		9	0.072	
	F		0.93778	0.93862	0.00084	0.00088	10	0.088		10	0.088	
	G		0.93100	0.93188	0.00088	0.00092	10	0.092		10	0.092	
	H		0.92728	0.92804	0.00076	0.00080	9	0.089	0.0841	9	0.089	0.0863
Blank			0.93359	0.93355	-0.00004							

Project Number: 60225262-058-(084-089) Species: *Hyalella azteca*

Summary Statistics for Growth Data (dry wt per original organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Sand Control	8	0.068	0.101	0.0841	0.0107	12.709%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Sand Control	8	0.072	0.101	0.0863	0.0085	9.842%

QA: CW 09/14/12
QA: AR 09/25/12

AS 8/23/12

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(084-089)   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)
Form Sed Control	A		0.92539	0.92595	0.00056	0.00060	10	0.060		10	0.060	
	B		0.94624	0.94669	0.00045	0.00049	10	0.049		7	0.070	
	C		0.92820	0.92860	0.00040	0.00044	10	0.044		7	0.063	
	D		0.94663	0.94729	0.00066	0.00070	10	0.070		10	0.070	
	E		0.94365	0.94414	0.00049	0.00053	10	0.053		10	0.053	
	F		0.94006	0.94056	0.00050	0.00054	10	0.054		10	0.054	
	G		0.92886	0.92949	0.00063	0.00067	10	0.067		9	0.074	
	H		0.93050	0.93105	0.00055	0.00059	10	0.059	0.0570	10	0.059	0.0629
Blank			0.93359	0.93355	-0.00004							

Project Number: 60225262-058-(084-089)   Species: *Hyalella azteca*

Summary Statistics for Growth Data (dry wt per original organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Form Sed Control	8	0.044	0.070	0.0570	0.0088	15.409%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Form Sed Control	8	0.053	0.074	0.0629	0.0079	12.529%

QA:CW 09/14/12

QA: AR09/25/12

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(084-089) Species: *Hyalella azteca*

AS 8/23/12

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)
LJH	A		0.93916	0.93990	0.00074	0.00078	10	0.078		10	0.078	
	B		0.94254	0.94323	0.00069	0.00073	10	0.073		10	0.073	
	C		0.94702	0.94773	0.00071	0.00075	10	0.075		10	0.075	
	D		0.94627	0.94695	0.00068	0.00072	10	0.072		10	0.072	
	E		0.94755	0.94809	0.00054	0.00058	10	0.058		9	0.064	
	F		0.94702	0.94769	0.00067	0.00071	10	0.071		10	0.071	
	G		0.93450	0.93532	0.00082	0.00086	10	0.086		8	0.108	
	H		0.93164	0.93209	0.00045	0.00049	10	0.049	0.0703	9	0.054	0.0744
Blank			0.93359	0.93355	-0.00004							

Project Number: 60225262-058-(084-089) Species: *Hyalella azteca*

Summary Statistics for Growth Data (dry wt per original organism)

Treatment	N	Min	Max	Mean	SD	C.V.
LJH	8	0.049	0.086	0.0703	0.0116	16.526%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
LJH	8	0.054	0.108	0.0744	0.0152	20.476%

QA:CW 09/14/12
QA: AR09/25/12

OS 8/23/12

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(084-089) 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)
LSH	A		0.94005	0.94085	0.00080	0.00084	10	0.084		10	0.084	
	B		0.93956	0.94047	0.00091	0.00095	10	0.095		10	0.095	
	C		0.93512	0.93590	0.00078	0.00082	10	0.082		10	0.082	
	D		0.94621	0.94707	0.00086	0.00090	10	0.090		10	0.090	
	E		0.94469	0.94559	0.00090	0.00094	10	0.094		10	0.094	
	F		0.94040	0.94113	0.00073	0.00077	10	0.077		10	0.077	
	G		0.92564	0.92652	0.00088	0.00092	10	0.092		9	0.102	
	H		0.92713	0.92795	0.00082	0.00086	10	0.086	0.0875	10	0.086	0.0888
Blank			0.93359	0.93355	-0.00004							

Project Number: 60225262-058-(084-089) Species: *Hyalella azteca*

Summary Statistics for Growth Data (dry wt per original organism)

Treatment	N	Min	Max	Mean	SD	C.V.
LSH	8	0.077	0.095	0.0875	0.0063	7.228%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
LSH	8	0.077	0.102	0.0888	0.0081	9.165%

QA:CW 09/14/12
QA: AR 09/25/12

DS 8/28/12

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(084-089) 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)
MSH	A		0.93101	0.93182	0.00081	0.00085	10	0.085		9	0.094	
	B		0.92765	0.92830	0.00065	0.00069	10	0.069		10	0.069	
	C		0.92202	0.92281	0.00079	0.00083	10	0.083		10	0.083	
	D		0.93663	0.93730	0.00067	0.00071	10	0.071		8	0.089	
	E		0.92769	0.92831	0.00062	0.00066	10	0.066		10	0.066	
	F		0.92657	0.92733	0.00076	0.00080	10	0.080		10	0.080	
	G		0.91700	0.91788	0.00088	0.00092	10	0.092		10	0.092	
	H		0.91740	0.91791	0.00051	0.00055	10	0.055	0.0751	7	0.079	0.0815
Blank			0.93359	0.93355	-0.00004							

Project Number: 60225262-058-(084-089) Species: *Hyalella azteca*

Summary Statistics for Growth Data (dry wt per original organism)

Treatment	N	Min	Max	Mean	SD	C.V.
MSH	8	0.055	0.092	0.0751	0.0120	15.996%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
MSH	8	0.066	0.094	0.0815	0.0103	12.620%

QA:CW 09/14/12
QA: AR09/25/12

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(084-089) Species: *Hyalella azteca*

AS 8/23/12

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)
USC	A		0.91800	0.91905	0.00105	0.00109	10	0.109		10	0.109	
	B		0.92199	0.92287	0.00088	0.00092	10	0.092		10	0.092	
	C		0.92328	0.92404	0.00076	0.00080	10	0.080		10	0.080	
	D		0.92342	0.92407	0.00065	0.00069	10	0.069		9	0.077	
	E		0.92551	0.92619	0.00068	0.00072	10	0.072		10	0.072	
	F		0.92722	0.92808	0.00086	0.00090	10	0.090		10	0.090	
	G		0.92905	0.92974	0.00069	0.00073	10	0.073		10	0.073	
	H		0.92489	0.92553	0.00064	0.00068	10	0.068	0.0816	10	0.068	0.0826
Blank			0.93359	0.93355	-0.00004							

Project Number: 60225262-058-(084-089) Species: *Hyalella azteca*

Summary Statistics for Growth Data (dry wt per original organism)

Treatment	N	Min	Max	Mean	SD	C.V.
USC	8	0.068	0.109	0.0816	0.0144	17.583%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
USC	8	0.068	0.109	0.0826	0.0136	16.500%

QA: CW 09/14/12
QA: AR 09/25/12
OS 8/23/12

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(084-089) 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)
LSLA	A		0.93206	0.93315	0.00109	0.00113	10	0.113		10	0.113	
	B		0.93683	0.93764	0.00081	0.00085	10	0.085		10	0.085	
	C		0.94179	0.94275	0.00096	0.00100	10	0.100		10	0.100	
	D		0.94462	0.94552	0.00090	0.00094	10	0.094		10	0.094	
	E		0.94596	0.94674	0.00078	0.00082	10	0.082		9	0.091	
	F		0.94679	0.94771	0.00092	0.00096	10	0.096		10	0.096	
	G		0.94089	0.94181	0.00092	0.00096	10	0.096		10	0.096	
	H		0.93311	0.93399	0.00088	0.00092	10	0.092	0.0948	10	0.092	0.0959
Blank			0.93359	0.93355	-0.00004							

Project Number: 60225262-058-(084-089) Species: *Hyalella azteca*

Summary Statistics for Growth Data (dry wt per original organism)

Treatment	N	Min	Max	Mean	SD	C.V.
LSLA	8	0.082	0.113	0.0948	0.0095	10.009%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
LSLA	8	0.085	0.113	0.0959	0.0082	8.544%

QA: CW 09/14/12
QA: AR 09/25/12
AZ 8/23/12

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(084-089) 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)
EFSC	A		0.92987	0.93048	0.00061	0.00065	10	0.065		10	0.065	
	B		0.93466	0.93511	0.00045	0.00049	10	0.049		8	0.061	
	C		0.93144	0.93206	0.00062	0.00066	10	0.066		10	0.066	
	D		0.93077	0.93137	0.00060	0.00064	10	0.064		10	0.064	
	E		0.92648	0.92696	0.00048	0.00052	10	0.052		10	0.052	
	F		0.92586	0.92631	0.00045	0.00049	10	0.049		9	0.054	
	G		0.92668	0.92726	0.00058	0.00062	10	0.062		10	0.062	
	H		0.93488	0.93559	0.00071	0.00075	10	0.075	0.0603	10	0.075	0.0625
Blank			0.93359	0.93355	-0.00004							

Project Number: 60225262-058-(084-089) Species: *Hyalella azteca*

Summary Statistics for Growth Data (dry wt per original organism)

Treatment	N	Min	Max	Mean	SD	C.V.
EFSC	8	0.049	0.075	0.0603	0.0093	15.513%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
EFSC	8	0.052	0.075	0.0625	0.0071	11.384%

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Toxstat Version 3.5, Study #60225262-058-(084-089)                   Page 24 of 33
Coeur Alaska, Inc.
Hyalella azteca 10-day Sub Chronic Study
List Data and Summary for Growth Per ORIGINAL Organism-Controls only
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QA: CW 09/14/12
QA: AR 09/25/12
8/24/12

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  Title:  60225262-058-(084-089) H.azteca-Growth PO-controls
  File:      0584cgpo.dat              Transform:            NO TRANSFORMATION
  Number of Groups:  2
  ------------------------------------------------------------------------------

     GRP  IDENTIFICATION    REP        VALUE            TRANS VALUE
     ---  ---------------  -----    -------------    -------------
      1            Sand      1            0.0810            0.0810
      1            Sand      2            0.1010            0.1010
      1            Sand      3            0.0680            0.0680
      1            Sand      4            0.0820            0.0820
      1            Sand      5            0.0720            0.0720
      1            Sand      6            0.0880            0.0880
      1            Sand      7            0.0920            0.0920
      1            Sand      8            0.0890            0.0890
      2        Form Sed      1            0.0600            0.0600
      2        Form Sed      2            0.0490            0.0490
      2        Form Sed      3            0.0440            0.0440
      2        Form Sed      4            0.0700            0.0700
      2        Form Sed      5            0.0530            0.0530
      2        Form Sed      6            0.0540            0.0540
      2        Form Sed      7            0.0670            0.0670
      2        Form Sed      8            0.0590            0.0590
  ------------------------------------------------------------------------------


  Title:  60225262-058-(084-089) H.azteca-Growth PO-controls
  File:      0584cgpo.dat              Transform:            NO TRANSFORMATION

             Summary Statistics on Data              TABLE 1 of 2
  ------------------------------------------------------------------------------

          GRP  IDENTIFICATION    N       MIN        MAX         MEAN
          ---  ---------------  ----  ----------  ----------  ----------
           1            Sand      8     0.0680      0.1010      0.0841
           2        Form Sed      8     0.0440      0.0700      0.0570
  ------------------------------------------------------------------------------


  Title:  60225262-058-(084-089) H.azteca-Growth PO-controls
  File:      0584cgpo.dat              Transform:            NO TRANSFORMATION

             Summary Statistics on Data              TABLE 2 of 2
  ------------------------------------------------------------------------------

     GRP  IDENTIFICATION       VARIANCE        SD          SEM          C.V. %
     ---  ---------------  -------------  ----------  ----------  ----------
      1            Sand          0.0001      0.0107      0.0038     12.7623
      2        Form Sed          0.0001      0.0088      0.0031     15.4089
  ------------------------------------------------------------------------------
```

QA:CW 09/14/12
QA: AR09/25/12
AB 8/24/12

```
Title:  60225262-058-(084-089) H.azteca-Growth PO-controls
  File:      0584cgpo.dat                Transform:            NO TRANSFORMATION

                        Shapiro - Wilk's Test for Normality
    ----------------------------------------------------------------------------

         D =    0.0013
         W =    0.9794

         Critical W  = 0.8440 (alpha = 0.01 , N = 16)
                  W  = 0.8870 (alpha = 0.05 , N = 16)

    ----------------------------------------------------------------------------

    Data PASS normality test (alpha = 0.01). Continue analysis.


