Technical Report No. 25-02

Baseline Aquatic Studies for the Johnson Tract Project - 2024

by

Josh M. Brekken

February 2025

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

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in reports by the Divisions of Habitat, Sport Fish, and Commercial Fisheries. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figures or figure captions.

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)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail fork	METF
standard length	SL
total length	TL

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 detected	N
no data	ND
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. 25-02

BASELINE AQUATIC STUDIES FOR THE JOHNSON TRACT PROJECT -2024

By

Josh M. Brekken

Alaska Department of Fish and Game
Habitat Section, Anchorage
333 Raspberry Rd., Anchorage, AK 99518

February 2025

These studies were financed by JT Mining Inc.

Cover photo: Upper Johnson monitoring reach looking upstream (at approximately 275 cfs).

Technical Reports are available through the Alaska State Library, Alaska Resources Library and Information Services (ARLIS) and on the Internet: http://www.adfg.alaska.gov/index.cfm?adfg=habitat_publications.main. This publication has undergone editorial and peer review.

Note: Product names or specific company names used in this publication are included for completeness but do not constitute product endorsement. The Alaska Department of Fish and Game, in accordance with State of Alaska ethics laws, does not favor one group over another through endorsement or recommendation.

Alaska Department of Fish and Game, Habitat Section
333 Raspberry Rd., Anchorage Alaska 99518, USA

This document should be cited as:
Brekken, J. M. 2025. Baseline Aquatic Studies for the Johnson Tract Project - 2024. Alaska Department of Fish and Game, Technical Report No. 25-02, Anchorage, AK.

The Alaska Department of Fish and Game (ADF&G) administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act (ADA) of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility please write:
ADF&G ADA Coordinator, P.O. Box 115526, Juneau, AK 99811-5526
U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, MS 2042, Arlington, VA 22203
Office of Equal Opportunity, U.S. Department of the Interior, 1849 C Street NW MS 5230, Washington DC 20240

The department's ADA Coordinator can be reached via phone at the following numbers:
(VOICE) 907-465-6077, (Statewide Telecommunication Device for the Deaf) 1-800-478-3648,
(Juneau TDD) 907-465-3646, or (FAX) 907-465-6078

For information on alternative formats and questions on this publication, please contact:
ADF&G Habitat Section, 1800 Glenn Highway, Palmer, Alaska 99645 (907) 861-3200

TABLE OF CONTENTS

Page

LIST OF TABLES

Table **Page**

LIST OF FIGURES

Figure **Page**

ACKNOWLEDGEMENTS

We thank JT Mining Inc. (JT Mining) for their financial and logistical support for the aquatic studies work. We specifically acknowledge the assistance provided by Allegra Cairns, Shayne Price, and the staff at the Johnson Tract field camp.

Beth Evers (ADF&G) assisted with all field activities. Al Ott, Chelsea Clawson, and Olivia Edwards (ADF&G) provided peer and technical review of this report, provided expertise with planning and preparation, and processed periphyton samples. Andi Parrott with ADF&G–Habitat assisted with contracting and financing tasks. Thank you all for your valued contribution.

EXECUTIVE SUMMARY

The Johnson Tract Project, on the west side of Cook Inlet, is currently being explored by JT Mining Inc. for its mineral potential. The Alaska Department of Fish and Game Habitat Section established an aquatic studies monitoring program in 2023 focused on collecting baseline data that reflect stream conditions in the Johnson Tract lease area.

Water quality parameters, periphyton concentrations, aquatic invertebrate numbers and diversity, fish presence, and element concentrations in whole body fish and stream sediments are monitored over time to establish baseline conditions, inform future planning, and to monitor change over time. Currently, monitoring occurs at two sites, one in the Johnson River (Upper Johnson) and one in Kona Creek (Kona Creek) which is a tributary of the Johnson River. Sampling in 2024 occurred on August 12, 13, and 14.

Streamflow in the region is dynamic, affected by the proximity of Cook Inlet and the Chigmit Mountains. A substantial high-water event occurred August 6-8, 2024, which affected 2024 sampling results for chlorophyll-a concentrations and macroinvertebrate densities.

Mean chlorophyll-a concentrations (periphyton) in 2024 were 0.18 mg/m^2 at Upper Johnson and 0.23 mg/m^2 at Kona Creek, compared to 4.72 mg/m^2 and 5.11 mg/m^2 in 2023, respectively.

Benthic macroinvertebrate densities were also substantially lower in both monitoring reaches in 2024 compared to 2023. Mean densities at Upper Johnson were 302 (per m^2) compared to 1,749 (per m^2) in 2023, while mean densities at Kona Creek were 156 (per m^2) compared to 2,574 (per m^2) in 2023. The benthic macroinvertebrate communities at both sites were dominated by the order Diptera, family Chironomidae.

Fifteen (15) Dolly Varden were retained at Upper Johnson and ten (10) Dolly Varden were retained at Kona Creek and analyzed for whole body concentrations of arsenic, cadmium, copper, lead, mercury, selenium, silver, and zinc. Mean concentrations of elements in Dolly Varden were similar between sites and were within the range of observed results from 2023. One sediment grab-sample was collected at each site and analyzed for aluminum, arsenic, cadmium, copper, iron, lead, mercury, selenium, silver, and zinc. Element concentrations in sediments were similar in 2024 to 2023.

The catch per unit effort in minnow traps for Dolly Varden at Upper Jonson was 2.66 (fish per trap per 24-hours) and 1.91 at Kona Creek in 2024.

INTRODUCTION

The Johnson Tract Project (Johnson Tract) is located near tidewater on the west side of Cook Inlet in Southcentral Alaska between Tuxedni and Chinitna Bays. The tract is currently being explored by JT Mining Inc. (JT Mining) under a lease agreement with Cook Inlet Region, Inc. (CIRI) which has mineral and surface rights in the upper Johnson River watershed and in adjacent drainages. The Johnson Tract, originally explored from 1982 to1995, was inactive for almost 25 years prior to acquisition by JT Mining in 2019. JT Mining conducted seasonal exploration surface drilling programs from 2019 to 2024 with a focus on delineating the high-grade Johnson Tract ore deposit (JT Deposit). In July of 2024, JT Mining was acquired by Contango Ore Inc., headquartered in Fairbanks, Alaska.

The Alaska Department of Fish and Game (ADF&G), Habitat Section, developed a monitoring program focused on collecting baseline data on a select number of parameters that reflect stream conditions in the Johnson Tract lease area. Two aquatic monitoring sites (or reaches) were established near the JT Deposit. One site is located in the mainstem Johnson River (Upper Johnson) the other site is located in Kona Creek (Kona Creek) which is a tributary of the Johnson River. Monitoring sampling was conducted at these sites on August 12th - 14th, 2024 and previously in 2023 (Brekken et. al., 2024).

PURPOSE

The purpose of this program and technical report is to document the baseline condition, abundance, and composition of biological communities, as well as water quality conditions, and element concentrations in juvenile Dolly Varden and sediments in the Johnson River watershed. Collecting aquatic baseline data and preparing a technical report will provide useful information for permit applications and to monitor change over time.

STUDY AREA

The project area is on the east side of the Chigmit Mountains and within the subpolar marine climate of Cook Inlet. This coastal area is often foggy and wet, with an average annual rainfall of 100 to 205 cm.

The Johnson River valley is about 35 km long between the headwaters and Cook Inlet. The Upper Johnson River, upstream of the mainstem ADF&G monitoring reach, is about 9 km long (including the Johnson Glacier) and drains an area of approximately 28 km^2. Kona Creek is about 8 km long from its headwaters at an alpine glacier to the confluence with the Johnson River. Kona Creek, upstream of the ADF&G Kona Creek monitoring reach is about 7 km long and drains an area of approximately 14 km^2. The aquatic monitoring reach in the Johnson River (Upper Johnson) is about 2 km downstream from the JT Deposit and 3.5 km downstream of the Johnson Glacier. The monitoring reach in Kona Creek is about 2 km upstream of the confluence of Kona Creek and the Johnson River. The Upper Johnson site is hydrogeologically connected to the JT Deposit as it is directly downstream. Kona Creek flanks the east side of the JT Deposit and is separated

hydrogeologically from the JT Deposit by a tight fault, known as the Dacite Fault. The sites are on relatively stable stream reaches containing riffles and are wadeable during moderate to low flows.

The streams at the monitoring sites are both located in anadromous reaches, both near the upper extent of anadromy for Dolly Varden (*Salvelinus malma*). Kona Creek supports Dolly Varden from the mouth to a barrier falls located about 2.5 km upstream. The creek does not support fish populations above the falls based on surveys conducted by ADF&G. The Johnson River supports anadromous Dolly Varden throughout most of its length (lower 24.5 km). The lower 20 km of the Johnson River supports coho salmon (*Oncorhynchus kisutch*), while the lower 7 km support chum (*O. keta*) and pink salmon (*O. gorbuscha*). Slimy sculpin (*Cottus cognatus*), coastrange sculpin (*C. aleuticus*), ninespine stickleback (*Pungitius pungitius*), and threespine stickleback (*Gasterosteus aculeatus*) are also found in the drainage.

Monitoring site locations are presented in Table 1. Overviews of the monitoring reaches are presented in Figures 1 and 2. The upper Johnson River watershed with monitoring sites and existing infrastructure are shown in Figure 3.

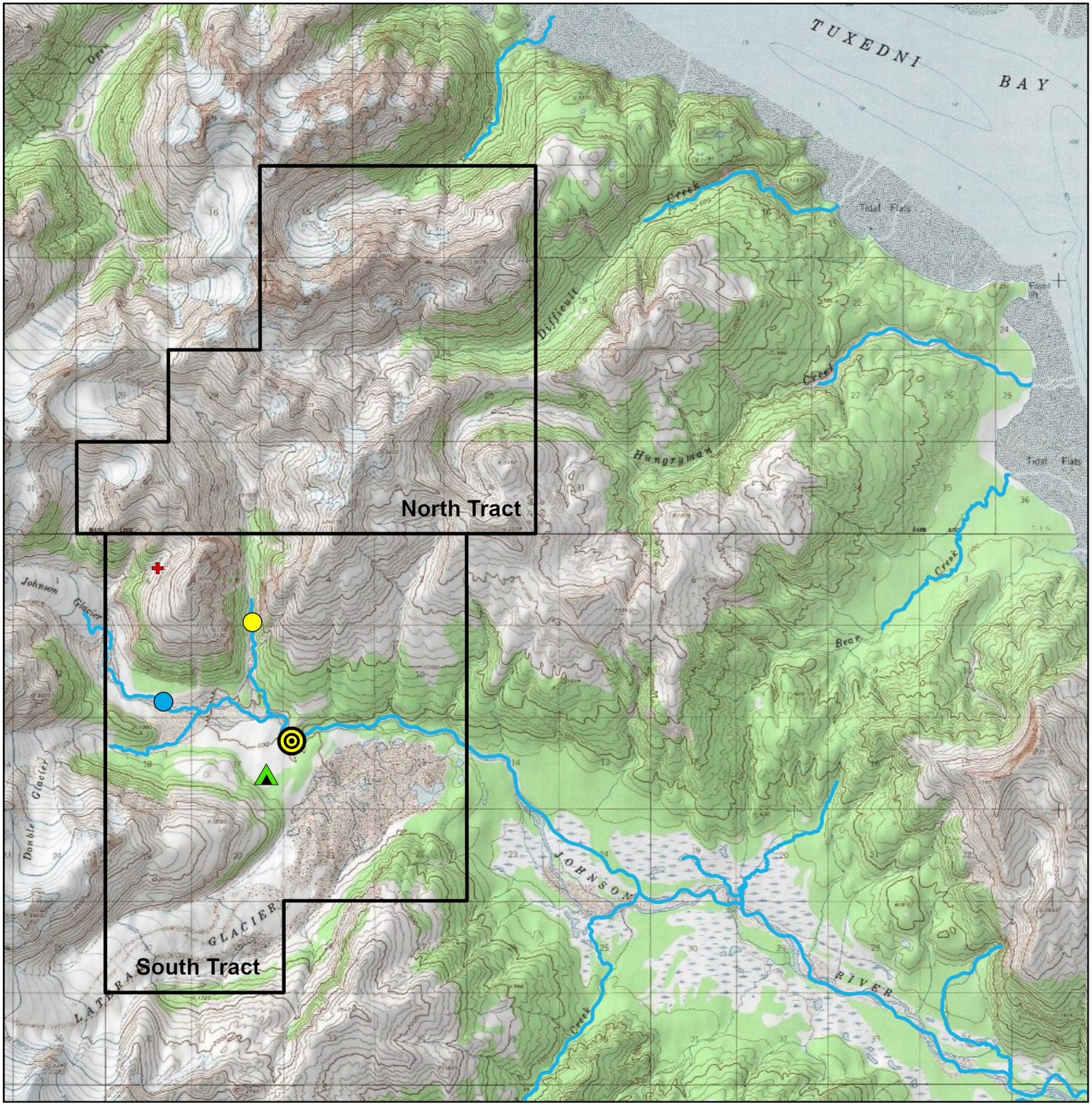
Table 1. Johnson Tract aquatic studies monitoring locations

Site	Longitude	Latitude	Elevation
Upper Johnson	60.09986 N	152.951146 W	148 ft.
Kona Creek	60.11238 N	152.922986 W	161 ft.

Water quality, periphyton and macroinvertebrate sampling occurred within 100 feet of listed coordinates and minnow traps were set within 1,000 feet.

Figure 1. Upper Johnson monitoring reach looking upstream. August 13, 2024, at approximately 310 cfs.

Figure 2. Kona Creek monitoring reach looking upstream. August 13, 2024, at approximately 150 cfs.



Johnson Tract Watershed Overview

Figure 3

ADF&G Biomonitoring Locations

- Johnson River
- Kona Creek

- Streamgage (JR-1)
- Johnson Tract Camp
- Anadromous Waters
- Johnson Tract Lease Boundaries
- Johnson Tract Deposit

Map Produced by
the Department of Fish & Game
1/2/2025

METHODS

WATER QUALITY

Water quality data have been collected at both monitoring sites from 2022 to 2024 using a hand-held YSI Pro Plus multiparameter meter (temperature, dissolved oxygen (DO), pH, and conductivity) and a Hach 2100Q meter (turbidity, 2023 and 2024). Water quality measurements have been collected by ADF&G during aquatic studies monitoring and during other visits opportunistically. The objective is to document the naturally occurring conditions in the surface water, although this type of sampling is more of a snapshot of the water quality, which likely varies throughout the year.

PERIPHYTON

Periphyton were sampled directly from submerged cobble, located in a riffle section of the stream reach. Sampling is scheduled in the latter half of the summer, ideally during a time of stable, moderate to low flow when sampling can be conducted safely, and to ensure that the submerged cobble had been wetted continuously for the previous 30 days. The USEPA Rapid Bioassessment Protocols for use in Streams and Wadeable Rivers were followed, but with more replicates per site to increase sample precision (Barbour et al. 1999). This modified approach is described below and follows the protocols as detailed in Bradley (2017).