    Title:  60225262-058-(084-089) H.azteca-Growth PO-controls
    File:      0584cgpo.dat                Transform:            NO TRANSFORMATION

                        F-Test for Equality of Two Variances
    ----------------------------------------------------------------------------
             GROUP   IDENTIFICATION          VARIANCE          F
             -----   --------------        ------------    ---------
               1             Sand             0.0001
               2           Form Sed           0.0001          1.4942
    ----------------------------------------------------------------------------
                                                 (p-value = 0.6093)
        Critical F = 8.8854    (P=0.01, 7, 7)
                     4.9949    (P=0.05, 7, 7)

        Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).
```

QA: AR 09/25/12
QA: CW 09/14/12
AS 8/24/12

Analysis of Growth Per ORIGINAL Organism-Controls only (Sand and Form Sed)

```
 Title:  60225262-058-(084-089) H.azteca-Growth PO-controls
 File:      0584cgpo.dat              Transform:            NO TRANSFORMATION
                                 ANOVA Table
 ----------------------------------------------------------------------------
    SOURCE             DF              SS                  MS           F
 ----------------------------------------------------------------------------
    Between             1            0.0029              0.0029      30.5915
    Within (Error)     14            0.0013              0.0001
 ----------------------------------------------------------------------------
    Total              15            0.0043
 ----------------------------------------------------------------------------
                                                        (p-value = 0.0001)
    Critical F  = 8.8616  (alpha = 0.01, df = 1,14)
                = 4.6001  (alpha = 0.05, df = 1,14)

    Since  F > Critical F  REJECT  Ho: All equal (alpha = 0.05)

  Title:  60225262-058-(084-089) H.azteca-Growth PO-controls
 File:      0584cgpo.dat              Transform:            NO TRANSFORMATION

        2 Sample t-Test   -   TABLE 1 OF 2          Ho: Control<Treatment
 ----------------------------------------------------------------------------
                                TRANSFORMED    MEAN CALCULATED IN       SIG
 GROUP    IDENTIFICATION           MEAN          ORIGINAL UNITS   t STAT  0.05
 -----  --------------------   -----------   ------------------  ------  ---
   1                   Sand      0.0841             0.0841
   2               Form Sed      0.0570             0.0570        5.5310  *
 ----------------------------------------------------------------------------
  Equal Var: t critical value = 1.7613    (1 Tailed, alpha = 0.05, df = 14)
                                                  (p-value = 0.0000)

                                TRANSFORMED    MEAN CALCULATED IN       SIG
 GROUP    IDENTIFICATION           MEAN          ORIGINAL UNITS   T STAT  0.05
 -----  --------------------   -----------   ------------------  ------  ---
   1                   Sand      0.0841             0.0841
   2               Form Sed      0.0570             0.0570        5.5310  *
 ----------------------------------------------------------------------------
 Unequal Var: t critical value = 1.7709    (1 Tailed, alpha = 0.05, df = 13)
                                                  (p-value = 0.0000)

         2 Sample t-Test   -   TABLE 2 OF 2          Ho: Control<Treatment
 ----------------------------------------------------------------------------
  Equal Variances:
 ----------------------------------------------------------------------------
                              NUM OF    MIN SIG DIFF     % OF    DIFFERENCE
 GROUP    IDENTIFICATION       REPS   (IN ORIG. UNITS)  CONTROL  FROM CONTROL
 -----  --------------------  -------  ---------------  -------  ------------
   1                   Sand      8
   2               Form Sed      8          0.0086        10.3       0.0271
 ----------------------------------------------------------------------------
   Unequal Variances:
 ----------------------------------------------------------------------------
                              NUM OF    MIN SIG DIFF     % OF    DIFFERENCE
 GROUP    IDENTIFICATION       REPS   (IN ORIG. UNITS)  CONTROL  FROM CONTROL
 -----  --------------------  -------  ---------------  -------  ------------
   1                   Sand      8
   2               Form Sed      8          0.0087        10.3       0.0271
 ----------------------------------------------------------------------------
```

DS 8/24/12
QA: CW 09/14/12
QA: NR 09/25/12

```
  Title:  60225262-058-(084-089) H.azteca-Growth PS-controls
  File:      0584cgps.dat              Transform:            NO TRANSFORMATION
  Number of Groups:  2
  ----------------------------------------------------------------------------

     GRP  IDENTIFICATION    REP        VALUE            TRANS VALUE
     ---  ---------------  -----    -------------    -------------
      1            Sand      1          0.0810            0.0810
      1            Sand      2          0.1010            0.1010
      1            Sand      3          0.0850            0.0850
      1            Sand      4          0.0820            0.0820
      1            Sand      5          0.0720            0.0720
      1            Sand      6          0.0880            0.0880
      1            Sand      7          0.0920            0.0920
      1            Sand      8          0.0890            0.0890
      2         Form Sed     1          0.0600            0.0600
      2         Form Sed     2          0.0700            0.0700
      2         Form Sed     3          0.0630            0.0630
      2         Form Sed     4          0.0700            0.0700
      2         Form Sed     5          0.0530            0.0530
      2         Form Sed     6          0.0540            0.0540
      2         Form Sed     7          0.0740            0.0740
      2         Form Sed     8          0.0590            0.0590
  ----------------------------------------------------------------------------


  Title:  60225262-058-(084-089) H.azteca-Growth PS-controls
  File:      0584cgps.dat              Transform:            NO TRANSFORMATION

             Summary Statistics on Data             TABLE 1 of 2
  ----------------------------------------------------------------------------

          GRP  IDENTIFICATION     N       MIN         MAX         MEAN
          ---  ---------------  ----  ----------  ----------  ----------
           1            Sand      8     0.0720      0.1010      0.0862
           2        Form Sed      8     0.0530      0.0740      0.0629
  ----------------------------------------------------------------------------


  Title:  60225262-058-(084-089) H.azteca-Growth PS-controls
  File:      0584cgps.dat              Transform:            NO TRANSFORMATION

             Summary Statistics on Data             TABLE 2 of 2
  ----------------------------------------------------------------------------

     GRP  IDENTIFICATION       VARIANCE        SD          SEM          C.V. %
     ---  ---------------  -------------  ----------  ----------   ----------
      1            Sand        0.0001       0.0085      0.0030        9.9109
      2         Form Sed       0.0001       0.0078      0.0028       12.3909
  ----------------------------------------------------------------------------
```

DS 8/24/12
QA'ed 09/14/12
QA: MR 09/25/12

```
Title:  60225262-058-(084-089) H.azteca-Growth PS-controls
  File:      0584cgps.dat                 Transform:               NO TRANSFORMATION

                    Shapiro - Wilk's Test for Normality
 ----------------------------------------------------------------------------

      D =    0.0009
      W =    0.9882

      Critical W  = 0.8440 (alpha = 0.01 , N = 16)
               W  = 0.8870 (alpha = 0.05 , N = 16)

 ----------------------------------------------------------------------------

 Data PASS normality test (alpha = 0.01). Continue analysis.


 Title:  60225262-058-(084-089) H.azteca-Growth PS-controls
 File:      0584cgps.dat                 Transform:               NO TRANSFORMATION

                    F-Test for Equality of Two Variances
 ----------------------------------------------------------------------------
          GROUP  IDENTIFICATION         VARIANCE          F
          -----  ---------------      ------------    ---------
            1              Sand          0.0001
            2          Form Sed          0.0001         1.2039
 ----------------------------------------------------------------------------
                                            (p-value = 0.8129)
   Critical F = 8.8854    (P=0.01, 7, 7)
                4.9949    (P=0.05, 7, 7)

   Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).
```

```
Coeur Alaska, Inc.
Hyalella azteca 10-day Sub Chronic Study
Analysis of Growth Per SURVIVING Organism-Controls only (Sand and Form Sed)

  Title:  60225262-058-(084-089) H.azteca-Growth PS-controls
  File:      0584cgps.dat             Transform:            NO TRANSFORMATION
                                 ANOVA Table
  ----------------------------------------------------------------------------
     SOURCE             DF             SS                 MS              F
  ----------------------------------------------------------------------------
     Between             1           0.0022             0.0022      32.6769
     Within (Error)     14           0.0009             0.0001
  ----------------------------------------------------------------------------
     Total              15           0.0031
  ----------------------------------------------------------------------------
                                                               (p-value = 0.0001)

     Critical F  = 8.8616  (alpha = 0.01, df = 1,14)
                 = 4.6001  (alpha = 0.05, df = 1,14)

     Since  F > Critical F  REJECT  Ho: All equal (alpha = 0.05)

         2 Sample t-Test   -   TABLE 1 OF 2          Ho: Control<Treatment
  ----------------------------------------------------------------------------
                               TRANSFORMED    MEAN CALCULATED IN          SIG
  GROUP    IDENTIFICATION          MEAN        ORIGINAL UNITS     t STAT  0.05
  ----- --------------------  -----------  ------------------  ------  ---
    1                 Sand      0.0862             0.0862
    2             Form Sed      0.0629             0.0629        5.7164   *
  ----------------------------------------------------------------------------
   Equal Var: t critical value = 1.7613   (1 Tailed, alpha = 0.05, df = 14)
                                                  (p-value = 0.0000)

                               TRANSFORMED    MEAN CALCULATED IN          SIG
  GROUP    IDENTIFICATION          MEAN        ORIGINAL UNITS     T STAT  0.05
  ----- --------------------  -----------  ------------------  ------  ---
    1                 Sand      0.0862             0.0862
    2             Form Sed      0.0629             0.0629        5.7164   *
  ----------------------------------------------------------------------------
  Unequal Var: t critical value = 1.7613   (1 Tailed, alpha = 0.05, df = 14)
                                                  (p-value = 0.0000)


         2 Sample t-Test   -   TABLE 2 OF 2          Ho: Control<Treatment
  ----------------------------------------------------------------------------
   Equal Variances:
  ----------------------------------------------------------------------------
                             NUM OF   MIN SIG DIFF    % OF    DIFFERENCE
  GROUP    IDENTIFICATION     REPS   (IN ORIG. UNITS)  CONTROL  FROM CONTROL
  ----- --------------------  -------  ---------------  -------  ------------
    1                 Sand      8
    2             Form Sed      8          0.0072        8.4       0.0234
  ----------------------------------------------------------------------------
    Unequal Variances:
  ----------------------------------------------------------------------------
                             NUM OF   MIN SIG DIFF    % OF    DIFFERENCE
  GROUP    IDENTIFICATION     REPS   (IN ORIG. UNITS)  CONTROL  FROM CONTROL
  ----- --------------------  -------  ---------------  -------  ------------
    1                 Sand      8
    2             Form Sed      8          0.0072        8.4       0.0234
  ----------------------------------------------------------------------------
```

08/24/12
QA: CW 09/14/12
QA: MR 09/25/12

an.cw 09/14/12
DS 8/24/12

```
Toxstat Version 3.5, Study #60225262-058-(084-089)
Coeur Alaska, Inc.
Hyalella azteca 10-day Sub Chronic Study
List Data for Growth Per SURVIVING Organism - Form Sediment as control

 Title:  60225262-058-(084-089)-H.azteca-Growth PS-Form Sed
 File:      0584FGPS.DAT           Transform:              NO TRANSFORMATION
 Number of Groups:  7
 -----------------------------------------------------------------------------

   GRP  IDENTIFICATION   REP        VALUE            TRANS VALUE
   ---  ---------------- -----  -------------     -------------
    1         Form Sed     1          0.0600               0.0600
    1         Form Sed     2          0.0700               0.0700
    1         Form Sed     3          0.0630               0.0630
    1         Form Sed     4          0.0700               0.0700
    1         Form Sed     5          0.0530               0.0530
    1         Form Sed     6          0.0540               0.0540
    1         Form Sed     7          0.0740               0.0740
    1         Form Sed     8          0.0590               0.0590
    2              LJH     1          0.0780               0.0780
    2              LJH     2          0.0730               0.0730
    2              LJH     3          0.0750               0.0750
    2              LJH     4          0.0720               0.0720
    2              LJH     5          0.0640               0.0640
    2              LJH     6          0.0710               0.0710
    2              LJH     7          0.1080               0.1080
    2              LJH     8          0.0540               0.0540
    3              LSH     1          0.0840               0.0840
    3              LSH     2          0.0950               0.0950
    3              LSH     3          0.0820               0.0820
    3              LSH     4          0.0900               0.0900
    3              LSH     5          0.0940               0.0940
    3              LSH     6          0.0770               0.0770
    3              LSH     7          0.1020               0.1020
    3              LSH     8          0.0860               0.0860
    4              MSH     1          0.0940               0.0940
    4              MSH     2          0.0690               0.0690
    4              MSH     3          0.0830               0.0830
    4              MSH     4          0.0890               0.0890
    4              MSH     5          0.0660               0.0660
    4              MSH     6          0.0800               0.0800
    4              MSH     7          0.0920               0.0920
    4              MSH     8          0.0790               0.0790
    5              USC     1          0.1090               0.1090
    5              USC     2          0.0920               0.0920
    5              USC     3          0.0800               0.0800
    5              USC     4          0.0770               0.0770
    5              USC     5          0.0720               0.0720
    5              USC     6          0.0900               0.0900
    5              USC     7          0.0730               0.0730
    5              USC     8          0.0680               0.0680
    6             LSLA     1          0.1130               0.1130
    6             LSLA     2          0.0850               0.0850
    6             LSLA     3          0.1000               0.1000
    6             LSLA     4          0.0940               0.0940
    6             LSLA     5          0.0910               0.0910
    6             LSLA     6          0.0960               0.0960
    6             LSLA     7          0.0960               0.0960
    6             LSLA     8          0.0920               0.0920
    7             EFSC     1          0.0650               0.0650
    7             EFSC     2          0.0610               0.0610
    7             EFSC     3          0.0660               0.0660
```

QA:CW 09/14/12

QA: AR09/25/12

A8 8/24/12

```
   7             EFSC    4          0.0640            0.0640
   7             EFSC    5          0.0520            0.0520
   7             EFSC    6          0.0540            0.0540
   7             EFSC    7          0.0620            0.0620
   7             EFSC    8          0.0750            0.0750
 ------------------------------------------------------------------------------


 Title:   60225262-058-(084-089)-H.azteca-Growth PS-Form Sed
 File:       0584FGPS.DAT             Transform:              NO TRANSFORMATION

            Summary Statistics on Data              TABLE 1 of 2
 ------------------------------------------------------------------------------

         GRP  IDENTIFICATION     N        MIN         MAX          MEAN
         ---  ---------------- ----  ----------  ----------  ----------
          1          Form Sed    8     0.0530      0.0740      0.0629
          2               LJH    8     0.0540      0.1080      0.0744
          3               LSH    8     0.0770      0.1020      0.0888
          4               MSH    8     0.0660      0.0940      0.0815
          5               USC    8     0.0680      0.1090      0.0826
          6              LSLA    8     0.0850      0.1130      0.0959
          7              EFSC    8     0.0520      0.0750      0.0624
 ------------------------------------------------------------------------------


 Title:   60225262-058-(084-089)-H.azteca-Growth PS-Form Sed
 File:       0584FGPS.DAT             Transform:              NO TRANSFORMATION

            Summary Statistics on Data              TABLE 2 of 2
 ------------------------------------------------------------------------------

     GRP  IDENTIFICATION        VARIANCE       SD          SEM           C.V. %
     ---  ---------------- -------------- ---------- ----------  ----------
      1          Form Sed         0.0001     0.0078      0.0028       12.3909
      2               LJH         0.0002     0.0155      0.0055       20.8659
      3               LSH         0.0001     0.0081      0.0029        9.1092
      4               MSH         0.0001     0.0102      0.0036       12.5301
      5               USC         0.0002     0.0136      0.0048       16.4672
      6              LSLA         0.0001     0.0082      0.0029        8.5546
      7              EFSC         0.0001     0.0072      0.0025       11.5271
 ------------------------------------------------------------------------------
```

```
Toxstat Version 3.5, Study #60225262-058-(084-089)              Page 32 of 33
Coeur Alaska, Inc.
Hyalella azteca 10-day Sub Chronic Study
Analysis of Growth Per SURVIVING Organism - Form Sediment as control

  Title:  60225262-058-(084-089)-H.azteca-Growth PS-Form Sed
  File:      0584FGPS.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-(084-089)-H.azteca-Growth PS-Form Sed
  File:      0584FGPS.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     1             15                23              12          5

  ----------------------------------------------------------------------------

       Chi-Square =    2.8870              (p-value = 0.5769)

       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-(084-089)-H.azteca-Growth PS-Form Sed
  File:      0584FGPS.DAT             Transform:            NO TRANSFORMATION

                 Bartlett's Test for Homogeneity of Variance
  ----------------------------------------------------------------------------

  Calculated B1 statistic =   7.6941             (p-value = 0.2614)

  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)
```

AB 8/24/12
QA: cw 09/14/12
QA: AR 09/25/12

```
Toxstat Version 3.5, Study #60225262-058-(084-089)                Page 33 of 33
Coeur Alaska, Inc.
Hyalella azteca 10-day Sub Chronic Study
Analysis of Growth Per SURVIVING Organism - Form Sediment as control

  Title:  60225262-058-(084-089)-H.azteca-Growth PS-Form Sed
  File:     0584FGPS.DAT                Transform:           NO TRANSFORMATION

                                 ANOVA Table
  ----------------------------------------------------------------------------

     SOURCE              DF                 SS                 MS            F
  ----------------------------------------------------------------------------
     Between              6               0.0076             0.0013     11.4846

     Within (Error)      49               0.0054             0.0001
  ----------------------------------------------------------------------------
     Total               55               0.0131
  ----------------------------------------------------------------------------
                                                             (p-value = 0.0000)

     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-(084-089)-H.azteca-Growth PS-Form Sed
  File:     0584FGPS.DAT                Transform:           NO TRANSFORMATION

        Dunnett's Test   -   TABLE 1 OF 2             Ho:Control<Treatment
  ----------------------------------------------------------------------------
                                   TRANSFORMED    MEAN CALCULATED IN          SIG
  GROUP    IDENTIFICATION            MEAN          ORIGINAL UNITS     T STAT  0.05
  ----- --------------------     -----------    ------------------   ------  ---
    1                Form Sed      0.0629              0.0629
    2                     LJH      0.0744              0.0744        -2.1855
    3                     LSH      0.0888              0.0888        -4.9174
    4                     MSH      0.0815              0.0815        -3.5396
    5                     USC      0.0826              0.0826        -3.7534
    6                    LSLA      0.0959              0.0959        -6.2714
    7                    EFSC      0.0624              0.0624         0.0950
  ----------------------------------------------------------------------------
  Dunnett critical value = 2.3700   (1 Tailed, alpha = 0.05, df [used] = 6,40)
                                                       (Actual df = 6,49)

   Title:  60225262-058-(084-089)-H.azteca-Growth PS-Form Sed
  File:     0584FGPS.DAT                Transform:           NO TRANSFORMATION