Ten flat rocks, larger than 25 cm^2, were collected from a submerged riffle area of the streambed. A 5 cm by 5 cm square of high-density flexible foam was placed in the middle portion of the rock. All material around the foam square was scrubbed with a toothbrush and rinsed from the rock with clean water from the stream. The scrubbing process was repeated twice, with the toothbrush being rinsed clean between each step. The foam square was removed from the rock, and algae remaining on the rock were brushed with a clean toothbrush and rinsed with water into a filter receptacle with a 0.45 µm glass fiber filter. The material on the toothbrush was also rinsed onto the filter with stream water. The foam square and toothbrush were cleaned in between samples. Water was removed from the filter using a hand vacuum pump. After extracting most of the water (i.e., ¼ inch of water remains above the glass fiber filter), 3 to 5 drops of saturated $MgCO_3$ were added (no solid $MgCO_3$) while gently swirling the filter receptacle to ensure the entire sample received a light coating. Pumping continued until the water was gone and the filter was dry.

The receptacle on top of the vacuum pump was then removed and the glass filter folded over, so the sample material was protected on the inside of the filter. The glass fiber filter(s) were then placed on a paper coffee filter and the coffee filter was folded to entirely cover the fiber filter(s). The filters were then placed in a labeled, sealable plastic bag, with silica gel desiccant added. The sample bag was then placed in a cooler with ice. Immediately upon return to the Johnson Tract base camp, the samples were frozen and kept frozen until analyzed. Periphyton samples were sent to the ADF&G office in Fairbanks and were processed in the manner described in Ott et al. (2010). In short, samples were analyzed using a spectrophotometer and a standardized reference solution derived from fresh spinach leaves. Total chlorophyll-a, -b, and -c were calculated using the tri-chromatic equation (American Public Health Association 2012). Chlorophyll-a (Chl-*a*) is the primary algal pigment required for photosynthesis found in algae. Algae may also contain

appreciable amounts of accessory pigments, chlorophyll-b (Chl-*b*) and chlorophyll-c (Chl-*c*). The various taxonomic groups of algae differ greatly in their content of Chl-*b* and Chl-*c*.

Additionally, phaeophytin was calculated to determine if any Chl-*a* conversion occurred, and to correct concentrations for the presence of phaeophytin. Phaeophytin-corrected Chl-*a* (mg/m^2) results were used for data analysis. In 2024, periphyton biomass sampling was conducted on August 13, 2024. Samples were collected during moderate flow conditions (~310 cfs at Upper Johnson; ~150 cfs at Kona Creek). Ten samples were analyzed from each monitoring reach.

AQUATIC INVERTEBRATES

ADF&G used a Hess Sampler to collect aquatic benthic macroinvertebrate samples. Five replicate samples were collected from one riffle within each reach. The diameter of the Hess Sampler is 331 mm, encompassing an area of 0.086 m^2 and the mesh size is 243 µm. The sampler was pushed into the substrate and held in place (with the cod end of the net trailing downstream) while rocks were scrubbed in the water column which flowed into the trailing net. Large cobbles were scrubbed thoroughly inside the sampler and then discarded downstream. The rest of the substrate was worked and scrubbed inside the sampler with cobbles and larger gravels examined for invertebrates. The substrate inside the sampler was scrubbed for a couple of minutes ensuring the entire substrate, to approximately 10 cm depth, was thoroughly disturbed. After removing the sampler from the stream, the net was washed from the outside to ensure that no organisms were clinging or stuck to the net. The contents of the net were rinsed into a 500-mL sample jar using isopropyl alcohol from a squirt bottle. More alcohol was added to the sample jar to ensure the entire sample was submerged. The sampler was rinsed before a subsequent sample was collected slightly upstream and laterally adjacent to the previous sample.

In the lab the macroinvertebrate samples were rinsed over a #35 screen (0.447mm) to remove fine sediments and organisms were identified to the lowest practical taxonomic level using McCafferty (1998), Merritt and Cummings (1996), Pennak (1989), and Stewart and Oswood (2006). Typically identification was to genus for Ephemeroptera, Plecoptera, and Trichoptera; to family (in the case of Chironomidae and Simulidae) or genus if possible for Diptera; to order in the case of terrestrial adult insects, phylum or class in the case of worms or other macrofauna. Invertebrate density was calculated by dividing the total number of macroinvertebrates (5 samples/site) by the total area sampled (0.43 m^2). Taxa richness is reported as the total number of unique taxon collected per site. Samples were collected on August 13th, 2024.

ELEMENT CONCENTRATIONS AND CATCH METRICS IN DOLLY VARDEN

Juvenile Dolly Varden were collected on August 13th and 14th, 2024 at both monitoring reaches using minnow traps baited with salmon eggs. Dolly Varden, between 90 and 140-mm fork length (FL), were retained for whole body element analyses. Fish were selected from this length range to ensure minimum weight requirements for laboratory analyses, and to minimize age-related variability. Fish retained for element analyses were measured to fork length using a measuring board and weighed individually with a digital scale to the nearest tenth of a gram. Retained fish were handled with nitrile gloves and each fish was placed in an individually labeled plastic baggie and stored in an insulated cooler with ice packs. Fish not retained were returned to the sample

reach. The goal at each site was to retain and analyze 15 Dolly Varden in the appropriate size range.

Retained Dolly Varden were transported back to the Johnson Tract Camp where they were immediately frozen. The frozen fish were then brought to Anchorage where they were placed in the freezers at the ADF&G office. The fish samples were kept frozen until prepared for shipment to the analytical lab for analysis. ADF&G maintained written chain of custody for the samples. At the laboratory, whole body fish samples were homogenized, freeze dried, and ground prior to element analyses.

Whole body analyses of juvenile Dolly Varden were tested for the following elements: arsenic, cadmium, copper, lead, mercury, selenium, silver, and zinc. Samples were shipped to ACZ Laboratories in Colorado for analysis. Element concentrations were reported as wet weight concentrations from the lab and converted to a dry weight basis for this report. Results below their respective Method Detection Limit (MDL) are included in the results at the related MDL for analysis or comparison. When some results were below their respective Method Detection Limit (MDL) the MDL is shown as the minimum and when all results were below their respective Method Detection Limit (MDL), the average MDL is presented instead of a results concentration.

The elements selected for analysis are known to have negative effects on fish in high concentrations in the aquatic environment. There is particular concern with copper, cadmium, selenium, and zinc in the aquatic environment because of their potential toxicity to salmonids (Scannell 2009, United States Environmental Protection Agency (USEPA) 1987, Baldwin et al. 2003). The USEPA lists each of these elements as Priority Pollutants (USEPA 2002), and some activities can lead to increased concentrations in water (Eisler 1993, USEPA 2016, Mebane 2006). Arsenic can bioaccumulate and have acute and chronic toxicity (Kumari et al. 2017). Mercury toxicity has negative effects on fish, especially neurodevelopment of fertilized eggs and young developing fish (MacFarlane 2004). Lead can have acute and chronic effects on fish gills and their immune system as well as cause neurotoxicity. USEPA aquatic life criteria are reported as concentrations of pollutants in water and therefore cannot be directly compared to reported element concentrations based on whole body homogenization of juvenile Dolly Varden.

Fork lengths (mm) and weights (g) of fish measured were used to calculate Fulton's condition factor (*K*) using the equation given in Anderson and Neumann (1996), where the weight of each fish measured in grams (*W*) is divided by the cubed fork length of fish (*L*) measured in millimeters, and the product multiplied by 100,000, as follows:

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

The condition factor indicates the relative well-being of captured fish (i.e., higher *K* values indicate greater well-being) and allows for comparisons across seasons. In general, a salmonid with a Fulton's *K* value greater than or equal to 1 indicates a fish in good condition. Sampling fish provides a direct assessment of element concentrations and can be used to establish baseline concentrations in whole body fish prior to development. Late summer or early fall is the preferred time to sample, as it allows juvenile Dolly Varden to have the maximum residency time within the monitoring reach before moving to overwintering areas. Fifteen Dolly Varden were analyzed from Upper Johnson in 2024 while only 10 Dolly Varden were analyzed from Kona Creek due to low capture of appropriately sized fish.

In 2024, 8 minnow traps were set at both sites on August 12 and retrieved on August 13. Because of low catch rates of Dolly Varden within our target range for retention and analysis, at Upper Johnson, 10 traps were reset at Upper Johnson on August 13 and retrieved on August 14. The first set at Upper Johnson was in the mainstem of the monitoring reach while the second set at Upper Johnson was located in a side channel[1] adjacent to the mainstem at the monitoring reach. Traps were fished as close to 24 hours as logistics allowed. Catch per unit effort (CPUE) results were normalized for number of traps set to account for variable numbers of traps set. Weight and length data for all fish captured was not recorded in 2023 and results are shown as a comparison between sites, but future comparisons will be within sites across years.

ELEMENT CONCENTRATIONS IN SEDIMENT

Water bodies in the region of an ore deposit can exhibit higher than normal background element concentrations. Element concentrations can be monitored through sediments as erosion carries components of the local geology downstream. Monitoring the element concentration in sediments will provide baseline information on existing conditions prior to development.

Fine sediments (sand and silt with minor component of small gravels) were collected in each monitoring reach from a single location. Approximately 500 ml of fine sediment was scooped into HDPE wide mouth jars using latex gloves and disposable scoops from an actively flowing channel. Sediments were collected from the top 5 cm of the streambed. After collection, the samples were placed in a cooler with frozen icepacks and transported back to the Johnson Tract Camp where they were placed in a freezer and later brought to Anchorage in a cooler with icepacks. Samples were stored in a freezer and shipped in a cooler packed with frozen icepacks until received by the analytical laboratory.

Sediment samples were analyzed for the following elements: aluminum, arsenic, cadmium, copper, iron, lead, mercury, selenium, silver, and zinc. Samples were shipped to ACZ Laboratories in Colorado for analysis. Samples were air dried and screened (2 mm sieve) at the lab. Element concentrations were reported as wet weight concentrations from the lab and converted to dry weight for this report. Results below their respective Method Detection Limit (MDL) are included in the results at the related MDL for analysis or comparison.

The data are compared with the threshold effects concentrations (TEC) and the probable effects concentrations (PEC) for inorganics in freshwater sediment guidelines developed by the National Oceanic and Atmospheric Administration (NOAA; Buchman 2008). The guidelines are based on results of controlled laboratory bioassays, where element concentrations below the TECs rarely affect survival and growth of aquatic life, and element concentrations above the PECs can affect aquatic life survival and growth.

[1] Side channel coordinates: 60.099962 N, 152.945556 W

RESULTS

WATER QUALITY

Water quality measurements were collected during the August aquatic monitoring effort, as well as during other site visits, like during spawning surveys conducted in the fall of 2024. Water temperatures are generally warmer at Kona Creek than at Upper Johnson. Both systems are influenced by glacial input, but the proportion of glacial melt runoff is higher in the Johnson River. Upper Johnson water temperatures were more consistent in 2024 as water levels and air temperatures dropped with the onset of winter. It should be noted that the Upper Johnson site is located near the headwaters of that drainage while the Kona Creek site is in the lower part of that drainage.

Dissolved oxygen levels were high in both systems (≥11.4 mg/L). Streams with a saturation value of 90% or greater, or greater than 9 mg/L are considered healthy (Bjornn and Reiser 1991). Water pH at both sites was close to neutral (pH 6.55 - 6.86) during 2024 aquatic studies and indicative of a healthy stream (pH 6.5 to 8.5, Brabets 2002). The pH in Kona Creek was below 6.5 during the October 2024 spawning surveys (pH 6.31) which was collected during extreme low water conditions and the reading was taken closer to the mouth than the aquatic monitoring site. Conductivity was similar in August (33 and 34 µS/cm) between the two sites but was substantially higher at Upper Johnson (66 µS/cm) during low water conditions in October. Turbidity was higher at Upper Johnson, but water clarity improved in the Johnson River with less glacial melt input in late fall/early winter. Water quality results are depicted in Table 2.

Table 2. Water quality data at Johnson Tract aquatic studies monitoring sites.

Date	Temp. (°C)	DO (mg/L)	pH	Cond. (µS/cm)	Turbidity (NTU)
Upper Johnson					
September 22, 2022[1]	4.12	13.56	7.45	28	--
August 8, 2023	2.27	14.50	6.82	36	58.8
August 13, 2024	2.23	11.72	6.55	33	93.12
October 17, 2024	2.19	11.75	7.09	66	1.71
Kona Creek					
September 22, 2022	5.72	12.73	7.31	36	--
August 8, 2023	7.45	12.76	7.16	47	7.25
August 13, 2024	6.41	11.35	6.86	34	3.51
October 17, 2024[2]	3.07	11.69	6.31	39	0.25

[1] – collected 1 mile upstream of aquatic studies site
[2] – collected 1 mile downstream of aquatic studies site

PERIPHYTON

Sampling was originally scheduled for the first week of August (August 5th-7th) but was postponed due to high water caused by heavy precipitation that fell August 5th and 6th, 2024. After averaging

~365 cfs for the month of July, the Johnson River peaked at 2,441 cfs on August 7. Water levels quickly dropped to a moderate, manageable level by August 10 (588 cfs) and we traveled to the site on August 12 (418 cfs).

Periphyton levels in 2024 were extremely low (compared to 2023 results) with little variability at both monitoring reaches (Table 3), and the high-water event was likely a factor. Mean chlorophyll-a (Chl-*a*) concentrations at the Upper Johnson site were 0.182 mg/m^2, compared to 4.72 mg/m^2 in 2023. At Kona Creek, mean Chl-*a* concentrations were 0.235 mg/m^2, compared to 5.11 mg/m^2 in 2023. In 2024, half of the samples at each site were below the instrument detection limit (0.14 mg/m^2), compared to zero samples in 2023. Mean Chl-*a* concentrations for both sampling reaches are presented in Figure 4.

Individual sample chlorophyll concentrations from the Johnson Tract can be found in Appendix 1.

Table 3. Periphyton data at Johnson Tract monitoring sites.