        Dunnett's Test   -   TABLE 2 OF 2             Ho:Control<Treatment
  ----------------------------------------------------------------------------
                                 NUM OF    MIN SIG DIFF     % OF     DIFFERENCE
  GROUP    IDENTIFICATION         REPS   (IN ORIG. UNITS)  CONTROL  FROM CONTROL
  ----- --------------------   -------  ----------------  -------  ------------
    1                Form Sed      8
    2                     LJH      8          0.0125         19.8       -0.0115
    3                     LSH      8          0.0125         19.8       -0.0259
    4                     MSH      8          0.0125         19.8       -0.0186
    5                     USC      8          0.0125         19.8       -0.0198
    6                    LSLA      8          0.0125         19.8       -0.0330
    7                    EFSC      8          0.0125         19.8        0.0005
  ----------------------------------------------------------------------------
```

AS 8/24/12
QA:CW 09/14/12
QA: AR 09/29/12 ①

①AR 09/25/12 E

APPENDIX C

Analytical Data

Page ___ of ___
FCETL QA Form No.131
Revision 0
Effective 10/06
cw 09/13/12
aP: AR 09/25/12

PERCENT TOTAL SOLIDS AND PERCENT TOTAL VOLATILE SOLIDS (TVS)

Project No: 60225262-058-(084-089) + (090-095)

Analytical Balance ID: AND #2

TARE: Date/time: 8/30/12 @ 1440-1515 Analyst: cw

DRY GROSS: Date/time: 8/31/12 @ 0840-0850 Analyst: cw

ASHED GROSS: Date/time: 9/4/12 @ 0830-0840 Analyst: cw

Dried in Oven # 1 from Date: 8/30/12 Time: 1520
Oven °C: 104 to Date: 8/31/12 Time: 0735

Ashed in Furnace from Date: 8/31/12 Time: 0855
Furnace °C: 550 to Date: 8/31/12 Time: 1550

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)
10	Sand	A	18.0146	28.2266	27.8082		27.7974	
8		B	12.0275	23.2549	22.7950		22.7835	
21	Form Sed	A	19.9277	29.1327	27.9679		27.4246	
9A		B	12.3792	22.3766	21.0345		20.4131	
3A	LJH	A	10.4477	21.1086	18.7410		18.5258	
6A		B	12.1577	21.2732	19.2273		19.0506	
14A	LSH	A	12.3597	22.0940	20.0165		19.78~~7~~29	
10A		B	12.0625	22.0877	19.9266		0 19.6866	
20A	USC	A	11.2564	21.4682	19.1632		18.8393	
7A		B	12.0204	22.2977	19.9080		19.5836	
19A	MSH	A	10.7019	20.5502	18.5951		18.3622	
18A		B	10.6860	21.1700	18.9697		18.7328	
Blank			20.2110	N/A	20.2112		20.2115	

---

[1] Add in weight loss of blank boat, if appropriate.

① cw 09/04/12 cf

Page ___ of ___
FCETL QA Form No.131
Revision 0
Effective 10/06
cw 09\13\12
QA: AR 09/25/12

PERCENT TOTAL SOLIDS AND PERCENT TOTAL VOLATILE SOLIDS (TVS)

Project No: 60223262.058 ~ (084-089) + (090-095)

Analytical Balance ID: A+D #2

TARE: Date/time: 08|30|12 @ 1440-1515 Analyst: cw

DRY GROSS: Date/time: 8|31|12 @ 0840-0850 Analyst: cw

ASHED GROSS: Date/time: 9|14|12 @ 0830-0840 Analyst: cw

Dried in Oven # 1 from Date: 8|30|12 Time: 1520
Oven °C: 104 to Date: 8|31|12 Time: 0735

Ashed in Furnace from Date: 8|31|12 Time: 0855
Furnace °C: 550 to Date: 8|31|12 Time: 1550

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)
17	LSLA	A	11.9310	21.4140	19.4808		19.2242	
5A		B	12.0068	22.6386	20.3870		20.1074	
4A	EFSC	A	10.7730	20.3986	13.0271		12.3821	
12A		B	10.7977	21.2357	13.3044		12.5907	
Blank								

[1] Add in weight loss of blank boat, if appropriate.

Page __ of __
FCETL QA Form No. 132
Revision 0
Effective 10/09

Percent Total Solids and Percent Total Volatile Solids

QA: CW 09\13\12
QA: AR09/25/12

Project Number: 60225262-058-(084-089), (090-095)

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
Sand	A		18.0146	28.2266	27.8082	95.9029	95.9033	27.7974	0.1103	0.1085
	B		12.0275	23.2549	22.7950	95.9038		22.7835	0.1068	
Form Sed	A		19.9277	29.1327	27.9679	87.3460	86.9608	27.4246	6.7573	6.9684
	B		12.3792	22.3766	21.0345	86.5755		20.4131	7.1794	
LJH	A		10.4477	21.1086	18.7410	77.7917	77.6738	18.5258	2.5949	2.5471
	B		12.1577	21.2732	19.2273	77.5558		19.0506	2.4994	
LSH	A		12.3597	22.0940	20.0165	78.6579	78.5506	19.7829	3.0509	3.0514
	B		12.0625	22.0877	19.9266	78.4433		19.6866	3.0518	
USC	A		11.2564	21.4682	19.1632	77.4281	77.0879	18.8393	4.0965	4.1046
	B		12.0204	22.2977	19.9080	76.7478		19.5836	4.1128	
MSH	A		10.7019	20.5502	18.5951	80.1478	79.5803	18.3622	2.9506	2.9052
	B		10.6860	21.1700	18.9697	79.0128		18.7328	2.8598	
LSLA	A		11.9310	21.4140	19.4808	79.6140	79.2180	19.2242	3.3988	3.3676
	B		12.0068	22.6386	20.3870	78.8220		20.1074	3.3364	
EFSC	A		10.7730	20.3986	13.0271	23.4178	23.7164	12.3821	28.6145	28.5431
	B		10.7977	21.2357	13.3044	24.0151		12.5907	28.4717	
Blank			20.2110		20.2112			20.2115		

Tuesday, September 25, 2012

MSE
Analytical Laboratory

Rami Naddy
AECOM
4303 W Laporte Ave
Fort Collins, CO 80521

RE: Sediment Analysis - 60225262-058

Work Order: 1208087

Dear Rami Naddy:

MSE Lab Services received 8 sample(s) on 8/14/2012 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

9/25/12

MSE Lab Services

Date: *25-Sep-12*

CLIENT: AECOM
Lab Order: 1208087
Project: Sediment Analysis - 60225262-058
Lab ID: 1208087-001

Client Sample ID: Sand
Collection Date: 8/9/2012 11:10:00 AM
Matrix: SOIL

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846-ICP-AES TOTAL METALS			**SW6010B**	**SW3050B**			Analyst: **SW**
Aluminum	181	6.19	15.6		mg/Kg-dry	1	9/19/2012 12:12:00 PM
Zinc	ND	3.93	15.6		mg/Kg-dry	1	9/19/2012 12:12:00 PM
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **tj**
Arsenic	ND	0.091	0.312		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Cadmium	0.073	0.005	0.021		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Chromium	4.25	0.114	0.417		mg/Kg-dry	2	9/24/2012 1:00:05 PM
Copper	0.324	0.085	0.260		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Lead	0.165	0.009	0.042		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Nickel	0.511	0.060	0.208		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Selenium	ND	0.141	0.417		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Silver	ND	0.077	0.208		mg/Kg-dry	2	9/24/2012 1:00:05 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**SW7471**	**SW7471A**			Analyst: **jc**
Mercury	ND	0.0754	0.260		mg/Kg-dry	1	8/28/2012 12:41:55 PM
ORGANIC MATTER-WALKLEY BLACK			**OM_WALKLEYBLACK**				Analyst: **hb**
Organic Matter - Walkley Black	ND	0.09	0.20		%	1	8/30/2012 10:00:00 AM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	8/23/2012 9:50:00 AM
2mm Gradation	ND	0.05	0.10		%	1	8/23/2012 9:50:00 AM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **bo/jr**
% Clay	ND	0.1	0.1		%	1	8/30/2012 4:00:00 PM
% Sand	96.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
% Silt	4.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
Soil Class	SAND					1	8/30/2012 4:00:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **dk/jr**
Percent Moisture	4.00	0.01	0.05		wt%	1	8/22/2012 9:35:00 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: *25-Sep-12*

CLIENT: AECOM
Lab Order: 1208087
Project: Sediment Analysis - 60225262-058
Lab ID: 1208087-002

Client Sample ID: FORM SED
Collection Date: 8/9/2012 11:10:00 AM
Matrix: SOIL

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846-ICP-AES TOTAL METALS			**SW6010B**	**SW3050B**			Analyst: **SW**
Aluminum	609	6.73	17.0		mg/Kg-dry	1	9/19/2012 12:12:00 PM
Zinc	ND	4.27	17.0		mg/Kg-dry	1	9/19/2012 12:12:00 PM
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **tj**
Arsenic	ND	0.099	0.340		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Cadmium	0.072	0.006	0.023		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Chromium	8.25	0.125	0.453		mg/Kg-dry	2	9/24/2012 1:00:05 PM
Copper	0.783	0.093	0.283		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Lead	0.380	0.010	0.045		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Nickel	0.820	0.065	0.227		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Selenium	ND	0.154	0.453		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Silver	ND	0.083	0.227		mg/Kg-dry	2	9/24/2012 1:00:05 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**SW7471**	**SW7471A**			Analyst: **jc**
Mercury	ND	0.0326	0.113		mg/Kg-dry	1	8/28/2012 12:41:55 PM
ORGANIC MATTER-WALKLEY BLACK			**OM_WALKLEYBLACK**				Analyst: **bo/hb**
Organic Matter - Walkley Black	28.7	0.09	0.20		%	1	9/12/2012 12:00:00 PM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	8/23/2012 9:50:00 AM
2mm Gradation	ND	0.05	0.10		%	1	8/23/2012 9:50:00 AM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **bo/jr**
% Clay	10.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
% Sand	86.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
% Silt	4.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
Soil Class	LOAMY SAND					1	8/30/2012 4:00:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **dk/jr**
Percent Moisture	11.8	0.01	0.05		wt%	1	8/22/2012 9:35:00 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: *25-Sep-12*

CLIENT:	AECOM	**Client Sample ID:**	LJH(#25938)
Lab Order:	1208087	**Collection Date:**	8/9/2012 11:10:00 AM
Project:	Sediment Analysis - 60225262-058		
Lab ID:	1208087-003	**Matrix:**	SOIL

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846-ICP-AES TOTAL METALS			**SW6010B**	**SW3050B**			Analyst: **SW**
Aluminum	13100	7.32	18.5		mg/Kg-dry	1	9/19/2012 12:12:00 PM
Zinc	97.3	4.64	18.5		mg/Kg-dry	1	9/19/2012 12:12:00 PM
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **tj**
Arsenic	12.8	0.107	0.369		mg/Kg-dry	2	9/18/2012 12:12:08 PM
Cadmium	0.250	0.006	0.025		mg/Kg-dry	2	9/18/2012 12:12:08 PM
Chromium	35.5	0.135	0.493		mg/Kg-dry	2	9/24/2012 1:00:05 PM
Copper	76.8	0.101	0.308		mg/Kg-dry	2	9/18/2012 12:12:08 PM
Lead	9.45	0.011	0.049		mg/Kg-dry	2	9/18/2012 12:12:08 PM
Nickel	23.4	0.071	0.246		mg/Kg-dry	2	9/18/2012 12:12:08 PM
Selenium	ND	0.167	0.493		mg/Kg-dry	2	9/18/2012 12:12:08 PM
Silver	0.342	0.091	0.246		mg/Kg-dry	2	9/24/2012 1:00:05 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**SW7471**	**SW7471A**			Analyst: **jc**
Mercury	0.119	0.0356	0.123	J	mg/Kg-dry	1	8/28/2012 12:41:55 PM
ORGANIC MATTER-WALKLEY BLACK			**OM_WALKLEYBLACK**				Analyst: **hb**
Organic Matter - Walkley Black	1.19	0.09	0.20		%	1	8/30/2012 10:00:00 AM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	8/23/2012 9:50:00 AM
2mm Gradation	ND	0.05	0.10		%	1	8/23/2012 9:50:00 AM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **bo/jr**
% Clay	8.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
% Sand	92.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
% Silt	ND	0.1	0.1		%	1	8/30/2012 4:00:00 PM
Soil Class	SAND					1	8/30/2012 4:00:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **dk/jr**
Percent Moisture	18.8	0.01	0.05		wt%	1	8/22/2012 9:35:00 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: *25-Sep-12*

CLIENT: AECOM
Lab Order: 1208087
Project: Sediment Analysis - 60225262-058
Lab ID: 1208087-004

Client Sample ID: LSH(#25939)
Collection Date: 8/9/2012 11:10:00 AM
Matrix: SOIL

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846-ICP-AES TOTAL METALS			**SW6010B**	**SW3050B**			Analyst: **SW**
Aluminum	17900	7.61	19.2		mg/Kg-dry	1	9/19/2012 12:12:00 PM
Zinc	128	4.83	19.2		mg/Kg-dry	1	9/19/2012 12:12:00 PM
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **tj**
Arsenic	24.3	0.111	0.384		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Cadmium	0.578	0.007	0.026		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Chromium	51.4	0.141	0.512		mg/Kg-dry	2	9/24/2012 1:00:05 PM
Copper	79.1	0.105	0.320		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Lead	8.43	0.012	0.051		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Nickel	40.2	0.074	0.256		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Selenium	ND	0.174	0.512		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Silver	0.289	0.094	0.256		mg/Kg-dry	2	9/24/2012 1:00:05 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**SW7471**	**SW7471A**			Analyst: **jc**
Mercury	0.0681	0.0360	0.124	J	mg/Kg-dry	1	8/28/2012 12:41:55 PM
ORGANIC MATTER-WALKLEY BLACK			**OM_WALKLEYBLACK**				Analyst: **hb**
Organic Matter - Walkley Black	0.82	0.09	0.20		%	1	8/30/2012 10:00:00 AM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	8/23/2012 9:50:00 AM
2mm Gradation	0.09	0.05	0.10	J	%	1	8/23/2012 9:50:00 AM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **bo/jr**
% Clay	4.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
% Sand	96.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
% Silt	ND	0.1	0.1		%	1	8/30/2012 4:00:00 PM
Soil Class	SAND					1	8/30/2012 4:00:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **dk/jr**