Sample Date	Chl-*a* (mg/m^2)	Chl-*b* (mg/m^2)	Chl-*c* (mg/m^2)
	Upper Johnson		
8/8/23	4.72 ±2.23	0.0	0.47
8/13/24	0.18 ±0.14	0.05	0.1
	Kona Creek		
8/8/23	5.11 ±1.30	0.0	0.59
8/13/24	0.23 ±0.23	0.05	0.07

Note: Chl-*a* mean density ± 1SD

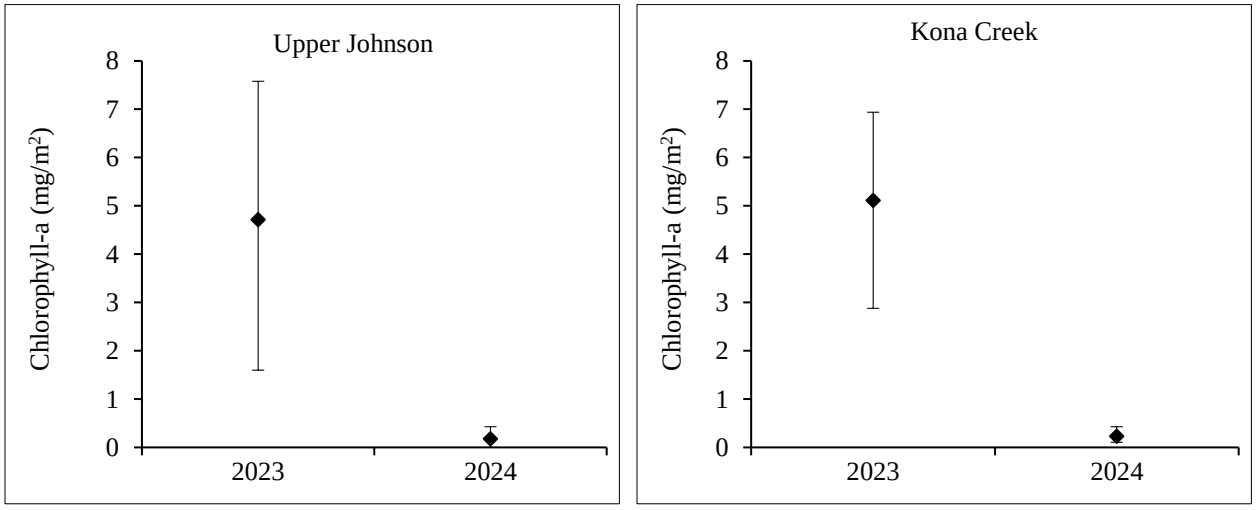


Figure 4. Mean Chl-*a* concentrations (markers) with minimum and maximum values (bars) for Upper Johnson and Kona Creek monitoring reaches, 2023-2024.

AQUATIC INVERTEBRATES

Benthic macroinvertebrate densities were lower in both monitoring reaches in 2024 compared to 2023. This is likely due to a high-water event that occurred the week before our sampling effort. In the Upper Johnson reach, 8 taxa were identified, and macroinvertebrate density was 302 per m^2 in 2024, compared to 10 taxa and 1,749 invertebrates per m^2 in 2023. In the Kona Creek reach, 10 taxa were identified with an estimated density of 156 invertebrates per m^2 compared to 24 taxa and 2,574 invertebrates per m^2 in 2023 (Table 4, Figure 5).

The number of EPT taxa remained unchanged in the Upper Johnson reach (3) but dropped from 11 (2023) to 4 (2024) in the Kona Creek reach (Table 4). The proportion of EPT insects in 2024 increased in each reach compared to 2023, likely due to significantly fewer chironomids which were the dominant taxa (order Diptera) at each site both years (Figure 6). Ephemeroptera (mayflies) was the most common order present in the EPT community in both reaches as it was in 2023. Very few Plecoptera (stoneflies) were present in the macroinvertebrate samples and no Trichoptera (caddisflies) were present in 2024. All three orders were present in 2023 (Figure 7).

A full summary of macroinvertebrate sampling results can be found in Appendix 2.

Table 4. Johnson Tract benthic macroinvertebrate data summaries for Upper Johnson and Kona Creek monitoring reaches, 2023 and 2024.

	Upper Johnson		Kona Creek	
	8/8/2023	8/13/2024	8/8/2023	8/13/2024
Mean BMI density (per m^2)	1,749	302	2,574	156
Total BMI taxa	10	8	24	10
Number of EPT taxa	3	3	11	4
Proportion of EPT insects	6.25%	8.7%	8.67%	14.1%
Proportion of Chironomidae	91.6%	88.2%	87.4%	70.3%

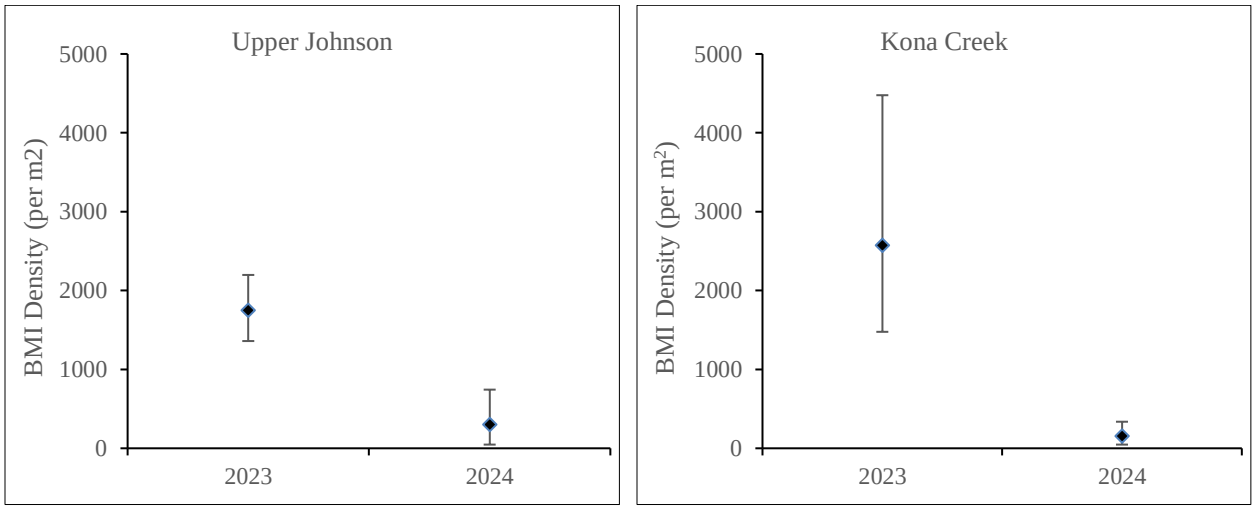


Figure 5. Mean benthic macroinvertebrate densities at Upper Johnson and Kona Creek, 2023-2024.

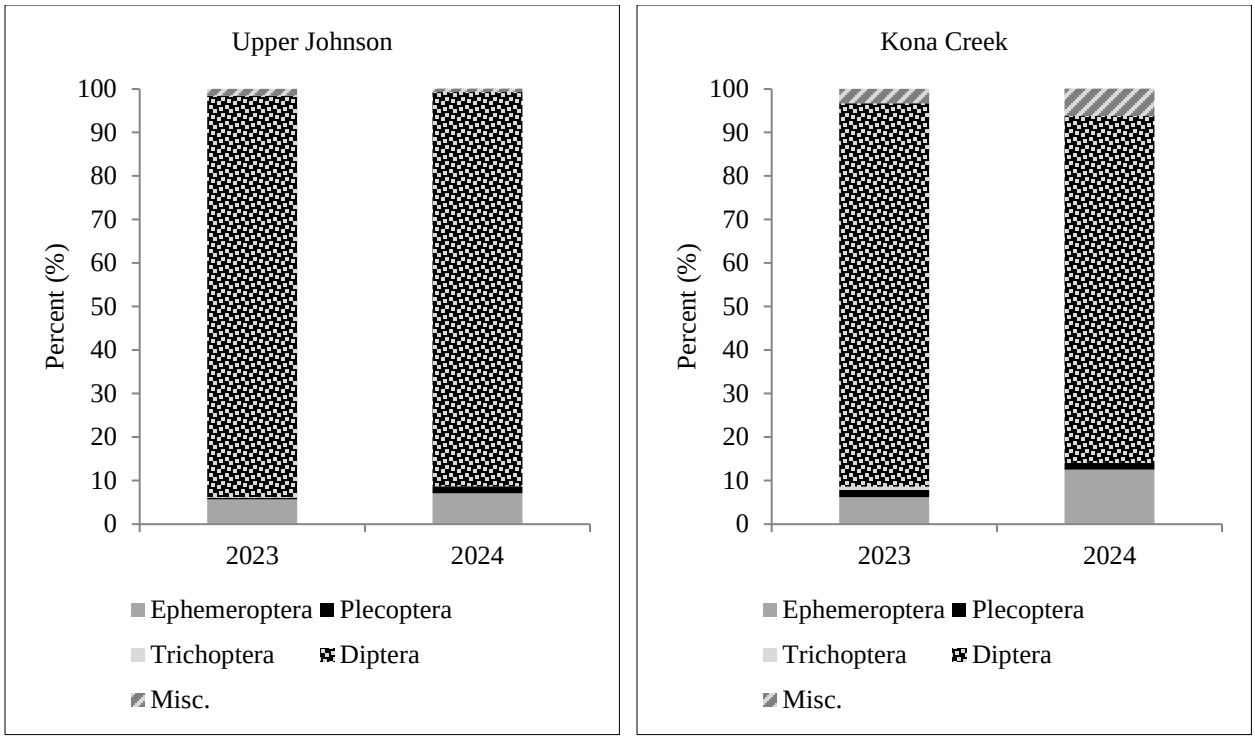


Figure 6. Benthic macroinvertebrate community composition by year at Upper Johnson and Kona Creek, 2023-2024.

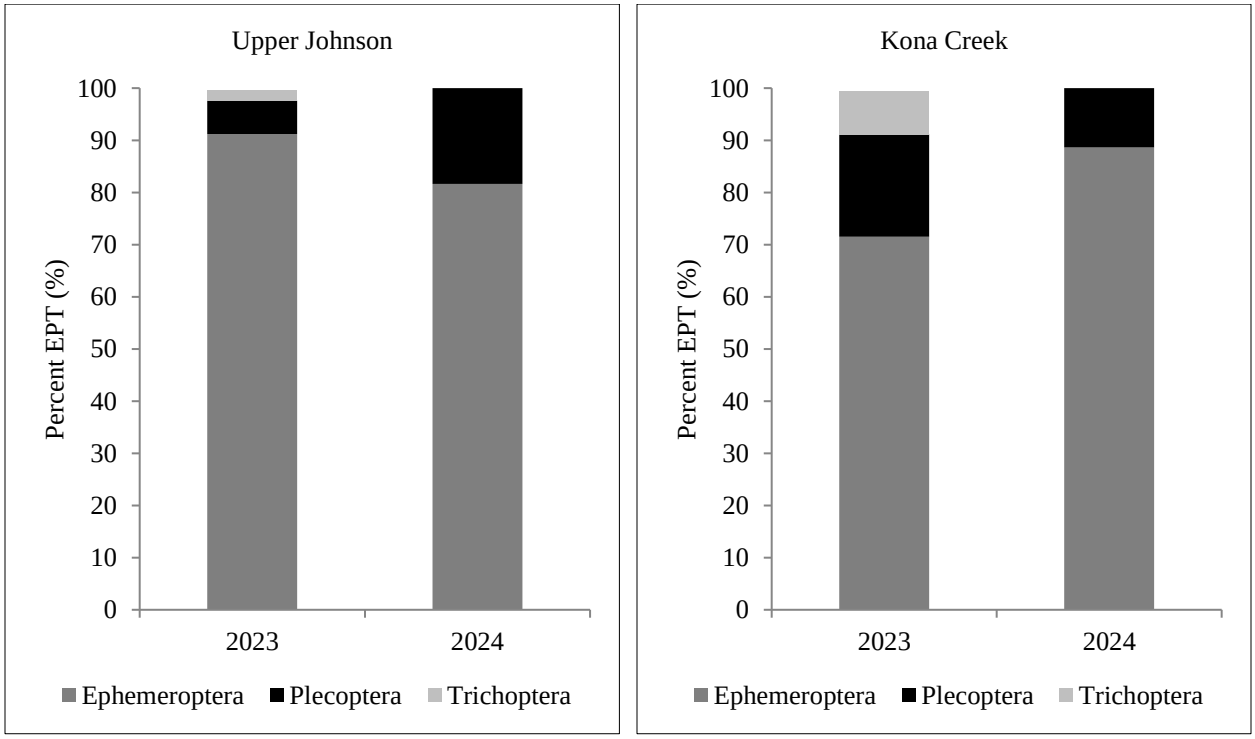


Figure 7. EPT community composition by year at Upper Johnson and Kona Creek, 2023-2024.

ELEMENT CONCENTRATIONS IN DOLLY VARDEN

In 2024, 15 Dolly Varden, measuring 96 to 127 mm (FL), were retained from Upper Johnson for whole-body element analysis. Ten (10) Dolly Varden were retained for analysis at Kona Creek and measured 85 to 142 mm. Mean concentrations of elements in Dolly Varden were similar between sites and were within the range of observed results from 2023.

Figures 8 through 15 depict the mean, minimum, and maximum dry weight concentrations of elements. Wet weight concentrations from the lab were converted to dry weight for this report (Appendix 3). The full laboratory report with analytical results, analysis methods, and MDLs can also be found in Appendix 3.

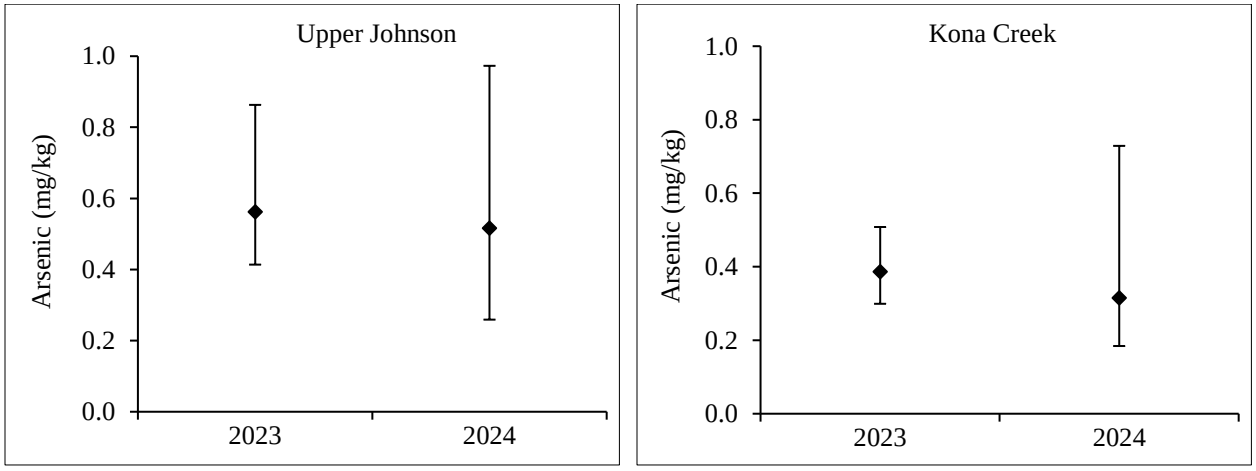


Figure 8. Mean whole body dry weight concentrations (diamond markers) for arsenic with min/max (bars) in juvenile Dolly Varden for Upper Johnson and Kona Creek.

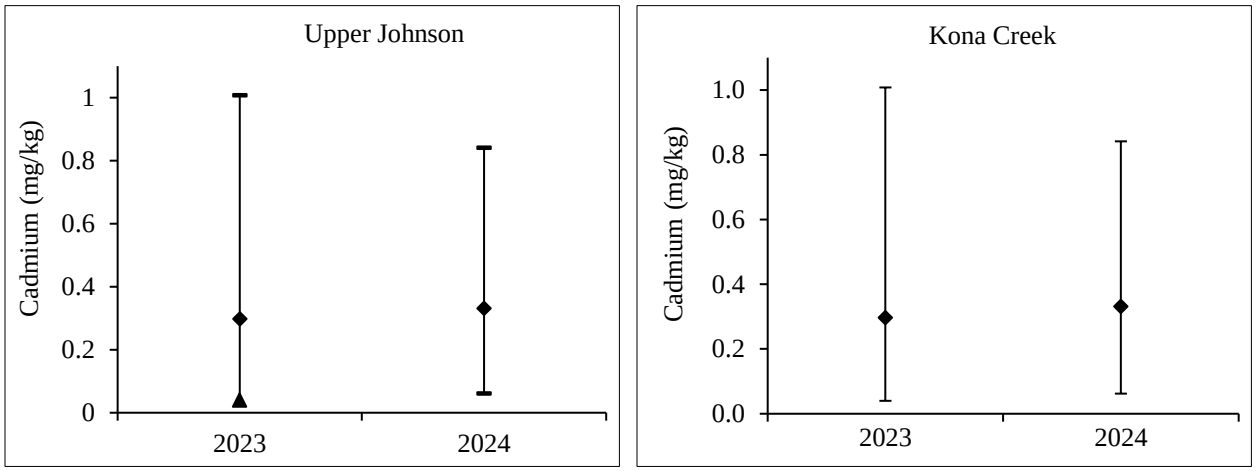


Figure 9. Mean whole body dry weight concentrations (diamond markers) for Cadmium concentrations (markers) with min/max (bars) in juvenile Dolly Varden for Upper Johnson and Kona Creek. The MDL is shown as a triangle marker (as the minimum) with one results below MDL in 2023 at Upper Johnson.

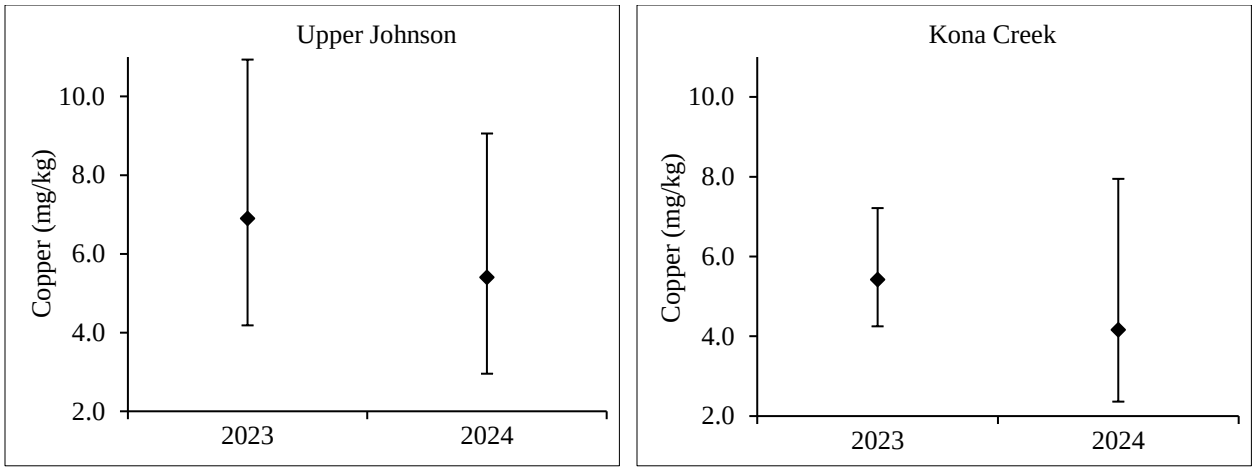


Figure 10. Mean whole body dry weight concentrations (diamond markers) for copper concentrations (markers) with min/max (bars) in juvenile Dolly Varden for Upper Johnson and Kona Creek.

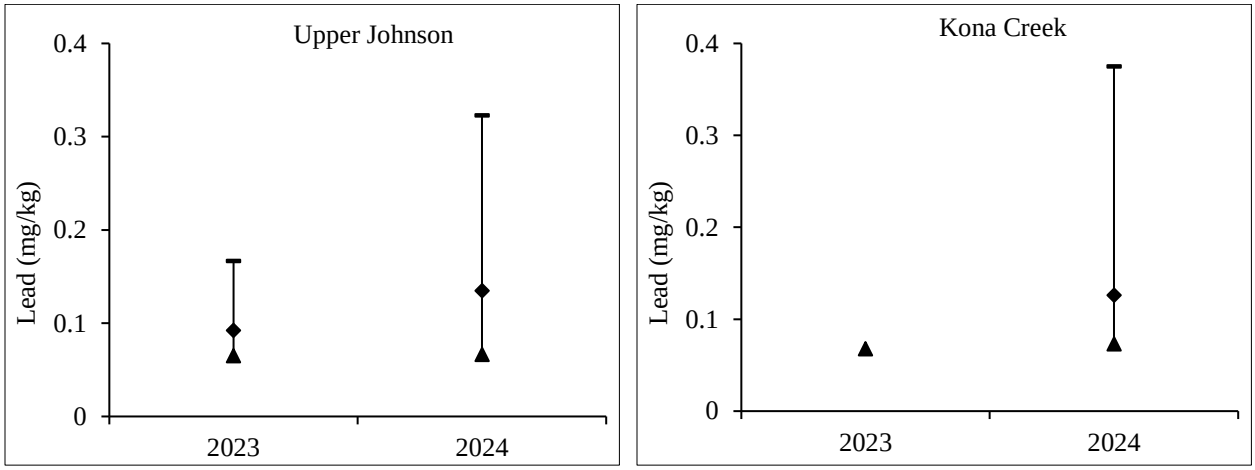


Figure 11. Mean whole body dry weight concentrations (diamond markers) for Lead with min/max (bars) in juvenile Dolly Varden for Upper Johnson and Kona Creek. MDL shown as triangle marker when results were below MDL. No results were above the MDL at Kona Creek in 2023.

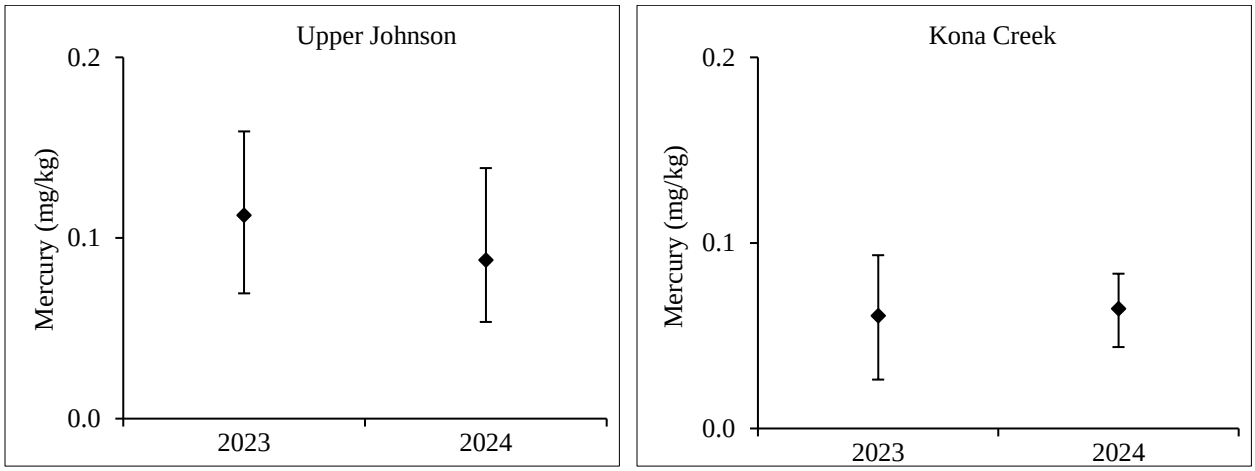


Figure 12. Mean whole body dry weight concentrations (diamond markers) for Mercury with min/max (bars) in juvenile Dolly Varden for Upper Johnson and Kona Creek.

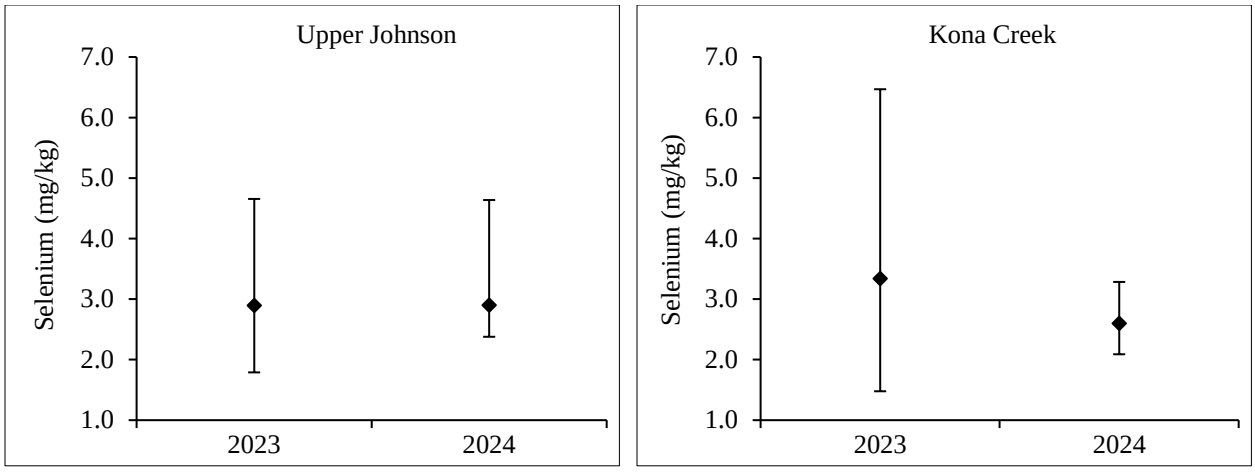


Figure 13. Mean whole body dry weight concentration (diamond markers) for Selenium with min/max (bars) in juvenile Dolly Varden for Upper Johnson and Kona Creek.

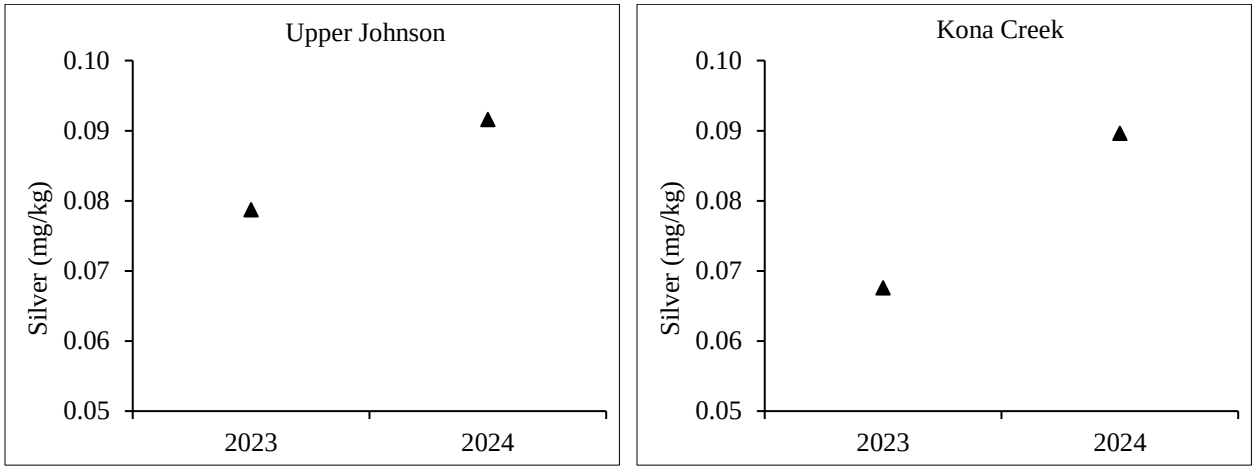


Figure 14. Mean whole body dry weight MDLs (triangle markers) for Silver concentrations in juvenile Dolly Varden for Upper Johnson and Kona Creek. Results were below the MDL at both sites in 2023 and 2024.

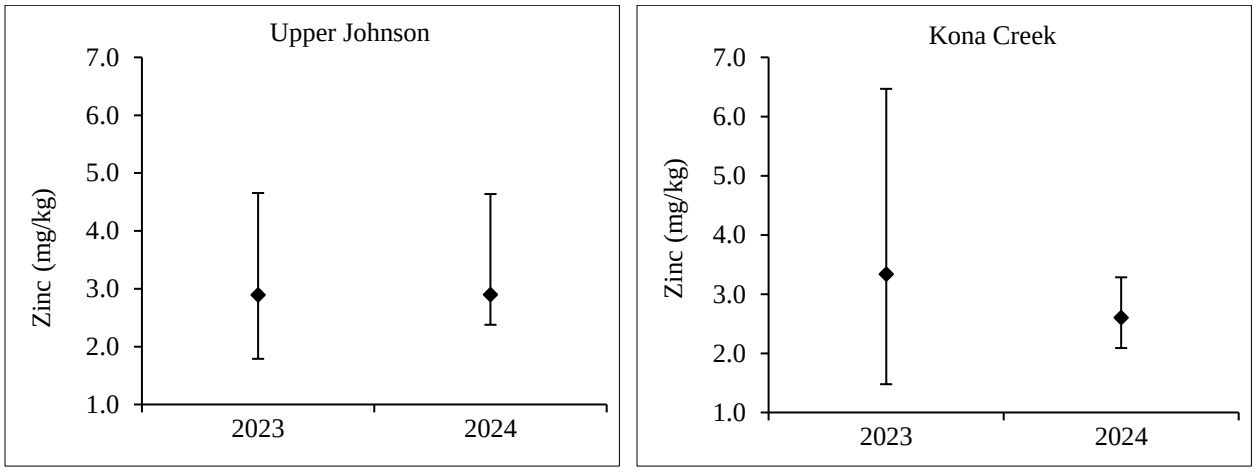


Figure 15. Mean whole body dry weight concentration (diamond markers) for Zinc with min/max (bars) in juvenile Dolly Varden for Upper Johnson and Kona Creek.

ELEMENT CONCENTRATIONS IN SEDIMENTS

Element concentrations in sediments were similar in 2024 and 2023 at Upper Johnson and Kona Creek with some exceptions (Figures 16-25). At Upper Johnson, Arsenic, Cadmium, Mercury, and Selenium concentrations were lower than results in 2023. At Kona Creek, Mercury, Selenium, and Silver were different than results in 2023.

Elements at both sites in 2024 were below NOAA's TEC and PEC values except for copper, which exceeded the TEC at both sites. TEC and PEC values are not defined for aluminum, iron, selenium, and silver. Figures 16 through 25 depict the mean, minimum, and maximum dry weight concentrations of elements. Wet weight concentrations from the lab were converted to dry weight for this report (Appendix 4). The analytical results, analysis methods, and full laboratory report can be found in Appendix 4.