Percent Moisture	21.9	0.01	0.05		wt%	1	8/22/2012 9:35:00 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: *25-Sep-12*

CLIENT:	AECOM	**Client Sample ID:**	MSH(#25940)
Lab Order:	1208087	**Collection Date:**	8/9/2012 11:10:00 AM
Project:	Sediment Analysis - 60225262-058		
Lab ID:	1208087-005	**Matrix:**	SOIL

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846-ICP-AES TOTAL METALS			**SW6010B**	**SW3050B**			Analyst: **SW**
Aluminum	18800	7.43	18.8		mg/Kg-dry	1	9/19/2012 12:12:00 PM
Zinc	124	4.72	18.8		mg/Kg-dry	1	9/19/2012 12:12:00 PM
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **tj**
Arsenic	56.1	0.109	0.375		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Cadmium	0.269	0.007	0.025		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Chromium	48.1	0.138	0.501		mg/Kg-dry	2	9/24/2012 1:00:05 PM
Copper	87.5	0.103	0.313		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Lead	11.3	0.011	0.050		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Nickel	39.3	0.072	0.250		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Selenium	ND	0.170	0.501		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Silver	0.225	0.092	0.250	J	mg/Kg-dry	2	9/24/2012 1:00:05 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**SW7471**	**SW7471A**			Analyst: **jc**
Mercury	0.0581	0.0359	0.124	J	mg/Kg-dry	1	8/28/2012 12:41:55 PM
ORGANIC MATTER-WALKLEY BLACK			**OM_WALKLEYBLACK**				Analyst: **hb**
Organic Matter - Walkley Black	1.05	0.09	0.20		%	1	8/30/2012 10:00:00 AM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	8/23/2012 9:50:00 AM
2mm Gradation	0.44	0.05	0.10		%	1	8/23/2012 9:50:00 AM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **bo/jr**
% Clay	4.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
% Sand	96.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
% Silt	ND	0.1	0.1		%	1	8/30/2012 4:00:00 PM
Soil Class	SAND					1	8/30/2012 4:00:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **dk/jr**
Percent Moisture	20.1	0.01	0.05		wt%	1	8/22/2012 9:35:00 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: *25-Sep-12*

CLIENT: AECOM
Lab Order: 1208087
Project: Sediment Analysis - 60225262-058
Lab ID: 1208087-006

Client Sample ID: USC(#25932)
Collection Date: 8/9/2012 11:10:00 AM

Matrix: SOIL

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846-ICP-AES TOTAL METALS			**SW6010B**	**SW3050B**			Analyst: **SW**
Aluminum	20300	7.61	19.2		mg/Kg-dry	1	9/19/2012 12:12:00 PM
Zinc	134	4.83	19.2		mg/Kg-dry	1	9/19/2012 12:12:00 PM
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **tj**
Arsenic	14.4	0.111	0.384		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Cadmium	0.776	0.007	0.026		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Chromium	125	0.141	0.513		mg/Kg-dry	2	9/24/2012 1:00:05 PM
Copper	55.4	0.105	0.320		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Lead	4.05	0.012	0.051		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Nickel	78.4	0.074	0.256		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Selenium	0.606	0.174	0.513		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Silver	0.132	0.094	0.256	J	mg/Kg-dry	2	9/24/2012 1:00:05 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**SW7471**	**SW7471A**			Analyst: **jc**
Mercury	0.0625	0.0365	0.126	J	mg/Kg-dry	1	8/28/2012 12:41:55 PM
ORGANIC MATTER-WALKLEY BLACK			**OM_WALKLEYBLACK**				Analyst: **hb**
Organic Matter - Walkley Black	3.74	0.09	0.20		%	1	8/30/2012 10:00:00 AM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	8/23/2012 9:50:00 AM
2mm Gradation	0.32	0.05	0.10		%	1	8/23/2012 9:50:00 AM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **bo/jr**
% Clay	2.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
% Sand	98.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
% Silt	ND	0.1	0.1		%	1	8/30/2012 4:00:00 PM
Soil Class	SAND					1	8/30/2012 4:00:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **dk/jr**
Percent Moisture	22.0	0.01	0.05		wt%	1	8/22/2012 9:35:00 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: *25-Sep-12*

CLIENT: AECOM
Lab Order: 1208087
Project: Sediment Analysis - 60225262-058
Lab ID: 1208087-007

Client Sample ID: LSLA(#25933)
Collection Date: 8/9/2012 11:10:00 AM
Matrix: SOIL

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846-ICP-AES TOTAL METALS			**SW6010B**	**SW3050B**			Analyst: **SW**
Aluminum	13600	7.43	18.8		mg/Kg-dry	1	9/19/2012 12:12:00 PM
Zinc	200	4.72	18.8		mg/Kg-dry	1	9/19/2012 12:12:00 PM
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **tj**
Arsenic	9.31	0.109	0.375		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Cadmium	1.22	0.007	0.025		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Chromium	32.0	0.138	0.500		mg/Kg-dry	2	9/24/2012 1:00:05 PM
Copper	50.7	0.103	0.313		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Lead	8.45	0.011	0.050		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Nickel	43.2	0.072	0.250		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Selenium	ND	0.170	0.500		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Silver	0.145	0.092	0.250	J	mg/Kg-dry	2	9/24/2012 1:00:05 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**SW7471**	**SW7471A**			Analyst: **jc**
Mercury	0.0994	0.0355	0.122	J	mg/Kg-dry	1	8/28/2012 12:41:55 PM
ORGANIC MATTER-WALKLEY BLACK			**OM_WALKLEYBLACK**				Analyst: **hb**
Organic Matter - Walkley Black	1.67	0.09	0.20		%	1	8/30/2012 10:00:00 AM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	8/23/2012 9:50:00 AM
2mm Gradation	0.13	0.05	0.10		%	1	8/23/2012 9:50:00 AM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **bo/jr**
% Clay	2.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
% Sand	98.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
% Silt	ND	0.1	0.1		%	1	8/30/2012 4:00:00 PM
Soil Class	SAND					1	8/30/2012 4:00:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **dk/jr**
Percent Moisture	20.1	0.01	0.05		wt%	1	8/22/2012 9:35:00 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: *25-Sep-12*

CLIENT: AECOM
Lab Order: 1208087
Project: Sediment Analysis - 60225262-058
Lab ID: 1208087-008

Client Sample ID: EFSA(#25934)
Collection Date: 8/9/2012 11:10:00 AM
Matrix: SOIL

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846-ICP-AES TOTAL METALS			**SW6010B**	**SW3050B**			Analyst: **SW**
Aluminum	15300	22.0	55.5		mg/Kg-dry	1	9/19/2012 12:12:00 PM
Zinc	1490	13.9	55.5		mg/Kg-dry	1	9/19/2012 12:12:00 PM
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **tj**
Arsenic	24.0	0.322	1.11		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Cadmium	23.2	0.019	0.074		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Chromium	38.9	0.406	1.48		mg/Kg-dry	2	9/24/2012 1:00:05 PM
Copper	159	0.303	0.924		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Lead	14.2	0.033	0.148		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Nickel	153	0.212	0.739		mg/Kg-dry	2	9/13/2012 12:12:08 PM
Selenium	0.934	0.502	1.48	J	mg/Kg-dry	2	9/13/2012 12:12:08 PM
Silver	0.513	0.272	0.739	J	mg/Kg-dry	2	9/24/2012 1:00:05 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**SW7471**	**SW7471A**			Analyst: **jc**
Mercury	0.327	0.107	0.369	J	mg/Kg-dry	1	8/28/2012 12:41:55 PM
ORGANIC MATTER-WALKLEY BLACK			**OM_WALKLEYBLACK**				Analyst: **BO**
Organic Matter - Walkley Black	16.7	0.09	0.20		%	1	8/31/2012 3:00:00 PM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	8/23/2012 9:50:00 AM
2mm Gradation	ND	0.05	0.10		%	1	8/23/2012 9:50:00 AM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **bo/jr**
% Clay	40.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
% Sand	26.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
% Silt	34.0	0.1	0.1		%	1	8/30/2012 4:00:00 PM
Soil Class	CLAY					1	8/30/2012 4:00:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **dk/jr**
Percent Moisture	73.0	0.01	0.05		wt%	1	8/22/2012 9:35:00 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)

Date: *25-Sep-12*
Report Date: *25-Sep-12*

QA/QC SUMMARY REPORT

Client: AECOM
Project: Sediment Analysis - 60225262-058

Work Order: 1208087
BatchID: 5917

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***PB-UNFILTERED-5917*** *Method:* ***SW6010B*** *Batch ID:* ***5917*** *Analysis Date: 9/19/2012 12:12:00 PM*										
Aluminum	ND	15.0	mg/Kg							
Zinc	ND	15.0	mg/Kg							
Sample ID: ***PB-FILTERED-5917*** *Method:* ***SW6010B*** *Batch ID:* ***5917*** *Analysis Date: 9/19/2012 12:12:00 PM*										
Aluminum	ND	15.0	mg/Kg							
Zinc	ND	15.0	mg/Kg							
Sample ID: ***LCS-5917*** *Method:* ***SW6010B*** *Batch ID:* ***5917*** *Analysis Date: 9/19/2012 12:12:00 PM*										
Aluminum	6630	15.0	mg/Kg	9672	68.5	80	120			S*
Zinc	193	15.0	mg/Kg	198.0	97.7	80	120			
Sample ID: ***1208087-003A-MS*** *Method:* ***SW6010B*** *Batch ID:* ***5917*** *Analysis Date: 9/19/2012 12:12:00 PM*										
Aluminum	27900	18.5	mg/Kg-dry	11910	124	75	125			
Zinc	347	18.5	mg/Kg-dry	243.8	103	75	125			
Sample ID: ***1208087-003A-MSD*** *Method:* ***SW6010B*** *Batch ID:* ***5917*** *Analysis Date: 9/19/2012 12:12:00 PM*										
Aluminum	23400	18.5	mg/Kg-dry	11910	87.2	75	125	17.3	20	
Zinc	334	18.5	mg/Kg-dry	243.8	97.1	75	125	3.89	20	
Sample ID: ***1208087-003A-MST*** *Method:* ***SW6010B*** *Batch ID:* ***5917*** *Analysis Date: 9/19/2012 12:12:00 PM*										
Aluminum	25400	18.5	mg/Kg-dry	11910	104	75	125	9.28	20	
Zinc	357	18.5	mg/Kg-dry	243.8	107	75	125	2.86	20	
Sample ID: ***PB-UNFILTERED-5917*** *Method:* ***SW6020*** *Batch ID:* ***5917*** *Analysis Date: 9/13/2012 12:12:08 PM*										
Cadmium	0.018	0.020	mg/Kg							J
Copper	0.136	0.250	mg/Kg							J
Lead	0.016	0.040	mg/Kg							J
Nickel	0.495	0.200	mg/Kg							
Sample ID: ***PB-FILTERED-5917*** *Method:* ***SW6020*** *Batch ID:* ***5917*** *Analysis Date: 9/13/2012 12:12:08 PM*										
Cadmium	0.020	0.020	mg/Kg							
Copper	0.138	0.250	mg/Kg							J
Lead	0.016	0.040	mg/Kg							J
Nickel	0.444	0.200	mg/Kg							
Sample ID: ***LCS-5917*** *Method:* ***SW6020*** *Batch ID:* ***5917*** *Analysis Date: 9/13/2012 12:12:08 PM*										
Cadmium	247	0.020	mg/Kg	274.0	90.1	80	120			
Copper	271	0.250	mg/Kg	242.0	112	80	120			
Lead	261	0.040	mg/Kg	240.0	109	80	120			
Nickel	85.7	0.200	mg/Kg	74.70	115	80	120			
Sample ID: ***1208087-003A-MS*** *Method:* ***SW6020*** *Batch ID:* ***5917*** *Analysis Date: 9/13/2012 12:12:08 PM*										
Cadmium	338	0.025	mg/Kg-dry	337.4	100	75	125			
Copper	451	0.308	mg/Kg-dry	298.0	126	75	125			S*
Lead	366	0.049	mg/Kg-dry	295.6	121	75	125			

Qualifiers:

NA	Sample conc. is > 4*spike level
S*	Spike Recovery outside limits; within Manufacturer Limits Manufacturer Limits for Aluminum 4270-15100 mg/Kg; Copper 184-326 mg/Kg; Mercury 2.97-80.4 mg/Kg; Silver 16.1-37.5 mg/Kg; Arsenic 39.7-100 mg/Kg; Selenium 121-340 mg/Kg; Nickel 63.3-100 mg/Kg

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Date: 25-Sep-12
Report Date: 25-Sep-12

QA/QC SUMMARY REPORT

Client: AECOM
Project: Sediment Analysis - 60225262-058
Work Order: 1208087
BatchID: 5917

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***1208087-003A-MS***			*Method:* ***SW6020***		*Batch ID:* ***5917***		*Analysis Date: 9/13/2012 12:12:08 PM*			
Nickel	141	0.246	mg/Kg-dry	92.00	127	75	125			S*
Sample ID: ***1208087-003A-MSD***			*Method:* ***SW6020***		*Batch ID:* ***5917***		*Analysis Date: 9/13/2012 12:12:08 PM*			
Cadmium	300	0.025	mg/Kg-dry	337.4	89.0	75	125	11.7	20	
Copper	387	0.308	mg/Kg-dry	298.0	104	75	125	15.2	20	
Lead	323	0.049	mg/Kg-dry	295.6	106	75	125	12.7	20	
Nickel	122	0.246	mg/Kg-dry	92.00	107	75	125	14.2	20	
Sample ID: ***1208087-003A-MST***			*Method:* ***SW6020***		*Batch ID:* ***5917***		*Analysis Date: 9/13/2012 12:12:08 PM*			
Cadmium	317	0.025	mg/Kg-dry	337.4	93.8	75	125	6.34	20	
Copper	424	0.308	mg/Kg-dry	298.0	116	75	125	6.20	20	
Lead	346	0.049	mg/Kg-dry	295.6	114	75	125	5.80	20	
Nickel	133	0.246	mg/Kg-dry	92.00	119	75	125	5.36	20	
Sample ID: ***PB-UNFILTERED-5917***			*Method:* ***SW6020***		*Batch ID:* ***5917***		*Analysis Date: 9/13/2012 12:12:08 PM*			
Arsenic	ND	0.300	mg/Kg							
Selenium	ND	0.400	mg/Kg							
Sample ID: ***PB-FILTERED-5917***			*Method:* ***SW6020***		*Batch ID:* ***5917***		*Analysis Date: 9/13/2012 12:12:08 PM*			
Arsenic	ND	0.300	mg/Kg							
Selenium	ND	0.400	mg/Kg							
Sample ID: ***LCS-5917***			*Method:* ***SW6020***		*Batch ID:* ***5917***		*Analysis Date: 9/13/2012 12:12:08 PM*			
Arsenic	66.3	0.300	mg/Kg	59.10	112	80	120			
Selenium	192	0.400	mg/Kg	178.0	108	80	120			