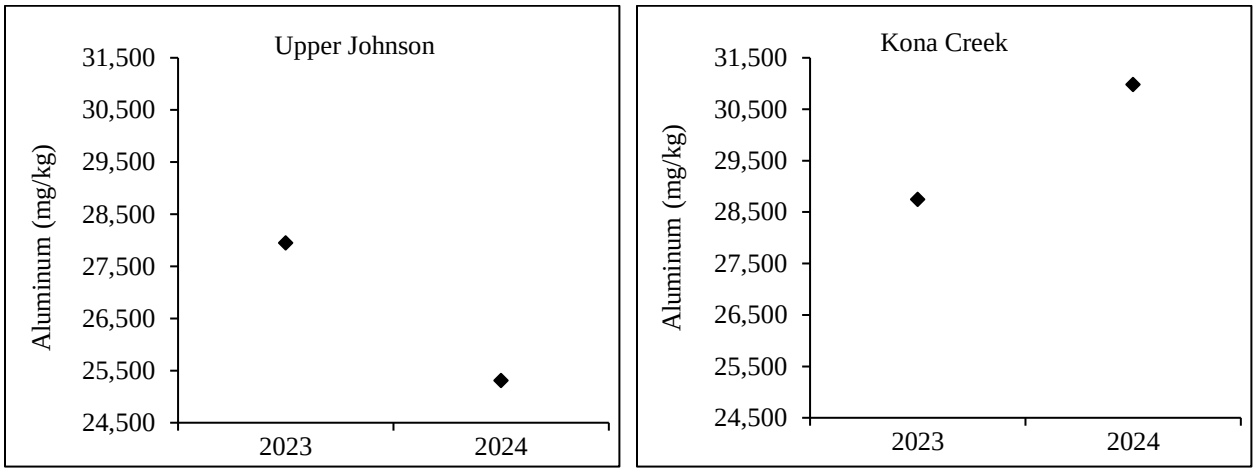


Figure 16. Mean element concentrations (diamond markers) in sediment for Aluminum at Upper Johnson and Kona Creek in 2023 and 2024.

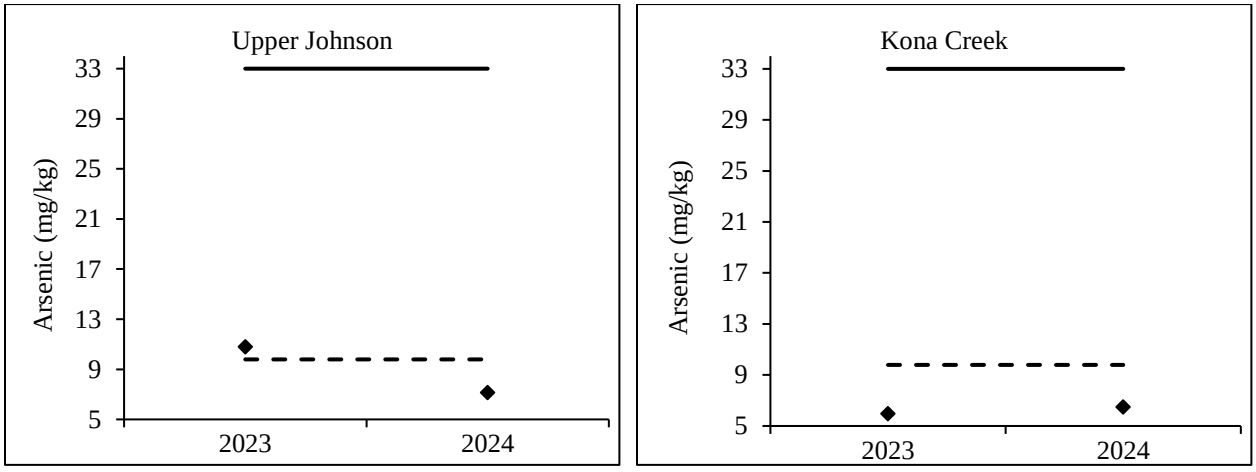


Figure 17. Mean element concentrations (diamond markers) in sediment for Arsenic at Upper Johnson and Kona Creek in 2023 and 2024. The dashed line represents the TEC and the solid line represents the PEC for freshwater sediments (Buchman 2008).

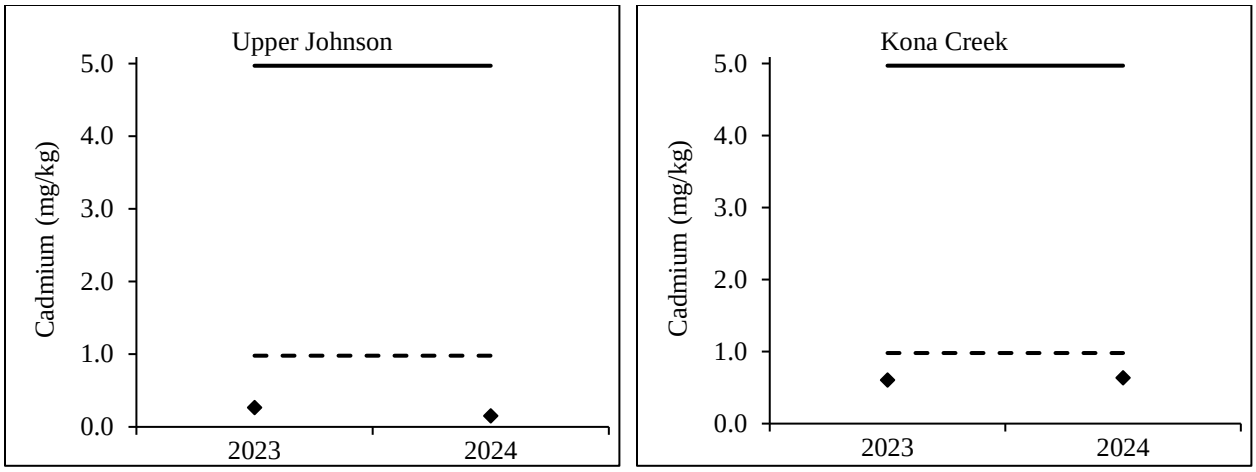


Figure 18. Mean element concentrations (diamond markers) in sediment for Cadmium at Upper Johnson and Kona Creek in 2023 and 2024. The dashed line represents the TEC and the solid line represents the PEC for freshwater sediments (Buchman 2008).

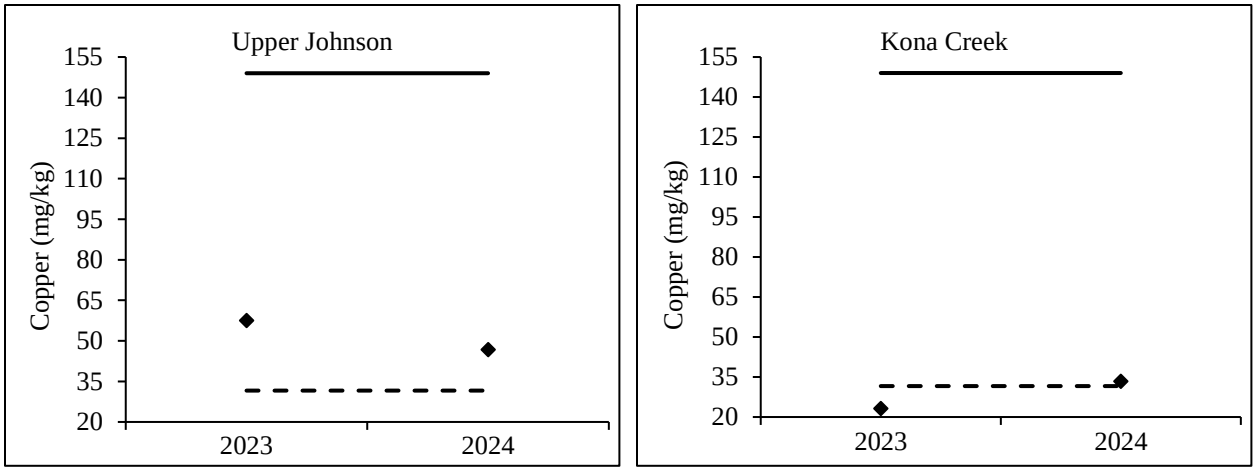


Figure 19. Mean element concentrations (diamond markers) in sediment for Copper at Upper Johnson and Kona Creek in 2023 and 2024. The dashed line represents the TEC and the solid line represents the PEC for freshwater sediments (Buchman 2008).

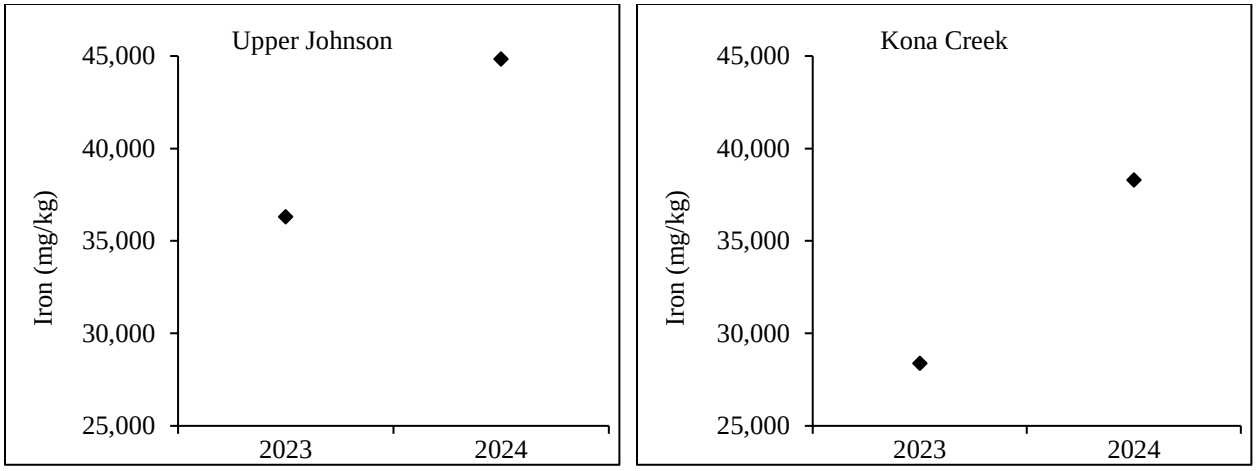


Figure 20. Mean element concentrations (diamond markers) in sediment for Iron at Upper Johnson and Kona Creek in 2023 and 2024.

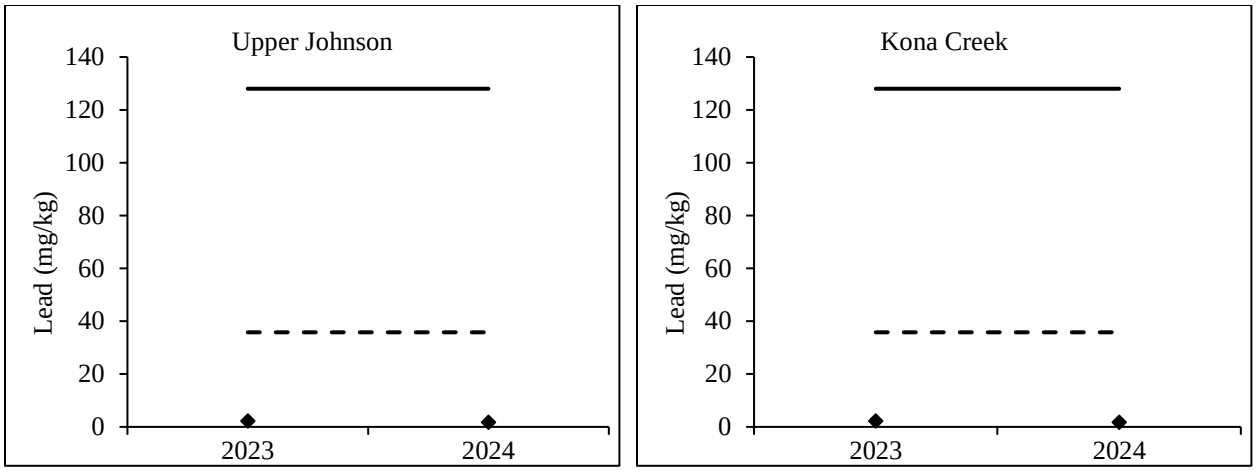


Figure 21. Mean element concentrations (diamond markers) in sediment for lead at Upper Johnson and Kona Creek in 2023 and 2024. The dashed line represents the TEC and the solid line represents the PEC for freshwater sediments (Buchman 2008).

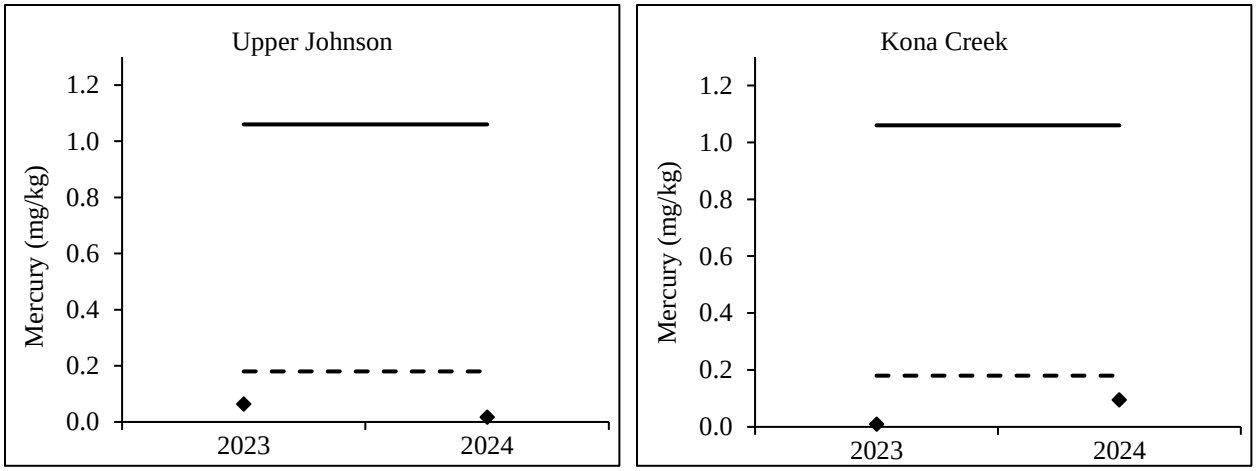


Figure 22. Mean element concentrations (diamond markers) in sediment for lead at Upper Johnson and Kona Creek in 2023 and 2024. The dashed line represents the TEC and the solid line represents the PEC for freshwater sediments (Buchman 2008).

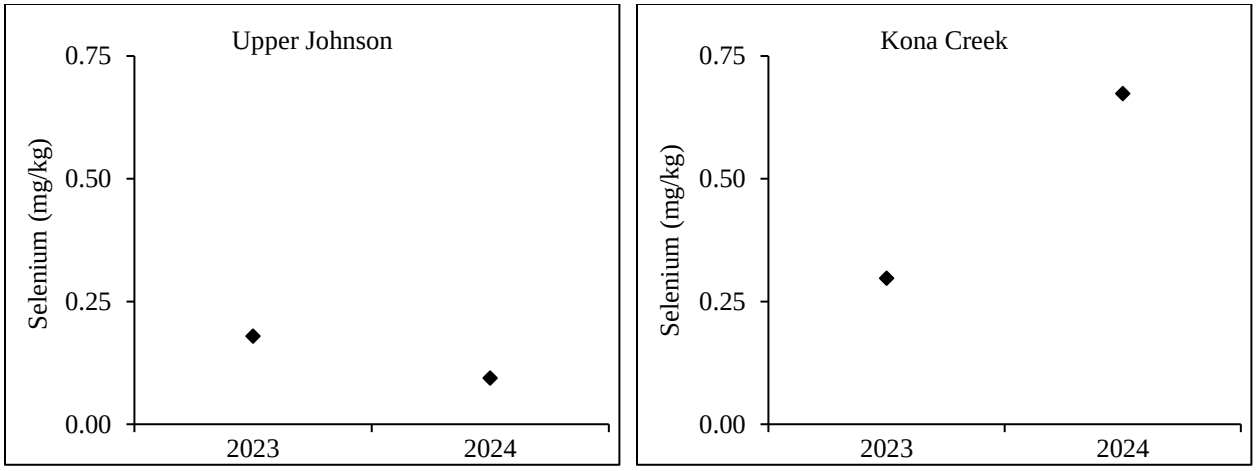


Figure 23. Mean element concentrations (diamond markers) in sediment for Selenium at Upper Johnson and Kona Creek in 2023 and 2024.

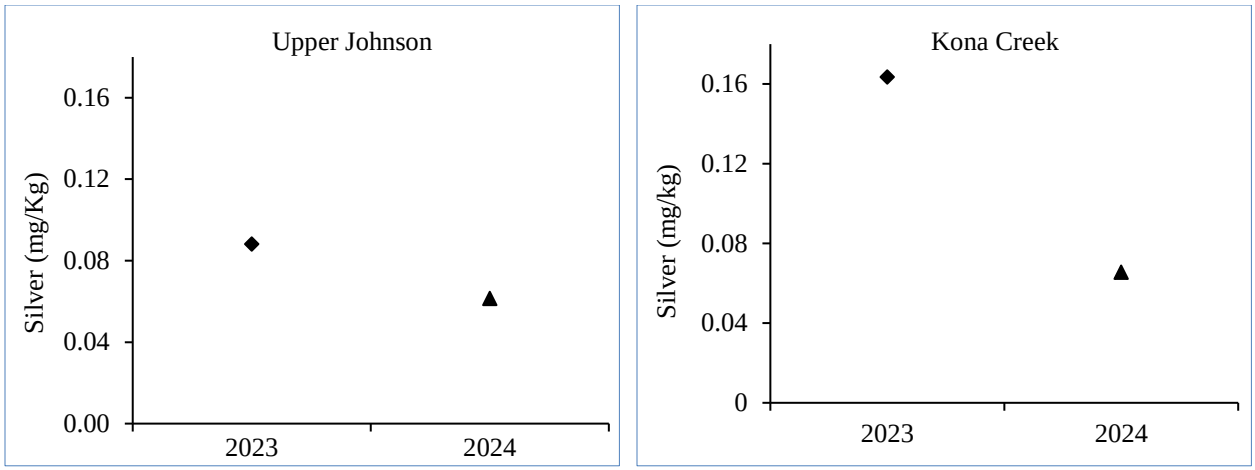


Figure 24. Mean element concentrations (diamond markers) and MDL (triangle markers), when results were below MDL, in sediment for Silver at Upper Johnson and Kona Creek in 2023 and 2024.

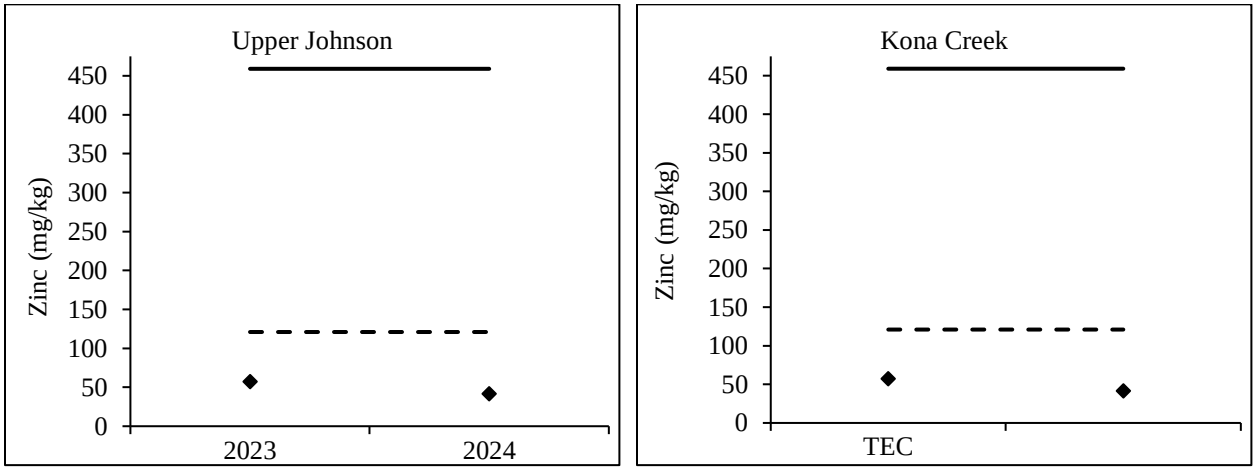


Figure 25. Mean element concentrations (diamond markers) in sediment for lead at Upper Johnson and Kona Creek in 2023 and 2024. The dashed line represents the TEC and the solid line represents the PEC for freshwater sediments (Buchman 2008).

JUVENILE DOLLY VARDEN CATCHES AND METRICS

A total of 39 Dolly Varden (FL 61-145 mm) were captured at Upper Johnson and 14 Dolly Varden (FL 76-147 mm) were captured at Kona Creek, although the totals for Upper Johnson represent two separate sets. Weight-length data show similar growth rates and fitness, within the small sample size, among captured Dolly Varden between the two sites (Figure 26). The fish condition factor of all fish captured was 1.00 at Upper Johnson and 0.94 at Kona Creek.

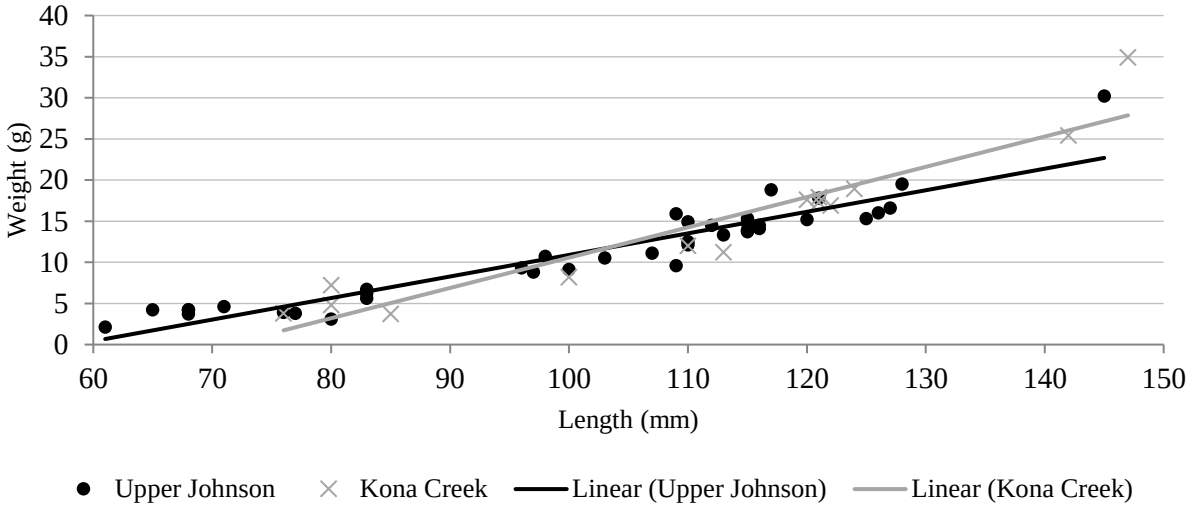


Figure 26. Dolly Varden length-weight data and linear trendlines at Upper Johnson and Kona Creek, 2024.

The combined CPUE for Upper Johnson was 2.66 Dolly Varden (per trap per day) and at Kona Creek it was 1.91. The CPUE at Upper Johnson in the mainstem channel was 1.12 and in adjacent side channel habitat it was 3.81 (Figure 27). The average soak, or fishing time, of the minnow traps was 20 hours at Upper Johnson and 22 hours at Kona Creek. CPUE results were normalized to 24 hours. Results for individual minnow traps can be found in Appendix 5.

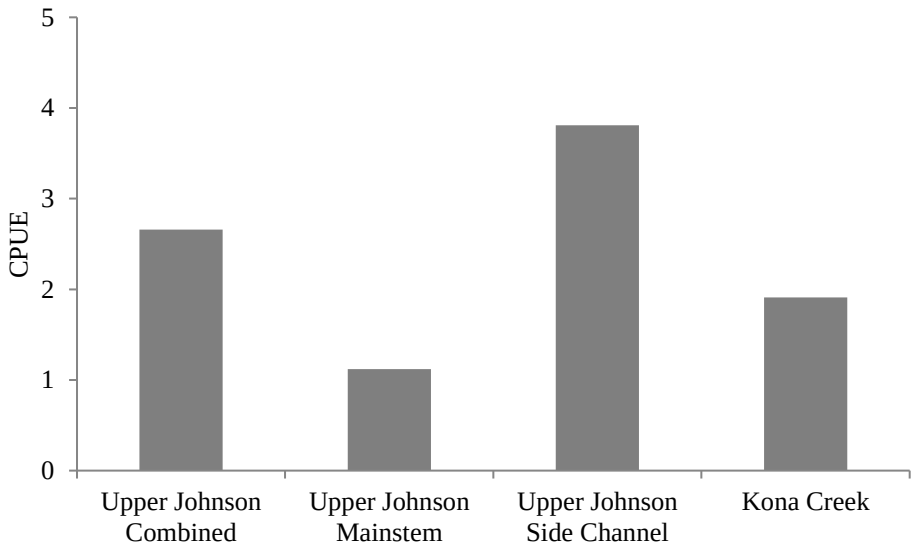


Figure 27. Dolly Varden CPUE at Upper Johnson and Kona Creek, 2024.

DISCUSSION

A substantial high-water event occurred in the Johnson River watershed the week prior to sampling. After averaging ~365 cfs for the month of July, the river peaked at 2,441 cfs on August 7, 2024, based on gauge data (JR-1) provided by JT Mining. Monitoring occurred August 12-14 after levels had dropped to 418 cfs (August 12). This high-water event scoured, moved, and redeposited substrate in the channel. The high water likely lowered periphyton and BMI communities and potentially altered juvenile Dolly Varden distribution.

Periphyton levels at both monitoring sites were low in 2024 (<0.25 mg/m^2), especially compared to 2023, which were relatively low compared to non-glacial streams in the region. The relatively low and variable periphyton biomass is similar to other glacial systems in Alaska. Periphyton are sensitive to disturbance as well as changes in water quality.

Benthic macroinvertebrate densities were lower in both sample sites in 2024 compared to 2023. Very few EPT taxa were present at both sites in 2024, 11 individuals at Upper Johnson (compared to 47 in 2023) and 9 individuals at Kona Creek (compared to 96 in 2023). The order Diptera dominated the BMI community at both sites in 2024, as it did in 2023. Although overall numbers were down, the proportions of dominant taxa (order Diptera) remained relatively consistent: at Upper Johnson the order Diptera comprised 90% of the sample in 2024 compared to 92% in 2023 and at Kona Creek the order Diptera comprised 80% of the sample in 2024 compared to 88% in 2023. Most of the Diptera counts were from the family Chironomidae which are fast/early colonizers that can easily adapt to changing habitats and can exercise more than one feeding strategy (Entrekin et al. 2007) and are common in glacial and dynamic systems in Alaska.

Element concentrations in Dolly Varden and in sediments were similar or within range of results from 2023. Comparisons will become more meaningful over time after more years of baseline data are accumulated. Overall, captured fish are in a generally healthy condition based on fish condition factor which was roughly 1 for both sites.

ADF&G recommends that baseline aquatic sampling continue at Johnson Tract. The value of baseline data grows with time, and multiple years of baseline data more accurately capture the natural variability in site conditions prior to development, especially dynamic systems like the Johnson River watershed.

REFERENCES

American Public Health Association. 2012. Standard methods for the examination of water and wastewater. Section 1020.H.2. 22nd Edition. American Public Health Association, Washington D.C.

Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447–482 [*In]* B. R. Murphy and D. W. Willis, editors. Fisheries techniques. Second Edition. American Fisheries Society, Bethesda, MD.

Baldwin, D. H., J. F. Sandahl, J. S. Labenia, and N. L. Scholz. 2003. Sublethal effects of copper on coho salmon: Impacts on nonoverlapping receptor pathways in the peripheral olfactory nervous system. Environmental Toxicology and Chemistry 22: 2266–2274.

Barbour, M. T., J. Gerritsen, B. D. Snyder, and J. B. Stribling. 1999. Rapid bioassessment protocols for use in streams and wadeable rivers: Periphyton, benthic macroinvertebrates and fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. Available: http://water.epa.gov/scitech/monitoring/rsl/bioassessment/index.cfm.

Biro, P. A., A. E. Morton, J. R. Post, and E. A. Parkinson. 2004. Over-winter lipid depletion and mortality of age-0 rainbow trout (*Oncorhynchus mykiss*). Canadian Journal of Fisheries and Aquatic Sciences 61: 1513–1519.

Bjornn, T. C., and Reiser, D. W. 1991. Habitat Requirements of Salmonids in Streams. American Fisheries Society Special Publication 19:83-138.

Brabets, T. P. 2002. Water Quality of the Tlikakila River and Five Major Tributaries to Lake Clark, Lake Clark National Park and Preserve, Alaska, 1999-2001. Water-Resources Investigations Report 02-4127.

Bradley, P. T. 2017. Methods for Aquatic Life Monitoring at the Red Dog Mine Site. Alaska Department of Fish and Game, Technical Report No. 17-09, Fairbanks, Alaska. https://www.adfg.alaska.gov/index.cfm?adfg=habitat_publications.main

Brekken, J. M., R. C. Benkert, and A. C. Kastning. 2024. Baseline Aquatic Studies for the Johnson Tract Project – 2023. Alaska Department of Fish and Game, Technical Report No. 24-08, Anchorage, AK.

Buchman, M. F. 2008. NOAA screening quick reference tables, National Oceanic and Atmospheric Administration, Office of Response and Restoration Division, Report 08-1, Seattle, WA

Clawson. C. M. 2023. Aquatic Biomonitoring at Red Dog Mine, 2023. Alaska Department of Fish and Game, Technical Report No. 23-02, Fairbanks, Alaska.

Eisler, R. 1985. Cadmium hazards to fish, wildlife, and invertebrates: A synoptic review. U.S. Fish and Wildlife Service Biological Report 85 (1.2), Contaminant Hazard Reviews Report No. 2.

Eisler, R. 1993. Zinc hazards to fish, wildlife, and invertebrates: A synoptic review. U.S. Fish and Wildlife Service Biological Report 10, Contaminant Hazard Reviews Report No. 26.

Entrekin, S. A., J. B. Wallace, and S. L. Eggert. 2007. The response of Chironomidae (Diptera) to a long-term exclusion of terrestrial organic matter. Hydrobiologia 575(1):401-413.

Graham, G. E., and K. D. Kelley. 2009. The Drenchwater deposit, Alaska: An example of a natural low pH environment resulting from weathering of an undisturbed shale-hosted Zn–Pb–Ag deposit. Applied Geochemistry 24: 232–245.