Sample ID: ***1208087-003A-MS***			*Method:* ***SW6020***		*Batch ID:* ***5917***		*Analysis Date: 9/13/2012 12:12:08 PM*			
Arsenic	121	0.369	mg/Kg-dry	72.78	149	75	125			S*
Selenium	276	0.493	mg/Kg-dry	219.2	126	75	125			S*
Sample ID: ***1208087-003A-MSD***			*Method:* ***SW6020***		*Batch ID:* ***5917***		*Analysis Date: 9/13/2012 12:12:08 PM*			
Arsenic	99.4	0.369	mg/Kg-dry	72.78	119	75	125	19.7	20	
Selenium	239	0.493	mg/Kg-dry	219.2	109	75	125	14.6	20	
Sample ID: ***1208087-003A-MST***			*Method:* ***SW6020***		*Batch ID:* ***5917***		*Analysis Date: 9/13/2012 12:12:08 PM*			
Arsenic	108	0.369	mg/Kg-dry	72.78	131	75	125	11.2	20	S*
Selenium	255	0.493	mg/Kg-dry	219.2	116	75	125	7.97	20	
Sample ID: ***PB-UNFILTERED-5917***			*Method:* ***SW6020***		*Batch ID:* ***5917***		*Analysis Date: 9/24/2012 1:00:05 PM*			
Chromium	5.83	0.400	mg/Kg							
Silver	ND	0.200	mg/Kg							
Sample ID: ***PB-FILTERED-5917***			*Method:* ***SW6020***		*Batch ID:* ***5917***		*Analysis Date: 9/24/2012 1:00:05 PM*			
Chromium	5.03	0.400	mg/Kg							
Silver	ND	0.200	mg/Kg							

Qualifiers:

NA Sample conc. is > 4*spike level

S* Spike Recovery outside limits; within Manufacturer Limits
Manufacturer Limits for Aluminum 4270-15100 mg/Kg; Copper 184-326 mg/Kg; Mercury 2.97-80.4 mg/Kg; Silver 16.1-37.5 mg/Kg; Arsenic 39.7-100 mg/Kg; Selenium 121-340 mg/Kg; Nickel 63.3-100 mg/Kg

QA/QC SUMMARY REPORT

Client: AECOM
Project: Sediment Analysis - 60225262-058

Work Order: 1208087
BatchID: 5917

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***LCS-5917***			*Method:* ***SW6020***		*Batch ID:* ***5917***		*Analysis Date: 9/24/2012 1:00:05 PM*			
Chromium	166	0.400	mg/Kg	150.0	110	80	120			
Silver	32.3	0.200	mg/Kg	24.90	130	80	120			S*
Sample ID: ***1208087-003A-MS***			*Method:* ***SW6020***		*Batch ID:* ***5917***		*Analysis Date: 9/24/2012 1:00:05 PM*			
Chromium	257	0.493	mg/Kg-dry	184.7	120	75	125			
Silver	42.0	0.246	mg/Kg-dry	30.67	136	75	125			S*
Sample ID: ***1208087-003A-MSD***			*Method:* ***SW6020***		*Batch ID:* ***5917***		*Analysis Date: 9/24/2012 1:00:05 PM*			
Chromium	228	0.493	mg/Kg-dry	184.7	104	75	125	11.9	20	
Silver	38.3	0.246	mg/Kg-dry	30.67	124	75	125	9.13	20	
Sample ID: ***1208087-003A-MST***			*Method:* ***SW6020***		*Batch ID:* ***5917***		*Analysis Date: 9/24/2012 1:00:05 PM*			
Chromium	239	0.493	mg/Kg-dry	184.7	110	75	125	7.28	20	
Silver	38.5	0.246	mg/Kg-dry	30.67	124	75	125	8.64	20	

Qualifiers:

NA Sample conc. is > 4*spike level

S* Spike Recovery outside limits; within Manufacturer Limits
Manufacturer Limits for Aluminum 4270-15100 mg/Kg; Copper 184-328 mg/Kg; Mercury 2.97-80.4 mg/Kg; Silver 16.1-37.5 mg/Kg; Arsenic 39.7-100 mg/Kg; Selenium 121-340 mg/Kg; Nickel 63.3-100 mg/Kg

QA/QC SUMMARY REPORT

Client: AECOM
Project: Sediment Analysis - 60225262-058

Work Order: 1208087
BatchID: 5924

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***5924-PB***			*Method:* ***SW7471***		*Batch ID:* ***5924***		*Analysis Date: 8/28/2012 12:41:55 PM*			
Mercury	ND	0.100	mg/Kg							
Sample ID: ***LCS-5924***			*Method:* ***SW7471***		*Batch ID:* ***5924***		*Analysis Date: 8/28/2012 12:41:55 PM*			
Mercury	17.3	2.45	mg/Kg	27.80	62.2	80	120			S*
Sample ID: ***1208087-001A-MS***			*Method:* ***SW7471***		*Batch ID:* ***5924***		*Analysis Date: 8/28/2012 12:41:55 PM*			
Mercury	19.2	2.51	mg/Kg-dry	28.96	66.4	75	125			S*
Sample ID: ***1208087-001A-MSD***			*Method:* ***SW7471***		*Batch ID:* ***5924***		*Analysis Date: 8/28/2012 12:41:55 PM*			
Mercury	19.8	2.60	mg/Kg-dry	28.96	68.2	75	125	2.74	20	S*

Qualifiers:

NA Sample conc. Is > 4*spike level

S* Spike Recovery outside limits; within Manufacturer Limits
Manufacturer Limits for Aluminum 4270-15100 mg/Kg; Copper 184-328 mg/Kg; Mercury 2.97-80.4 mg/Kg; Silver 16.1-37.5 mg/Kg; Arsenic 39.7-100 mg/Kg; Selenium 121-340 mg/Kg; Nickel 63.3-100 mg/Kg

QA/QC SUMMARY REPORT

Client: AECOM
Project: Sediment Analysis - 60225262-058

Work Order: 1208087
BatchID: R20713

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***1208087-005A-D***			*Method:* ***D2216***		*Batch ID:* ***R20713***		*Analysis Date: 8/22/2012 9:35:00 AM*			
Percent Moisture	20.6	0.05	wt%					2.26	35	

Qualifiers:

NA Sample conc. is > 4*spike level

S* Spike Recovery outside limits; within Manufacturer Limits
Manufacturer Limits for Aluminum 4270-15100 mg/Kg; Copper 184-326 mg/Kg;
Mercury 2.97-80.4 mg/Kg; Silver 16.1-37.5 mg/Kg; Arsenic 39.7-100 mg/Kg;
Selenium 121-340 mg/Kg; Nickel 63.3-100 mg/Kg

Date: 25-Sep-12
Report Date: 25-Sep-12

QA/QC SUMMARY REPORT

Client: AECOM
Project: Sediment Analysis - 60225262-058
Work Order: 1208087
BatchID: R20774

Sample ID: ***1208087-003A-D*** *Method:* ***ASTMD422*** *Batch ID:* ***R20774*** *Analysis Date: 8/23/2012 9:50:00 AM*

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
1" Gradation	ND	0.10	%					0	35	
2mm Gradation	ND	0.10	%					0	35	

Qualifiers:

NA	Sample conc. is > 4*spike level
S*	Spike Recovery outside limits; within Manufacturer Limits Manufacturer Limits for Aluminum 4270-15100 mg/Kg; Copper 184-326 mg/Kg; Mercury 2.97-80.4 mg/Kg; Silver 16.1-37.5 mg/Kg; Arsenic 39.7-100 mg/Kg; Selenium 121-340 mg/Kg; Nickel 63.3-100 mg/Kg

QA/QC SUMMARY REPORT

Client: AECOM
Project: Sediment Analysis - 60225262-058
Work Order: 1208087
BatchID: R20826

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
*Sample ID: **LCS***			*Method: **OM_WALKLE***	*Batch ID: **R20826***			*Analysis Date: 8/31/2012 3:00:00 PM*			
Organic Matter - Walkl	48.8	0.20	%	49.60	98.3	70.7	109			
*Sample ID: **PB***			*Method: **OM_WALKLE***	*Batch ID: **R20826***			*Analysis Date: 8/31/2012 3:00:00 PM*			
Organic Matter - Walkl	ND	0.20	%							
*Sample ID: **1208165-001A-D***			*Method: **OM_WALKLE***	*Batch ID: **R20826***			*Analysis Date: 8/31/2012 3:00:00 PM*			
Organic Matter - Walkl	1.05	0.20	%					3.06	35	

Qualifiers: NA Sample conc. is > 4*spike level

S* Spike Recovery outside limits; within Manufacturer Limits
Manufacturer Limits for Aluminum 4270-15100 mg/Kg; Copper 184-326 mg/Kg;
Mercury 2.97-80.4 mg/Kg; Silver 16.1-37.5 mg/Kg; Arsenic 39.7-100 mg/Kg;
Selenium 121-340 mg/Kg; Nickel 63.3-100 mg/Kg

QA/QC SUMMARY REPORT

Client: AECOM

Project: Sediment Analysis - 60225262-058

Work Order: 1208087

BatchID: R20829

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***1208114-001A-D*** *Method:* ***OM_WALKLE*** *Batch ID:* ***R20829*** *Analysis Date: 8/30/2012 10:00:00 AM*										
Organic Matter - Walkl	0.83	0.20	%					2.00	35	
Sample ID: ***LCS*** *Method:* ***OM_WALKLE*** *Batch ID:* ***R20829*** *Analysis Date: 8/30/2012 10:00:00 AM*										
Organic Matter - Walkl	54.6	0.20	%	49.60	110	80	120			
Sample ID: ***PB*** *Method:* ***OM_WALKLE*** *Batch ID:* ***R20829*** *Analysis Date: 8/30/2012 10:00:00 AM*										
Organic Matter - Walkl	ND	0.20	%							

Qualifiers:

NA Sample conc. is > 4*spike level

S* Spike Recovery outside limits; within Manufacturer Limits
Manufacturer Limits for Aluminum 4270-15100 mg/Kg; Copper 184-328 mg/Kg;
Mercury 2.97-80.4 mg/Kg; Silver 16.1-37.5 mg/Kg; Arsenic 39.7-100 mg/Kg;
Selenium 121-340 mg/Kg; Nickel 63.3-100 mg/Kg

QA/QC SUMMARY REPORT

Client: AECOM
Project: Sediment Analysis - 60225262-058

Work Order: 1208087
BatchID: R20843

Sample ID: ***1208087-001A-D*** *Method:* ***MSA15-5*** *Batch ID:* ***R20843*** *Analysis Date: 8/30/2012 4:00:00 PM*

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
% Clay	ND	0.1	%					0	35	
% Sand	96.0	0.1	%					0	35	
% Silt	4.0	0.1	%					0	35	
Soil Class	SAND									

Qualifiers:

NA	Sample conc. is > 4*spike level	S*	Spike Recovery outside limits; within Manufacturer Limits Manufacturer Limits for Aluminum 4270-15100 mg/Kg; Copper 184-326 mg/Kg; Mercury 2.97-80.4 mg/Kg; Silver 16.1-37.5 mg/Kg; Arsenic 39.7-100 mg/Kg; Selenium 121-340 mg/Kg; Nickel 63.3-100 mg/Kg

Date: 25-Sep-12
Report Date: 25-Sep-12

QA/QC SUMMARY REPORT

Client: AECOM
Project: Sediment Analysis - 60225262-058

Work Order: 1208087
BatchID: R20928

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***1208157-001A-D***			*Method:* ***OM_WALKLE***	*Batch ID:* ***R20928***			*Analysis Date: 9/12/2012 12:00:00 PM*			
Organic Matter - Walkl	0.61	0.20	%					2.81	35	
Sample ID: ***LCS***			*Method:* ***OM_WALKLE***	*Batch ID:* ***R20928***			*Analysis Date: 9/12/2012 12:00:00 PM*			
Organic Matter - Walkl	49.9	0.20	%	49.60	101	70.7	109			
Sample ID: ***PB***			*Method:* ***OM_WALKLE***	*Batch ID:* ***R20928***			*Analysis Date: 9/12/2012 12:00:00 PM*			
Organic Matter - Walkl	ND	0.20	%							

Qualifiers:

NA Sample conc. is > 4*spike level

S* Spike Recovery outside limits; within Manufacturer Limits
Manufacturer Limits for Aluminum 4270-15100 mg/Kg; Copper 184-326 mg/Kg; Mercury 2.97-80.4 mg/Kg; Silver 16.1-37.5 mg/Kg; Arsenic 39.7-100 mg/Kg; Selenium 121-340 mg/Kg; Nickel 63.3-100 mg/Kg

AECOM

CHAIN OF CUSTODY RECORD

1208087

Page 1 of 1

Client/Project Name: 058 (2012)

Project Location: AECOM/FCETL

Project Number: 60225262-058

Field Logbook No.:

Sampler (Print Name)/(Affiliation): Christina Needham (AECOM)/ Kara Barnett (AECOM)

Chain of Custody Tape Nos.: 42721

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 (As, Cd, Cu, Pb, Se) (Al, Cr, Ni, Ag, Zn)	Mercury	% Coarse Material	Rapid Hydro (% clay, Sand, Silt.)						Lab I.D.	Remarks
Sand	8/9/12	1110		X	8oz plastic	Soil	Ice (cool)		X	X	X	X	X						001	
Form Sed	↓	↓		↓	↓	↓	↓		X	X	X	X	X						002	
LJH (#25938)	↓	↓		↓	↓	↓	↓		X	X	X	X	X						003	
LSH (#25939)	↓	↓		↓	↓	↓	↓		X	X	X	X	X						004	
MSH (#25940)	↓	↓		↓	↓	↓	↓		X	X	X	X	X						005	
USC (#25932)	↓	↓		↓	↓	↓	↓		X	X	X	X	X						006	
LSLA (#25933)	↓	↓		↓	↓	↓	↓		X	X	X	X	X						007	
EFSA (#25934)	↓	↓		↓	↓	↓	↓		X	X	X	X	X						008	

Relinquished by: (Print Name)/(Affiliation)	Date / Time	Received by: (Print Name)/(Affiliation)	Date / Time
Christina Needham (AECOM) Signature: Christina Needham	Date: 8/13/12 Time: 1130	Tyler Johnston (MSE Lab Services) Signature: Tyler Johnston	Date: 8/14/12 Time: 1020
 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

Temp 5°C
Recieved In cooler on Ice
Sealed containers

Sample Shipped Via: UPS [✓ FedEx] Courier Other

Temp blank: Yes [✓ No]

Serial No. № 52557

O:\GRAPHICS\FORMS\Chain of Custody (COC)\Chain-of-Custody_Ft Collins_10_07.doc

MSE Lab Services

Sample Receipt Checklist

Client Name AECOM_INC

Date and Time Received: 8/14/2012 10:20:00 AM

Work Order Number 1208087

RcptNo: 1

Received by ~~ty~~ tyler J

COC_ID: **1208087**

CoolerID:

Checklist completed by Debbee Ortega 8-15-12
Signature Date

Reviewed by Do 8/17/12
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? N/A
Soils

Checked by DF 8/15/12

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: REC'D IN COOLER/ICE; TEMP=5 DEGREE C

Corrective Action

Tuesday, September 25, 2012

MSE
Analytical Laboratory

Rami Naddy
AECOM
4303 W Laporte Ave
Fort Collins, CO 80521

RE: 60225262-058

Work Order: 1207139

Dear Rami Naddy:

MSE Lab Services received 6 sample(s) on 7/25/2012 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

9/26/12 SW

MSE Lab Services

Date: *25-Sep-12*

CLIENT: AECOM
Lab Order: 1207139
Project: 60225262-058
Lab ID: 1207139-001

Client Sample ID: LSH (#25942)
Collection Date: 7/3/2012

Matrix: SEDIMENT

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
AVS-SEM METALS			**AVS-SEM**	**SW3005A**			Analyst: **tj**
Cadmium	0.00137	0.00002	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Copper	0.2112	0.00020	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
Lead	0.01701	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Nickel	0.04684	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Simultaneously Extracted Metal:	0.6375	0.00051	0.00191		µmoles/g	1	9/13/2012 12:12:08 PM
Zinc	0.3611	0.00050	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
PERCENT SOLIDS			**A2540G**				Analyst: **dk/jr**
Percent Solids	79.6	0.01	0.1		%	1	8/21/2012 3:40:00 PM
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**				Analyst: **jo**
Sulfide	ND	0.55	1.50		µmoles/g	1	8/29/2012 8:00:00 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)

CLIENT: AECOM
Lab Order: 1207139
Project: 60225262-058
Lab ID: 1207139-002

Client Sample ID: MSH (#25943)
Collection Date: 7/3/2012

Matrix: SEDIMENT

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
AVS-SEM METALS			**AVS-SEM**	**SW3005A**			Analyst: **tj**
Cadmium	0.00070	0.00002	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Copper	0.2810	0.00020	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
Lead	0.03112	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Nickel	0.05961	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Simultaneously Extracted Metal:	0.6320	0.00051	0.00191		µmoles/g	1	9/13/2012 12:12:08 PM
Zinc	0.2595	0.00050	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
PERCENT SOLIDS			**A2540G**				Analyst: **dk/jr**
Percent Solids	84.8	0.01	0.1		%	1	8/21/2012 3:40:00 PM
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**				Analyst: **jo**
Sulfide	0.93	0.55	1.50	J	µmoles/g	1	8/29/2012 8:00:00 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)

CLIENT:	AECOM	**Client Sample ID:**	USC (#25935)
Lab Order:	1207139	**Collection Date:**	7/2/2012
Project:	60225262-058		
Lab ID:	1207139-003	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
AVS-SEM METALS			**AVS-SEM**	**SW3005A**			Analyst: **tj**
Cadmium	0.00192	0.00002	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Copper	0.08115	0.00020	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
Lead	0.00379	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Nickel	0.05206	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Simultaneously Extracted Metal	0.4368	0.00051	0.00191		µmoles/g	1	9/13/2012 12:12:08 PM
Zinc	0.2979	0.00050	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
PERCENT SOLIDS			**A2540G**				Analyst: **dk/jr**
Percent Solids	78.8	0.01	0.1		%	1	8/21/2012 3:40:00 PM
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**				Analyst: **jo**
Sulfide	1.35	0.55	1.50	J	µmoles/g	1	8/29/2012 8:00:00 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: *25-Sep-12*

CLIENT:	AECOM	**Client Sample ID:**	EFSC (#25937)
Lab Order:	1207139	**Collection Date:**	
Project:	60225262-058		
Lab ID:	1207139-004	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
AVS-SEM METALS			**AVS-SEM**	**SW3005A**			Analyst: **tj**
Cadmium	0.06460	0.00002	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Copper	0.3021	0.00020	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
Lead	0.00944	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Nickel	0.5195	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Simultaneously Extracted Metal:	7.827	0.00051	0.00191		µmoles/g	1	9/13/2012 12:12:08 PM
Zinc	6.931	0.00050	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
PERCENT SOLIDS			**A2540G**				Analyst: **dk/jr**
Percent Solids	72.3	0.01	0.1		%	1	8/21/2012 3:40:00 PM
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**				Analyst: **jo**
Sulfide	1.10	0.55	1.50	J	µmoles/g	1	8/29/2012 8:00:00 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)

CLIENT: AECOM
Lab Order: 1207139
Project: 60225262-058
Lab ID: 1207139-005

Client Sample ID: LJH (#25941)
Collection Date: 7/2/2012

Matrix: SEDIMENT

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
AVS-SEM METALS			**AVS-SEM**	**SW3005A**			Analyst: **tj**
Cadmium	0.00101	0.00002	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Copper	0.3437	0.00020	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
Lead	0.02664	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Nickel	0.03198	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Simultaneously Extracted Metal:	0.6427	0.00051	0.00191		µmoles/g	1	9/13/2012 12:12:08 PM
Zinc	0.2393	0.00050	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
PERCENT SOLIDS			**A2540G**				Analyst: **dk/jr**
Percent Solids	80.8	0.01	0.1		%	1	8/21/2012 3:40:00 PM
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**				Analyst: **jo**
Sulfide	1.05	0.55	1.50	J	µmoles/g	1	8/29/2012 8:00:00 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)

CLIENT: AECOM
Lab Order: 1207139
Project: 60225262-058
Lab ID: 1207139-006

Client Sample ID: LSLA (#25936)
Collection Date: 7/3/2012
Matrix: SEDIMENT

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
AVS-SEM METALS			**AVS-SEM**	**SW3005A**			Analyst: **tj**
Cadmium	0.00573	0.00002	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Copper	0.1204	0.00020	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
Lead	0.01162	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Nickel	0.07371	0.00001	0.00010		µmoles/g	1	9/13/2012 12:12:08 PM
Simultaneously Extracted Metal:	1.049	0.00051	0.00191		µmoles/g	1	9/13/2012 12:12:08 PM
Zinc	0.8376	0.00050	0.00100		µmoles/g	1	9/13/2012 12:12:08 PM
PERCENT SOLIDS			**A2540G**				Analyst: **dk/jr**
Percent Solids	77.4	0.01	0.1		%	1	8/21/2012 3:40:00 PM
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**				Analyst: **jo**
Sulfide	0.99	0.55	1.50	J	µmoles/g	1	8/29/2012 8:00:00 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

P.O. Box 4078
200 Technology Way
Butte, MT 59701

Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

Date: 25-Sep-12
Report Date: 25-Sep-12

QA/QC SUMMARY REPORT

Client: AECOM
Project: 60225262-058

Work Order: 1207139
BatchID: 5937

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***X-PB-5937***			*Method:* ***AVS-SEM***		*Batch ID:* ***5937***		*Analysis Date: 9/13/2012 12:12:08 PM*			
Cadmium	ND	0.00010	µmoles/g							
Copper	0.00079	0.00100	µmoles/g							J
Lead	0.00009	0.00010	µmoles/g							J
Nickel	0.00074	0.00010	µmoles/g							
Simultaneously Extract	0.05240	0.00191	µmoles/g							
Zinc	0.05076	0.00100	µmoles/g							
Sample ID: ***PB-5937***			*Method:* ***AVS-SEM***		*Batch ID:* ***5937***		*Analysis Date: 9/13/2012 12:12:08 PM*			
Cadmium	ND	0.00010	µmoles/g							
Copper	0.00050	0.00100	µmoles/g							J
Lead	0.00001	0.00010	µmoles/g							J
Nickel	0.00055	0.00010	µmoles/g							
Simultaneously Extract	0.00500	0.00191	µmoles/g							
Zinc	0.00393	0.00100	µmoles/g							
Sample ID: ***LCS-5937***			*Method:* ***AVS-SEM***		*Batch ID:* ***5937***		*Analysis Date: 9/13/2012 12:12:08 PM*			
Cadmium	0.08513	0.00010	µmoles/g	0.08900	95.7	80	120			
Copper	0.1891	0.00100	µmoles/g	0.1570	120	80	120			
Lead	0.05578	0.00010	µmoles/g	0.04800	116	80	120			
Nickel	0.2018	0.00010	µmoles/g	0.1700	119	80	120			
Simultaneously Extract	0.7109	0.00191	µmoles/g	0.6170	115	80	120			
Zinc	0.1790	0.00100	µmoles/g	0.1530	117	80	120			
Sample ID: ***1207139-002A-D***			*Method:* ***AVS-SEM***		*Batch ID:* ***5937***		*Analysis Date: 9/13/2012 12:12:08 PM*			
Cadmium	0.00081	0.00010	µmoles/g					15.7	20	
Copper	0.2736	0.00100	µmoles/g					2.68	20	
Lead	0.02635	0.00010	µmoles/g					16.6	20	
Nickel	0.04883	0.00010	µmoles/g					19.9	20	
Simultaneously Extract	0.5976	0.00191	µmoles/g					5.60	20	
Zinc	0.2480	0.00100	µmoles/g					4.56	20	
Sample ID: ***1207139-002A-MS***			*Method:* ***AVS-SEM***		*Batch ID:* ***5937***		*Analysis Date: 9/13/2012 12:12:08 PM*			
Cadmium	0.06259	0.00010	µmoles/g	0.08278	74.8	75	125			
Copper	0.4461	0.00100	µmoles/g	0.1460	113	75	125			
Lead	0.07930	0.00010	µmoles/g	0.04464	108	75	125			
Nickel	0.2381	0.00010	µmoles/g	0.1581	113	75	125			
Simultaneously Extract	1.244	0.00191	µmoles/g	0.5739	107	75	125			
Zinc	0.4176	0.00100	µmoles/g	0.1423	111	75	125			
Sample ID: ***1207139-002A-MSD***			*Method:* ***AVS-SEM***		*Batch ID:* ***5937***		*Analysis Date: 9/13/2012 12:12:08 PM*			
Cadmium	0.06279	0.00010	µmoles/g	0.08278	75.0	75	125	0.327	20	
Copper	0.4282	0.00100	µmoles/g	0.1460	101	75	125	4.09	20	
Lead	0.07550	0.00010	µmoles/g	0.04464	99.4	75	125	4.90	20	

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: AECOM
Project: 60225262-058

Work Order: 1207139
BatchID: 5937

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***1207139-002A-MSD***			*Method:* ***AVS-SEM***	*Batch ID:* ***5937***			*Analysis Date: 9/13/2012 12:12:08 PM*			
Nickel	0.2249	0.00010	µmoles/g	0.1581	105	75	125	5.73	20	
Simultaneously Extract	1.189	0.00191	µmoles/g	0.5739	97.1	75	125	4.46	20	
Zinc	0.3980	0.00100	µmoles/g	0.1423	97.3	75	125	4.81	20	

Date: 25-Sep-12
Report Date: 25-Sep-12

QA/QC SUMMARY REPORT

Client: AECOM
Project: 60225262-058
Work Order: 1207139
BatchID: R20694

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***1207139-001A***			*Method:* ***A2540G***		*Batch ID:* ***R20694***		*Analysis Date: 8/21/2012 3:40:00 PM*			
Percent Solids	79.4	0.1	%					0.251	35	

Qualifiers: NA Sample conc. Is > 4*spike level S Spike Recovery outside accepted recovery limits

Date: 25-Sep-12
Report Date: 25-Sep-12

QA/QC SUMMARY REPORT

Client: AECOM
Project: 60225262-058
Work Order: 1207139
BatchID: R20853

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***1207139-002A-D***			*Method:* ***AVS-SEM***		*Batch ID:* ***R20853***		*Analysis Date: 8/29/2012 8:00:00 AM*			
Sulfide	0.93	1.50	µmoles/g					0	35	J
Sample ID: ***1207139-003A-S***			*Method:* ***AVS-SEM***		*Batch ID:* ***R20853***		*Analysis Date: 8/29/2012 8:00:00 AM*			
Sulfide	9.85	1.50	µmoles/g	10.64	79.9	80	120			
Sample ID: ***LCS-WC 2634***			*Method:* ***AVS-SEM***		*Batch ID:* ***R20853***		*Analysis Date: 8/29/2012 8:00:00 AM*			
Sulfide	3.63	1.50	µmoles/g	4.194	86.6	85	105			
Sample ID: ***PB***			*Method:* ***AVS-SEM***		*Batch ID:* ***R20853***		*Analysis Date: 8/29/2012 8:00:00 AM*			
Sulfide	ND	1.50	µmoles/g							

Qualifiers:
NA Sample conc. is > 4*spike level
S Spike Recovery outside accepted recovery limits

AECOM

CHAIN OF CUSTODY RECORD

1207139

Page 1 of 1

Client/Project Name: 058

Project Location: FCETL/AECOM

Project Number: 60225262.058 2012

Field Logbook No.:

Sampler (Print Name)/(Affiliation): Client

Chain of Custody Tape Nos.: 43266

Signature:

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	S – Soil
WW – Wastewater	SL – Sludge
GW – Groundwater	SD – Sediment
SW – Surface Water	SO – Solid
ST – Storm Water	A – Air
W – Water	L – Liquid
	P – Product

Field Sample No./Identification	Date	Time	COMP	GRAB	Sample Container (Size/Mat'l)	Matrix	Preserv.	Field Filtered	AVS	Lab I.D.	Remarks
LSH (#25942)	7/3/12	Unk.			4oz Glass	Sed	Ice		X	001	
MSH (#25943)	7/3/12								X	002	
USC (#25935)	7/2/12								X	003	
EFSC (#25937)	Unk.								X	004	
LJH (#25941)	7/2/12								X	005	
LSLA (#25936)	7/3/12	↓			↓	↓	↓		X		

Relinquished by: (Print Name)/(Affiliation) Christina Needham (AECOM)
Signature: Christina Needham
Date: 7/24/12
Time: 1300

Received by: (Print Name)/(Affiliation) B. O'Donnell
Signature: B. O'Donnell
Date: 7/25/12
Time: 1330

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

Overnight

Temp blank: Yes No

O:\GRAPHICS\FORMS\Chain of Custody (COC)\Chain-of-Custody Ft Collins_10_07.doc

Serial No. № 52449

MSE Lab Services

Sample Receipt Checklist

Client Name AECOM_INC

Date and Time Received: 7/25/2012 1:30:00 PM

Work Order Number 1207139

RcptNo: 1

Received by BO

COC_ID:

CoolerID:

Checklist completed by BO Donnell 7/25/12
Signature Date

Reviewed by JW 7/26/12
Initials Date

Matrix:

Carrier name Priority US Mail

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 7/25/12

Sediment

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 = 1.2 DEGREE C - COOLER ON ICE.

Corrective Action

APPENDIX F: SPAWNING SUBSTRATE QUALITY DATA

Appendix F.–2012 spawning substrate data for sites sampled near Kensington Gold Mine.

Slate Creek Sample Point 1, Sampled on 7/9/2012

	Volume (mL/L) Retained Per Sieve (Sieve Size in mm)									Sample Depth (cm)
Sample No.	101.6	50.8	25.4	12.7	6.35	1.68	0.42	0.15	Imhoff	
1	1050	140	140	280	190	395	95	15	24	20
2	0	0	200	225	140	325	140	15	24	20
3	0	515	310	225	250	580	240	27	65	21
4	0	570	510	260	290	750	415	53	54	20

Slate Creek Sample Point 2, Sampled on 7/9/12

	Volume (mL/L) Retained Per Sieve (Sieve Size in mm)									Sample Depth (cm)
Sample No.	101.6	50.8	25.4	12.7	6.35	1.68	0.42	0.15	Imhoff	
1	101.6	250	380	270	260	475	195	23	46.5	20
2	600	75	395	295	180	375	135	15	18.5	20
3	0	450	340	370	340	590	295	30	18	20
4	0	0	320	460	285	545	300	28	16.5	19

Johnson Creek Sample Point 1, Sampled on 7/11/12

	Volume (mL/L) Retained Per Sieve (Sieve Size in mm)									Sample Depth (cm)
Sample No.	101.6	50.8	25.4	12.7	6.35	1.68	0.42	0.15	Imhoff	
1	0	0	205	655	725	290	170	60	51.5	25
2	0	0	75	265	670	755	340	100	55.5	25
3	0	0	80	560	605	620	100	89	65.5	25
4	0	0	90	450	560	575	195	65	66.5	25

Johnson Creek Sample Point 2, Sampled on 7/11/12

	Volume (mL/L) Retained Per Sieve (Sieve Size in mm)									Sample Depth (cm)
Sample No.	101.6	50.8	25.4	12.7	6.35	1.68	0.42	0.15	Imhoff	
1	0	0	15	260	440	940	1040	150	38	25
2	0	0	215	450	350	370	250	35	16.5	25
3	0	0	510	1000	605	355	55	41	91	25
4	0	190	510	725	350	200	30	25	11	25

Sherman Creek Sample Point 1, Sampled on 7/10/12

	Volume (mL/L) Retained Per Sieve (Sieve Size in mm)									Sample Depth (cm)