Groot, C., and L. Margolis. 1991. Pacific salmon life histories. Department of Fisheries and Oceans Biological Sciences Branch. British Columbia, Canada.

Hamilton, S. J. 2003. Review of residue-based selenium toxicity thresholds for freshwater fish. Ecotoxicology and Environmental Safety 56: 201–210.

Hodkinson, I. D., and J. K. Jackson. 2005. Terrestrial and aquatic invertebrates as bioindicators for environmental monitoring, with particular reference to mountain ecosystems. Environmental Management 35(5): 649–666.

Hoem Neher, T. D., A. E. Rosenberger, C. E. Zimmerman, C. M. Walker, and S. J. Baird. 2013. Estuarine Environments as Rearing Habitats for Juvenile Coho Salmon in Contrasting South-Central Alaska Watersheds. Transactions of the American Fisheries Society. 142(6): 1481-1494.

Hogstrand, C. 2012. Zinc. Pages 135–200 [*In*] C. M. Wood, A. P. Farrell, and C. J. Brauner, editors. Homeostasis and toxicology of essential metals, Fish Physiology, Volume 31A. Elsevier/Academic Press, Oxford, UK.

Holm, J., V. Palace, P. Siwik, G. Sterling, R. Evans, C. Baron, J. Werner, and K. Wautier. 2005. Developmental effects of bioaccumulated selenium in eggs and larvae of two salmonid species. Environmental Toxicology and Chemistry 24: 2373–2381.

Jaecks, T. A. 2010. Population dynamics and trophic ecology of Dolly Varden in the Iliamna River, Alaska: Life history of freshwater fish relying on marine food subsidies. Master's thesis. University of Washington, Seattle.

Janz, D. M. 2012. Selenium. Pages 327–374 [*In*] C. M. Wood, A. P. Farrell, and C. J. Brauner, editors. Homeostasis and toxicology of essential metals, Fish Physiology, Volume 31A. Elsevier/Academic Press, Oxford, UK.

Kelley, K. D., and C. D. Taylor. 1997. Environmental geochemistry of shale-hosted Ag-Pb-Zn massive sulfide deposits in northwest Alaska: Natural background concentrations of metals in water from mineralized areas. Applied Geochemistry 12: 397–409.

Kumari, B., Kumar, V., Sinha, A.K. 2017. Toxicology of arsenic in fish and aquatic systems. Environ Chem Lett 15, 43-64.

Leopold, L. B. 1994. A view of the river. Harvard University Press. Cambridge, MA.

Lowe, R. L., and G. D. LaLiberte. 2006. Benthic stream algae: Distribution and structure. Pages 327-339 [*In*] F. R. Hauser and G .A. Lamberti, editors. Methods in stream ecology, Second Edition. Academic Press/Elsevier, Oxford, UK.

MacFarlane, B. 2004. Mercury concentrations in fish in Resurrection Creek, Alaska. USDA Forest Service, Chugach National Forest. January 2004.

McDafferty, W. P. 1998. Aquatic entomology: The fishermen's and ecologist's illustrated guide to insects and their relatives. Jones and Bartlett Publishers.

McIntyre, J. K., D. H. Baldwin, D. A. Beauchamp, and N. L. Scholz. 2012. Low-level copper exposures increase visibility and vulnerability of juvenile coho salmon to cutthroat trout predators. Ecological Applications 22: 1460–1471.

Mebane, C. A. 2006 (2010 rev.). Cadmium risks to freshwater life: Derivation and validation of low-effect criteria values using laboratory and field studies. U.S. Geological Survey Scientific Investigations Report 2006-5245, version 1.2. Available: http://pubs.usgs.gov/sir/2006/5245/.

Meehan, W. R. 1991. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication 19.

Merritt, R. W. and K. W. Cummings 1996. An introduction to the aquatic insects of North America. Third Edition. Kendall/Hunt Publishing Company.

Milner, A. M., and R. G. Bailey. 1989. Salmonid colonization of new streams in Glacier Bay National Park, Alaska. Aquaculture and Fisheries Management 20: 179-192.

Morrow, J. E. 1980. The freshwater fishes of Alaska. Alaska Northwest Publishing Company, Anchorage, Alaska

Oswood, M. W. 1989. Community structure of benthic invertebrates in interior Alaskan (USA) streams and rivers. Hydrobiologia 172: 97–110.

Pennak, R. W. 1989. Freshwater invertebrates of the United States: Protozoa to Mollusca, Third Edition. Wiley Interscience.

Plafkin, J. L., M. T. Barbour, K. D. Porter, S. K. Gross, and R. M. Hughes. 1989. Rapid bioassessment protocols for use in streams and rivers: Benthic macroinvertebrates and fish. EPA/440/4-89/001 (previously published as EPA/444/4-89-001). United States Environmental Protection Agency, Office of Water, Assessment and Watershed Protection Division, Washington, D.C. Available: http://nepis.epa.gov.

Pollard, W. R., G. F. Hartman, C. Groot, and P. Edgell. 1997. Field identification of coastal juvenile salmonids. Harbour Publishing, Madeira Park, BC.

Quinn, T. P. 2005. The behavior and ecology of Pacific salmon and trout. University of Washington Press, Seattle.

Resh, V. H. 2008. Which group is best? Attributes of different biological assemblages used in freshwater biomonitoring programs. Environmental Monitoring and Assessment 138: 131–138.

Resh, V. H., and J. K. Jackson. 1993. Rapid assessment approaches in benthic macroinvertebrate biomonitoring studies. Pages 195–233 [I*n]* D. M. Rosenberg and V. H. Resh, editors. Freshwater biomonitoring and benthic macroinvertebrates. Chapman and Hall, New York.

Ripley, E. A., R. E. Redmann, and A. A. Crowder. 1996. Environmental effects of mining. St. Lucie Press, Delray Beach, FL.

Rosgen, D. L. 1994. A classification of natural rivers. Catena 22: 169–199.

Rosgen, D. L. 1996b. Applied river morphology. Second Edition. Wildland Hydrology Books, Pagosa Springs, CO.

Runnels, D. D., T. A. Shepherd, and E. E. Angino. 1992. Metals in water: Determining natural background concentrations in mineralized areas. Environmental Science and Technology 26: 2316–2323.

Stewart, K. W. and M. W. Oswood. 2006. The Stoneflies (Plecoptera) of Alaska and western Canada. The Caddis Press.

Weber Scannell, P. 2009. Effects of copper on aquatic species: A review of the literature. Alaska Department of Fish and Game, Division of Habitat, Technical Report No. 09-04, Fairbanks. Available: http://www.adfg.alaska.gov/index.cfm?adfg=habitat_publications.main.

USEPA (United States Environmental Protection Agency). 1987. Ambient water quality criteria for zinc – 1987. Office of Water, EPA-440/5-87-003. Office of Research and Development, Duluth, MN. Available: http://nepis.epa.gov.

USEPA (United States Environmental Protection Agency). 2001. 2001 Update of ambient water quality criteria for cadmium. Office of Water, EPA-822-R-01-001 (April 2001). Office of Science and Technology, Washington, D.C. Available: http://water.epa.gov/scitech/swguidance/standards/upload/2001_04_13_criteria_cadmium_cad2001upd.pdf.

USEPA (United States Environmental Protection Agency). 2002. National recommended water quality criteria: 2002. Office of Water, EPA-822-R-02-047 (November 2002). Office of Science and Technology (4304T). Available: http://nepis.epa.gov.

USEPA (United States Environmental Protection Agency). 2016. Final Aquatic Life Ambient Water Quality Criterion for Selenium - Freshwater 2016. Office of Water, EPA 822-R-16-006 (June 2016). Office of Science and Technology, Washington, D.C.

Woody, C. A., Shaftel, R., Rinella, D., Bogan, D. 2014. Long Term Monitoring Plan for Wadeable Streams, Lime Hills Ecoregion, Kvichak and Nushagak River Watersheds. March 2014.

York, G., and A. Milner. 1996. Colonization and community development of salmonids and benthic macroinvertebrates in a new stream within Kenai Fjords National Park, Alaska. Environment and Natural Resources Institute, University of Alaska Anchorage.

APPENDIX 1. PERIPHYTON STANDING CROP, JOHNSON TRACT 2023.

Daily vial no.	Site	Date collected	Date analyzed	Vial chl-a	Chl-a (mg/m^2)	Chl-a[1] (mg/m^2)	664/665 Ratio	Chl-b (mg/m^2)	Chl-c (mg/m^2)
32	Upper Johnson	8/13/24	12/3/2024	0.02	0.09[2]	**0.00**[2]	1.00	0.02	0.15
33	Upper Johnson	8/13/24	12/3/2024	0.02	0.08[2]	**0.11**[2]	2.00	0.10	0.12
34	Upper Johnson	8/13/24	12/3/2024	0.12	0.50	**0.43**	1.57	0.07	0.10
35	Upper Johnson	8/13/24	12/3/2024	0.06	0.22	**0.21**	1.67	0.04	0.10
36	Upper Johnson	8/13/24	12/3/2024	0.02	0.09[2]	**0.11**[2]	2.00	0.03	0.05
37	Upper Johnson	8/13/24	12/3/2024	0.03	0.13[2]	**0.11**[2]	1.50	0.08	0.12
38	Upper Johnson	8/13/24	12/3/2024	0.06	0.22	**0.21**	1.67	0.04	0.10
39	Upper Johnson	8/13/24	12/3/2024	0.01	0.04[2]	**0.11**[2]	-	0.05	0.06
40	Upper Johnson	8/13/24	12/3/2024	0.01	0.04[2]	**0.11**[2]	-	0.05	0.06
41	Upper Johnson	8/13/24	12/3/2024	0.11	0.45	**0.43**	1.67	0.00	0.14
42	Kona Creek	8/13/24	12/3/2024	0.01	0.04[2]	**0.11**[2]	-	0.05	0.06
43	Kona Creek	8/13/24	12/3/2024	0.06	0.22	**0.21**	1.67	0.04	0.10
44	Kona Creek	8/13/24	12/3/2024	0.02	0.09[2]	**0.11**[2]	2.00	0.03	0.05
45	Kona Creek	8/13/24	12/3/2024	0.01	0.04[2]	**0.11**[2]	-	0.06	0.00
46	Kona Creek	8/13/24	12/3/2024	0.09	0.36	**0.32**	1.60	0.06	0.05
47	Kona Creek	8/13/24	12/3/2024	0.22	0.86	**0.85**	1.73	0.05	0.08
48	Kona Creek	8/13/24	12/3/2024	0.03	0.13[2]	**0.11**[2]	1.50	0.08	0.12
49	Kona Creek	8/13/24	12/3/2024	0.04	0.18	**0.21**	2.00	0.06	0.11
50	Kona Creek	8/13/24	12/3/2024	0.03	0.14	**0.21**	3.00	0.01	0.05
51	Kona Creek	8/13/24	12/3/2024	0.01	0.04[2]	**0.11**[2]	-	0.05	0.06

Notes:

[1] Phaeophytin corrected

[2] Chl-a results below detection limit (0.14 mg/m2)

No results above linear check (69.02 mg/m2) in 2024 samples.

APPENDIX 2. HESS BMI SAMPLE RESULTS, JOHNSON TRACT 2024.

	Monitoring reach	
	Upper Johnson	Kona Creek
Sample date	8/13/2024	8/13/2024
Aquatic invertebrate taxa richness/site	8	10
EPT taxa richness/site	3	4
% EPT	8.66%	14.06%
% Ephemeroptera	7.09%	12.5%
% Plecoptera	1.5%	1.56%
% Trichoptera	0%	0%
% Aquatic Diptera	90.6%	79.7%
% Aquatic Chironomidae	88.2%	70.3%
% Miscellaneous aquatic invertebrates	0.8%	6.3%
% Dominant aquatic taxon	88.0%	69.3%
Hess Sampler area total(m^2)	0.43	0.43
Area/Hess Sampler (m^2)	0.09	0.09
Estimated total invertebrates/m^2	302	2,574
Standard deviation of aquatic invertebrate density	288.7	1,131
Total abundance of invertebrates[a]	130	67
Total abundance Ephemeroptera[a]	9	8
Total abundance Plecoptera[a]	2	1
Total abundance Trichoptera[a]	0	0
Total abundance Diptera[a]	115	51
Total abundance misc. invertebrates[a]	1	4
Average number invertebrates/Hess[b]	26	13
Average number Ephemeroptera/Hess[b]	2	2
Average number Plecoptera/Hess[b]	<1	<1
Average number Trichoptera/Hess[b]	0	0
Average number Diptera/Hess[b]	23	10
Average number misc. invertebrates/Hess[b]	<1	1
Standard deviation invertebrates/Hess[b]	25	10
Total larval fish/site[b]	0	0

Notes:
[a] Corrected for subsampling.
[b] Five Hess samples per site.

Data Sheet – Johnson Tract

Hess Samples from 2024: Number of invertebrates by family or genus (all life stages)

Site: **Upper Johnson**

Date: August 13, 2024 Sampled by: J. Brekken, B. Evers (ADF&G)

	Taxon		Sample Net =	1	2	3	4	5
Insecta	Ephemeroptera	Baetidae	*Baetis*		3	4		1
			Acentrella					
		Heptageniidae	*Cinygmula*			1		
			Epeorus					
		Ameletidae	*Ameletus*					
		Ephemerellidae	*Drunella*					
			Ephemerella					
	Plecoptera	Capniidae	*Capnia*					
			Eucapnopsis					
			Isocapnia					
			Paracapnia					
		Leutridae	Despaxia					
		Chloroperlidaee	*Kathroperla*					
			Suwallia					
		Nemouridae	*Nemoura*					
			Ostrocerca					
			Podmosta					
			Zapada					1
		Perlodidae	*Alloperla*					
			Isoperla					
			Perlomyia					
		Not Determined						1
	Trichoptera	Brachycentridae	*Brachycentrus*					
		Limnephilidae	*Ecclosomyia*					
		Glossosomatidae						
		Ryachophiliide	Ryachophilia					
	Diptera	Chironomidae		8	34	57	3	10
		Empididae	*Chelifera*	1				
			Clinocera					
			Oreogeton					
		Psychodidae						
		Tabanidae						
		Tipulidae	*Tipula*					
			Gonomyodes					
			Rhabdomastix					
			Hexatoma					
		Simuliidae	Not determined			1	1	
		Ceratopogonidae						
	Coleoptera	Carabidae						
		Chrysomelidae						
		Curculionidae						
		Dytiscidae						
		Hydrophilidae						
		Hydroscaphidae						
		Staphylinidae						
Miscellaneous	Collembola	Entomobryidae						
	Acari	Acarina						
	Oligochaeta				1			
	Ostracoda							
	Copepoda	Cyclopoida						
		Calanoida						
		Harpacticoida						
	Terrestrial Flies			2		1		

Data Sheet – Johnson Tract

Hess Samples from 2024: Number of invertebrates by family or genus (all life stages)

Site: **Kona Creek**

Date: August 13, 2024 Sampled by: J. Brekken, B. Evers (ADF&G)

	Taxon		Sample Net =	1	2	3	4	5
Insecta	Ephemeroptera	Baetidae	*Baetis*		2	2	1	1
			Acentrella					
		Heptageniidae	*Cinygmula*			1		
			Epeorus		1			
		Ameletidae	*Ameletus*					
		Ephemerellidae	*Drunella*					
			Ephemerella					
	Plecoptera	Capniidae	*Capnia*					
			Eucapnopsis					
			Isocapnia					
			Paracapnia					
		Leutridae	Despaxia					
		Chloroperlidaee	*Kathroperla*					
			Suwallia					
		Nemouridae	*Nemoura*					
			Ostrocerca					
			Podmosta					
			Zapada	1				
		Perlodidae	*Alloperla*					
			Isoperla					
			Perlomyia					
	Trichoptera	Brachycentridae	*Brachycentrus*					
		Limnephilidae	*Ecclosomyia*					
		Glossosomatidae						
		Ryachophiliide	Ryachophilia					
	Diptera	Chironomidae		2	5	12	23	3
		Empididae	*Chelifera*					
			Clinocera					
			Oreogeton					
		Psychodidae						
		Tabanidae						
		Tipulidae	*Tipula*					
			Gonomyodes					
			Rhabdomastix					
			Hexatoma					
		Simuliidae	*Simulium*	1	2			
		Ceratopogonidae						
		Stratiomyidae					1	1
		Not Determined					1	
	Coleoptera	Carabidae						
		Chrysomelidae						
		Curculionidae						
		Dytiscidae						
		Hydrophilidae						
		Hydroscaphidae						
		Staphylinidae						
Miscellaneous	Collembola	Entomobryidae						
	Acari	Acarina				2		
	Oligochaeta					1	1	
	Ostracoda							
	Copepoda	Cyclopoida						
		Calanoida						
		Harpacticoida						
	Terrestrial Flies				1		2	

APPENDIX 3. ANALYTICAL LABORATORY REPORTS FOR WHOLE FISH, JOHNSON TRACT 2024.