Sample No.	101.6	50.8	25.4	12.7	6.35	1.68	0.42	0.15	Imhoff	
1	0	500	350	350	300	635	240	25	24.5	17
2	0	600	450	350	350	1350	500	96	191	22
3	0	425	200	290	300	650	245	26	17.5	20
4	0	590	425	295	235	300	150	25	16.5	20

Sherman Creek Sample Point 2, Sampled on 7/16/12

	Volume (mL/L) Retained Per Sieve (Sieve Size in mm)									Sample Depth (cm)
Sample No.	101.6	50.8	25.4	12.7	6.35	1.68	0.42	0.15	Imhoff	
1	0	975	290	310	350	660	375	75	49	20
2	0	250	400	375	340	450	180	25	5.5	17
3	0	400	240	500	425	630	210	25	6.5	17
4	0	200	515	400	300	550	390	50	48	17

APPENDIX G: ADULT SALMON COUNT DATA

Table G1.–2012 Slate Creek adult pink salmon counts by reach.

	7/16/2012 Pink Salmon Counts				**7/25/2012 Pink Salmon Counts**				**7/31/2012 Pink Salmon Counts**			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
0-100m	0	0	0	0	0	0	0	0	30	32	31	0
100-200m	0	0	0	0	0	0	0	0	29	41	35	0
200-300m	0	0	0	0	0	0	0	0	112	98	105	1
300-400m	0	0	0	0	0	0	0	0	110	115	112	1
400-500m	0	0	0	0	0	0	0	0	82	79	80	0
500-600m	0	0	0	0	0	0	0	0	1	1	1	0
600-700m	0	0	0	0	0	0	0	0	0	0	0	0
700-800m	0	0	0	0	0	0	0	0	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**	**0**	**0**	**0**	**0**	**364**	**366**	**364**	**2**

	8/6/2012 Pink Salmon Counts				**8/13/2012 Pink Salmon Counts**				**8/20/2012 Pink Salmon Counts**			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
0-100m	21	58	39	0	495	455	475	15	270	250	260	300
100-200m	175	217	196	0	490	460	475	16	358	465	411	250
200-300m	317	325	321	0	570	540	555	35	550	590	570	350
300-400m	97	107	102	3	600	460	530	40	510	400	455	200
400-500m	210	144	177	3	390	410	400	25	200	165	182	100
500-600m	214	225	219	0	211	260	235	15	167	170	168	50
600-700m	25	19	22	0	270	275	272	25	270	300	285	50
700-800m	28	17	22	1	160	190	175	5	0	0	0	0
800-900m	14	2	8	0	36	35	35	0	0	0	0	0
900-barrier	0	0	0	0	0	0	0	0	0	0	0	0
Total	**1101**	**1114**	**1106**	**7**	**3222**	**3085**	**3152**	**176**	**2325**	**2340**	**2331**	**1300**

	8/27/2012 Pink Salmon Counts				**9/3/2012 Pink Salmon Counts**				**9/10/2012 Pink Salmon Counts**			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
0-100m	48	60	54	0	0	0	0	37	0	0	0	0
100-200m	73	80	76	0	1	1	1	43	0	0	0	0
200-300m	97	100	98	0	0	0	0	46	0	0	0	0
300-400m	28	17	22	0	0	0	0	32	0	0	0	0
400-500m	27	20	23	0	0	0	0	17	0	0	0	0
500-600m	17	17	17	0	0	0	0	0	0	0	0	0
600-700m	23	23	23	0	0	0	0	0	0	0	0	0
700-800m	5	6	5	0	0	0	0	0	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	**318**	**323**	**318**	**0**	**1**	**1**	**1**	**175**	**0**	**0**	**0**	**0**

Table G2.–2012 Johnson Creek adult pink salmon counts by reach.

	7/17/2012 Pink Salmon Counts				**7/24/2012 Pink Salmon Counts**				**7/31/2012 Pink Salmon Counts**			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	0	0	0	25	35	30	0	120	0	60	0
Lace-JM	0	0	0	0	0	0	0	0	50	0	25	0
JM-Trap	0	0	0	0	33	30	31	0	100	0	50	0
Trap-#4	0	0	0	0	0	0	0	0	50	65	57	0
#4-#7	0	0	0	0	0	25	12	0	150	130	140	0
#7-#10	0	0	0	0	0	0	0	0	158	0	79	0
#10-Power	0	0	0	0	0	0	0	0	0	0	0	0
Power-LF	0	0	0	0	0	0	0	0	0	0	0	0
LF-#15	0	0	0	0	0	0	0	0	0	0	0	0
#15-Falls pool	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**58**	**90**	**73**	**0**	**628**	**195**	**411**	**0**

	8/7/2012 Pink Salmon Counts				**8/14/2012 Pink Salmon Counts**				**8/21/2012 Pink Salmon Counts**			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	0	0	0	1	0	0	3	0	6	3	0
Lace-JM	0	0	0	0	7	0	3	3	51	3	27	2
JM-Trap	30	26	28	0	400	1	200	0	450	75	262	10
Trap-#4	17	56	36	0	400	300	350	0	560	225	392	25
#4-#7	150	130	140	0	300	260	280	0	350	240	295	10
#7-#10	462	320	391	0	840	550	695	20	550	350	450	50
#10-Power	250	2	126	0	150	100	125	0	520	180	350	120
Power-LF	0	0	0	0	10	0	5	0	40	10	25	10
LF-#15	50	15	32	0	50	30	40	0	15	10	12	15
#15-Falls pool	0	0	0	0	0	0	0	0	0	0	0	0
Total	**959**	**549**	**753**	**0**	**2158**	**1241**	**1698**	**26**	**2536**	**1099**	**1816**	**242**

	8/29/2012 Pink Salmon Counts				**9/3/2012 Pink Salmon Counts**				**9/11/2012 Pink Salmon Counts**			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	0	0	0	0	0	0	0	0	0	0	0
Lace-JM	0	0	0	0	0	0	0	0	0	0	0	0
JM-Trap	50	39	45	0	60	16	38	0	5	0	2	0
Trap-#4	50	58	54	0	17	7	12	0	1	0	0	0
#4-#7	32	13	23	0	5	4	4	0	5	3	4	0
#7-#10	100	14	57	0	8	3	5	0	0	0	0	0
#10-Power	30	10	20	0	1	1	1	0	0	0	0	0
Power-LF	0	2	1	0	0	0	0	0	0	2	1	0
LF-#15	0	0	0	0	0	0	0	0	0	0	0	0
#15-Falls pool	0	0	0	0	0	0	0	0	0	0	0	0
Total	**262**	**136**	**198**	**0**	**91**	**31**	**60**	**0**	**11**	**5**	**7**	**0**

	9/19/2012 Pink Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	0	0	0
Lace-JM	0	0	0	0
JM-Trap	0	0	0	0
Trap-#4	0	0	0	0
#4-#7	0	0	0	0
#7-#10	0	0	0	0
#10-Power	0	0	0	0
Power-LF	0	0	0	0
LF-#15	0	0	0	0
#15-Falls pool	0	0	0	0
Total	**0**	**0**	**0**	**0**

Table G3.–2012 Johnson Creek adult chum salmon counts by reach.

	7/17/2012 Chum Salmon Counts				**7/24/2012 Chum Salmon Counts**				**7/31/2012 Chum Salmon Counts**			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	0	0	0	0	0	0	0	0	30	15	0
Lace-JM	0	0	0	0	0	0	0	0	0	3	2	0
JM-Trap	0	0	0	0	0	0	0	0	2	50	26	0
Trap-#4	0	0	0	0	0	2	1	0	0	0	0	0
#4-#7	0	0	0	0	2	35	19	0	4	6	5	0
#7-#10	0	0	0	0	65	0	33	0	0	0	0	0
#10-Power	0	0	0	0	0	0	0	0	0	0	0	0
Power-LF	0	0	0	0	0	0	0	0	0	0	0	0
LF-#15	0	0	0	0	0	0	0	0	0	0	0	0
#15-Falls pool	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**67**	**37**	**52**	**0**	**6**	**89**	**48**	**0**

	8/7/2012 Chum Salmon Counts				**8/14/2012 Chum Salmon Counts**			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	0	0	0	0	0	0	0
Lace-JM	0	0	0	0	0	0	0	0
JM-Trap	0	0	0	0	0	0	0	0
Trap-#4	1	1	1	0	0	0	0	0
#4-#7	0	0	0	0	0	0	0	0
#7-#10	0	0	0	0	0	0	0	0
#10-Power	0	0	0	0	0	0	0	0
Power-LF	0	0	0	0	0	0	0	0
LF-#15	0	0	0	0	0	0	0	0
#15-Falls pool	0	0	0	0	0	0	0	0
Total	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**

Table G4.–2012 Johnson Creek adult coho salmon counts by reach.

	9/26/2012 Coho Salmon Counts				10/2/2012 Coho Salmon Counts				10/9/2012 Coho Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	0	0	0	0	0	0	0	0	0	0	0
Lace-JM	0	0	0	0	0	0	0	0	0	0	0	0
JM-Trap	0	0	0	0	0	0	0	0	0	0	0	0
Trap-#4	0	0	0	0	0	0	0	0	0	0	0	0
#4-#7	31	31	31	0	30	30	30	0	5	5	5	0
#7-#10	2	2	2	0	10	10	10	0	0	0	0	0
#10-Power	0	0	0	0	0	0	0	0	0	0	0	0
Power-LF	0	0	0	0	0	0	0	0	0	0	0	0
LF-#15	0	0	0	0	0	0	0	0	0	0	0	0
#15-Falls pool	0	0	0	0	0	0	0	0	0	0	0	0
Total	**33**	**33**	**33**	**0**	**40**	**40**	**40**	**0**	**5**	**5**	**5**	**0**

	10/16/2012 Coho Salmon Counts				10/25/2012 Coho Salmon Counts				10/30/2012 Coho Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	0	0	0	0	-	-	0	0	-	-	0
Lace-JM	0	0	0	0	0	-	-	0	0	-	-	0
JM-Trap	0	0	0	0	0	-	-	0	0	-	-	0
Trap-#4	0	0	0	0	0	-	-	0	0	-	-	0
#4-#7	0	0	0	0	4	-	-	0	2	-	-	0
#7-#10	0	0	0	0	0	-	-	0	0	-	-	0
#10-Power	0	0	0	0	1	-	-	0	1	-	-	0
Power-LF	0	0	0	0	0	-	-	0	0	-	-	0
LF-#15	0	0	0	0	0	-	-	0	0	-	-	0
#15-Falls pool	0	0	0	0	0	-	-	0	0	-	-	0
Total	**0**	**0**	**0**	**0**	**5**	**-**	**-**	**0**	**3**	**-**	**-**	**0**

	11/5/2012 Coho Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	-	-	0
Lace-JM	0	-	-	0
JM-Trap	0	-	-	0
Trap-#4	1	-	-	0
#4-#7	2	-	-	0
#7-#10	0	-	-	0
#10-Power	1	-	-	0
Power-LF	0	-	-	0
LF-#15	0	-	-	0
#15-Falls pool	0	-	-	0
Total	**4**	**-**	**-**	**0**

Note: snorkel surveys on 10/25, 10/30, and 11/5 were performed by a single observer.

Table G5.–2012 Sherman Creek adult pink salmon counts by reach.

	7/16/2012 Pink Salmon Counts				**7/26/2012 Pink Salmon Counts**				**7/31/2012 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	2	2	2	0	3	2	2	0
50-100m	0	0	0	0	0	0	0	0	0	0	0	0
100-150m	0	0	0	0	0	0	0	0	0	0	0	0
150-200m	0	0	0	0	0	0	0	0	7	7	7	0
200-250m	0	0	0	0	0	0	0	0	1	0	0	0
250-300m	0	0	0	0	0	0	0	0	0	0	0	0
300-350m	0	0	0	0	0	0	0	0	0	0	0	0
350-Falls Pool	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**2**	**2**	**2**	**0**	**11**	**9**	**9**	**0**

	8/6/2012 Pink Salmon Counts				**8/13/2012 Pink Salmon Counts**				**8/20/2012 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	10	6	8	0	48	40	44	3	60	45	52	3
50-100m	4	4	4	0	49	18	33	0	62	45	53	3
100-150m	6	5	5	0	5	4	4	1	36	16	26	6
150-200m	21	15	18	0	30	19	24	2	76	85	80	10
200-250m	15	14	14	0	55	43	49	0	81	90	85	0
250-300m	16	13	14	0	50	40	45	0	54	60	57	3
300-350m	26	19	22	1	45	27	36	3	77	65	71	10
350-Falls Pool	11	13	12	1	55	46	50	3	99	95	97	7
Total	**109**	**89**	**97**	**2**	**337**	**237**	**285**	**12**	**545**	**501**	**521**	**42**

	8/27/2012 Pink Salmon Counts				**9/3/2012 Pink Salmon Counts**				**9/10/2012 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	75	70	72	3	24	7	15	3	2	1	1	0
50-100m	83	70	76	4	31	32	31	6	10	8	9	0
100-150m	25	25	25	3	6	3	4	3	1	1	1	0
150-200m	80	75	77	15	54	63	58	23	3	3	3	0
200-250m	100	108	104	25	12	18	15	9	2	0	1	0
250-300m	80	56	68	16	9	8	8	7	8	8	8	0
300-350m	60	29	44	0	19	9	14	0	2	2	2	0
350-Falls Pool	55	56	55	0	0	0	0	0	0	0	0	0
Total	**558**	**489**	**521**	**66**	**155**	**140**	**145**	**51**	**28**	**23**	**25**	**0**

	9/18/2012 Pink Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
0-50m	0	0	0	0
50-100m	1	1	1	0
100-150m	0	0	0	0
150-200m	0	0	0	0
200-250m	0	0	0	0
250-300m	2	2	2	0
300-350m	0	0	0	0
350-Falls Pool	0	0	0	0
Total	**3**	**3**	**3**	**0**

Table G6.–Adult salmon counts for pink, chum, and coho salmon by statistical week in Slate, Sherman and Johnson Creeks, 2011–2012.

Pink Salmon Survey Data

Statistical Week	Slate Creek		Johnson Creek		Sherman Creek	
	2011	2012	2011	2012	2011	2012
29	-	0	-	0	-	0
30	0	0	1	73	1	2
31	0	364	180	411	300	9
32	370	1106	1892	753	774	97
33	764	3152	3850	1698	1051	285
34	1396	2331	5264	1816	399	521
35	1648	318	1351	198	159	521
36	1815	1	3712	60	873	145
37	231	0	672	7	417	25
38	46	-	437	0	611	3
39	0	-	145	-	36	-

Chum Salmon Survey Data

Statistical Week	Slate Creek		Johnson Creek		Sherman Creek	
	2011	2012	2011	2012	2011	2012
29	-	0	-	0	0	0
30	0	0	2	52	0	0
31	0	0	14	48	0	0
32	52	0	0	1	0	0
33	8	1	0	0	0	0
34	0	0	5	0	0	0
35	0	0	0	0	0	0

Coho Salmon Survey Data

Statistical Week	Slate Creek		Johnson Creek		Sherman Creek	
	2011	2012	2011	2012	2011	2012
39	-	0	-	33	-	-
40	-	0	-	40	-	-
41	-	0	-	5	-	-
42	-	0	-	0	-	-
43	0	-	15	5	-	-
44	0	-	9	3	-	-
45	0	-	-	4	-	-
46	0	-	9	-	-	-

Note: “-” indicates we did not survey for fish.

APPENDIX H: SHERMAN CREEK CATALOG NOMINATION

State of Alaska
Department of Fish and Game
Sportfish Division

Nomination Details For
Anadromous Waters Catalog
Nomination Number 12-506

Region Southeastern

USGS Quad Juneau D-4

Upper Reach Latitude 0.0000 **Longitude** 0.0000 (NAD83/WGS84)

Lower Reach Latitude 0.0000 **Longitude** 0.0000 (NAD83/WGS84)

AWC Waterbody # 115-31-10330

AWC Waterbody Name Sherman Creek

Observations		
Species	**Date Observed**	**Activity**

Comments:

Delete coho salmon rearing from stream. Coho rearing was added in 2010 according to an observation made on 5/25/09 by field technician Charmagne Guitierez on behalf of Aquatic Science Inc. In published biomonitoring results from Aquatic Science Inc. 2009 coho were not cited as being observed. The 2005-2010 NPDES annual reports for the Kensington Gold mine have never cited coho as being observed in Sherman Creek. The most recent biomonitoring field work in 2011 which was conducted by Juneau area habitat biologists also confirmed that coho are not present in Sherman creek.

Name of Observer: Benjamin Brewster

Submission Date: 03/08/12

ADFG Biologist:

Nomination Status: Change

Nomimation Changes To The AWC

Region **Map(quad)** **AWC Stream #**	**Stream Name**	**Action Taken**	**Species***	**Comments**
Southeastern JUNEAU D-4 115-31-10330		Delete species from existing stream or lake	CO	

Addition files included with this nomination.

File Name	**File Size**
12-506-Kensington Aquatic Studies ADFG 11-08 FINAL.pdf	12462909
12-506-2005 Annual Report.pdf	19672091
12-506-2009 Kensington Annual Rpt Vol 2.pdf	46812081

This nomination available as a PDF.

12-506.pdf

*** Best to right click and open in a new window or tab. ***

***Species Codes:**

AC	- Arctic char	AL	- Arctic lamprey	AW	- Arctic cisco
BC	- broad whitefish	BW	- Bering cisco	CH	- chum salmon
CO	- coho salmon	CT	- cutthroat trout	DV	- Dolly Varden
HW	- humpback whitefish	K	- chinook salmon	LC	- least cisco
LP	- lamprey, undifferentiated	LV	- river lamprey	OL	- longfin smelt
OM	- rainbow smelt	OU	- eulachon	P	- pink salmon
PC	- Pacific lamprey	S	- sockeye salmon	SF	- inconnu
SH	- Steelhead trout	SM	- smelt, undifferentiated	ST	- sturgeon, undifferentiated
W	- whitefish, undifferentiated				

***Activity Codes:**

s	- Spawning	r	- Rearing	p	- Present