Wet Weight to Dry Weight Conversion Table – Fish Tissue 2024

CLIENTID	Sample Site	ANALYTE	RESULT	Dry Wt Result	QUAL	UNITS	MDL	Dry Wt MDL	PQL	% Solid
JR-1	Upper Johnson	Arsenic, total (3050)	0.0871	**0.411**	B	mg/Kg	0.029	0.137	0.145	21.2
JR-1	Upper Johnson	Cadmium, total (3050)	0.0625	**0.295**		mg/Kg	0.007	0.034	0.036	21.2
JR-1	Upper Johnson	Copper, total (3050)	1.28	**6.038**		mg/Kg	0.116	0.547	0.290	21.2
JR-1	Upper Johnson	Lead, total (3050)	0.0299	**0.141**	B	mg/Kg	0.015	0.068	0.073	21.2
JR-1	Upper Johnson	Mercury by Direct Combustion AA	24.2	**114.151**		ng/g	2.920	13.774	14.600	21.2
JR-1	Upper Johnson	Selenium, total (3050)	0.605	**2.854**		mg/Kg	0.015	0.068	0.036	21.2
JR-1	Upper Johnson	Silver, total (3050)		**0.000**	U	mg/Kg	0.015	0.068	0.073	21.2
JR-1	Upper Johnson	Zinc, total (3050)	26.7	**125.943**		mg/Kg	0.870	4.104	2.180	21.2
JR-2	Upper Johnson	Arsenic, total (3050)	0.131	**0.582**	B	mg/Kg	0.046	0.204	0.230	22.5
JR-2	Upper Johnson	Cadmium, total (3050)	0.0584	**0.260**		mg/Kg	0.012	0.051	0.058	22.5
JR-2	Upper Johnson	Copper, total (3050)	1.46	**6.489**		mg/Kg	0.184	0.818	0.460	22.5
JR-2	Upper Johnson	Lead, total (3050)	0.0483	**0.215**	B	mg/Kg	0.023	0.102	0.115	22.5
JR-2	Upper Johnson	Mercury by Direct Combustion AA	28.1	**124.889**		ng/g	2.030	9.022	10.150	22.5
JR-2	Upper Johnson	Selenium, total (3050)	0.535	**2.378**		mg/Kg	0.023	0.102	0.058	22.5
JR-2	Upper Johnson	Silver, total (3050)		**0.000**	U	mg/Kg	0.023	0.102	0.115	22.5
JR-2	Upper Johnson	Zinc, total (3050)	35.5	**157.778**		mg/Kg	1.380	6.133	3.450	22.5
JR-2	Upper Johnson	Arsenic, total (3050)	0.131	**0.582**	B	mg/Kg	0.046	0.204	0.230	24.3
JR-3	Upper Johnson	Arsenic, total (3050)	0.110	**0.453**	B	mg/Kg	0.044	0.181	0.220	24.3
JR-3	Upper Johnson	Cadmium, total (3050)	0.0502	**0.207**	B	mg/Kg	0.011	0.045	0.055	24.3
JR-3	Upper Johnson	Copper, total (3050)	1.35	**5.556**		mg/Kg	0.176	0.724	0.440	24.3
JR-3	Upper Johnson	Lead, total (3050)	0.0416	**0.171**	B	mg/Kg	0.022	0.091	0.110	24.3
JR-3	Upper Johnson	Mercury by Direct Combustion AA	24.5	**100.823**		ng/g	3.740	15.391	18.700	24.3
JR-3	Upper Johnson	Selenium, total (3050)	0.637	**2.621**		mg/Kg	0.022	0.091	0.055	24.3
JR-3	Upper Johnson	Silver, total (3050)		**0.000**	U	mg/Kg	0.022	0.091	0.110	24.3
JR-3	Upper Johnson	Zinc, total (3050)	39.5	**162.551**		mg/Kg	1.320	5.432	3.300	22.9
JR-3	Upper Johnson	Arsenic, total (3050)	0.110	**0.453**	B	mg/Kg	0.044	0.181	0.220	22.9
JR-4	Upper Johnson	Arsenic, total (3050)	0.139	**0.607**	B	mg/Kg	0.039	0.170	0.195	22.9
JR-4	Upper Johnson	Cadmium, total (3050)	0.0677	**0.296**		mg/Kg	0.010	0.043	0.049	22.9
JR-4	Upper Johnson	Copper, total (3050)	1.20	**5.240**		mg/Kg	0.156	0.681	0.390	22.9
JR-4	Upper Johnson	Lead, total (3050)	0.0197	**0.086**	B	mg/Kg	0.020	0.085	0.098	22.9
JR-4	Upper Johnson	Mercury by Direct Combustion AA	16.2	**70.742**		ng/g	2.990	13.057	14.950	22.9
JR-4	Upper Johnson	Selenium, total (3050)	0.681	**2.974**		mg/Kg	0.020	0.085	0.049	22.9

CLIENTID	Sample Site	ANALYTE	RESULT	Dry Wt Result	QUAL	UNITS	MDL	Dry Wt MDL	PQL	% Solid
JR-4	Upper Johnson	Silver, total (3050)		**0.000**	U	mg/Kg	0.020	0.085	0.098	25.5
JR-4	Upper Johnson	Zinc, total (3050)	32.7	**142.795**		mg/Kg	1.170	5.109	2.930	25.5
JR-4	Upper Johnson	Arsenic, total (3050)	0.139	**0.607**	B	mg/Kg	0.039	0.170	0.195	25.5
JR-5	Upper Johnson	Arsenic, total (3050)	0.109	**0.427**	B	mg/Kg	0.045	0.176	0.225	25.5
JR-5	Upper Johnson	Cadmium, total (3050)	0.0605	**0.237**		mg/Kg	0.011	0.044	0.056	25.5
JR-5	Upper Johnson	Copper, total (3050)	1.000	**3.922**		mg/Kg	0.180	0.706	0.450	25.5
JR-5	Upper Johnson	Lead, total (3050)		**0.000**	U	mg/Kg	0.023	0.088	0.113	25.5
JR-5	Upper Johnson	Mercury by Direct Combustion AA	14.7	**57.647**	B	ng/g	3.420	13.412	17.100	25.5
JR-5	Upper Johnson	Selenium, total (3050)	0.681	**2.671**		mg/Kg	0.023	0.088	0.056	24.4
JR-5	Upper Johnson	Silver, total (3050)		**0.000**	U	mg/Kg	0.023	0.088	0.113	24.4
JR-5	Upper Johnson	Zinc, total (3050)	30.1	**118.039**		mg/Kg	1.350	5.294	3.380	24.4
JR-5	Upper Johnson	Arsenic, total (3050)	0.109	**0.427**	B	mg/Kg	0.045	0.176	0.225	24.4
JR-6	Upper Johnson	Arsenic, total (3050)	0.107	**0.439**	B	mg/Kg	0.050	0.205	0.250	24.4
JR-6	Upper Johnson	Cadmium, total (3050)	0.0525	**0.215**	B	mg/Kg	0.013	0.051	0.063	24.4
JR-6	Upper Johnson	Copper, total (3050)	2.21	**9.057**		mg/Kg	0.200	0.820	0.500	24.4
JR-6	Upper Johnson	Lead, total (3050)	0.0338	**0.139**	B	mg/Kg	0.025	0.102	0.125	24.4
JR-6	Upper Johnson	Mercury by Direct Combustion AA	30	**122.951**		ng/g	3.960	16.230	19.800	21.7
JR-6	Upper Johnson	Selenium, total (3050)	0.601	**2.463**		mg/Kg	0.025	0.102	0.063	21.7
JR-6	Upper Johnson	Silver, total (3050)		**0.000**	U	mg/Kg	0.025	0.102	0.125	21.7
JR-6	Upper Johnson	Zinc, total (3050)	39.5	**161.885**		mg/Kg	1.500	6.148	3.750	21.7
JR-6	Upper Johnson	Arsenic, total (3050)	0.107	**0.439**	B	mg/Kg	0.050	0.205	0.250	21.7
JR-7	Upper Johnson	Arsenic, total (3050)	0.0963	**0.444**	B	mg/Kg	0.042	0.194	0.210	21.7
JR-7	Upper Johnson	Cadmium, total (3050)	0.0278	**0.128**	B	mg/Kg	0.011	0.048	0.053	21.7
JR-7	Upper Johnson	Copper, total (3050)	0.879	**4.051**		mg/Kg	0.168	0.774	0.420	21.7
JR-7	Upper Johnson	Lead, total (3050)		**0.000**	U	mg/Kg	0.021	0.097	0.105	21.2
JR-7	Upper Johnson	Mercury by Direct Combustion AA	30.1	**138.710**		ng/g	2.520	11.613	12.600	21.2
JR-7	Upper Johnson	Selenium, total (3050)	0.672	**3.097**		mg/Kg	0.021	0.097	0.053	21.2
JR-7	Upper Johnson	Silver, total (3050)		**0.000**	U	mg/Kg	0.021	0.097	0.105	21.2
JR-7	Upper Johnson	Zinc, total (3050)	30.8	**141.935**		mg/Kg	1.260	5.806	3.150	21.2
JR-7	Upper Johnson	Arsenic, total (3050)	0.0963	**0.444**	B	mg/Kg	0.042	0.194	0.210	21.2
JR-8	Upper Johnson	Arsenic, total (3050)	0.0722	**0.301**	B	mg/Kg	0.049	0.204	0.245	24.0
JR-8	Upper Johnson	Cadmium, total (3050)	0.0149	**0.062**	B	mg/Kg	0.012	0.051	0.061	24.0
JR-8	Upper Johnson	Copper, total (3050)	1.07	**4.458**		mg/Kg	0.196	0.817	0.490	24.0
JR-8	Upper Johnson	Lead, total (3050)	0.0281	**0.117**	B	mg/Kg	0.025	0.102	0.123	24.0
JR-8	Upper Johnson	Mercury by Direct Combustion AA	31.4	**130.833**		ng/g	3.010	12.542	15.050	24.0

CLIENTID	Sample Site	ANALYTE	RESULT	Dry Wt Result	QUAL	UNITS	MDL	Dry Wt MDL	PQL	% Solid
JR-8	Upper Johnson	Selenium, total (3050)	0.677	**2.821**		mg/Kg	0.025	0.102	0.061	24.0
JR-8	Upper Johnson	Silver, total (3050)		**0.000**	U	mg/Kg	0.025	0.102	0.123	24.0
JR-8	Upper Johnson	Zinc, total (3050)	38.1	**158.750**		mg/Kg	1.470	6.125	3.680	24.0
JR-8	Upper Johnson	Arsenic, total (3050)	0.0722	**0.301**	B	mg/Kg	0.049	0.204	0.245	24.0
JR-9	Upper Johnson	Arsenic, total (3050)	0.216	**0.973**	B	mg/Kg	0.047	0.212	0.235	22.2
JR-9	Upper Johnson	Cadmium, total (3050)	0.141	**0.635**		mg/Kg	0.012	0.053	0.059	22.2
JR-9	Upper Johnson	Copper, total (3050)	1.20	**5.405**		mg/Kg	0.188	0.847	0.470	22.2
JR-9	Upper Johnson	Lead, total (3050)	0.0387	**0.174**	B	mg/Kg	0.024	0.106	0.118	22.2
JR-9	Upper Johnson	Mercury by Direct Combustion AA	15.8	**71.171**	B	ng/g	3.480	15.676	17.400	22.2
JR-9	Upper Johnson	Selenium, total (3050)	0.623	**2.806**		mg/Kg	0.024	0.106	0.059	22.2
JR-9	Upper Johnson	Silver, total (3050)		**0.000**	U	mg/Kg	0.024	0.106	0.118	22.2
JR-9	Upper Johnson	Zinc, total (3050)	84.9	**382.432**		mg/Kg	1.410	6.351	3.530	22.2
JR-9	Upper Johnson	Arsenic, total (3050)	0.216	**0.973**	B	mg/Kg	0.047	0.212	0.235	22.2
JR-10	Upper Johnson	Arsenic, total (3050)	0.142	**0.645**	B	mg/Kg	0.046	0.209	0.230	22.0
JR-10	Upper Johnson	Cadmium, total (3050)	0.0899	**0.409**		mg/Kg	0.012	0.052	0.058	22.0
JR-10	Upper Johnson	Copper, total (3050)	1.26	**5.727**		mg/Kg	0.184	0.836	0.460	22.0
JR-10	Upper Johnson	Lead, total (3050)	0.0710	**0.323**	B	mg/Kg	0.023	0.105	0.115	22.0
JR-10	Upper Johnson	Mercury by Direct Combustion AA	15.2	**69.091**		ng/g	2.650	12.045	13.250	22.0
JR-10	Upper Johnson	Selenium, total (3050)	0.841	**3.823**		mg/Kg	0.023	0.105	0.058	22.0
JR-10	Upper Johnson	Silver, total (3050)		**0.000**	U	mg/Kg	0.023	0.105	0.115	22.0
JR-10	Upper Johnson	Zinc, total (3050)	32.4	**147.273**		mg/Kg	1.380	6.273	3.450	22.0
JR-10	Upper Johnson	Arsenic, total (3050)	0.142	**0.645**	B	mg/Kg	0.046	0.209	0.230	22.0
JR-11	Upper Johnson	Arsenic, total (3050)	0.126	**0.565**	B	mg/Kg	0.033	0.148	0.165	22.3
JR-11	Upper Johnson	Cadmium, total (3050)	0.0658	**0.295**		mg/Kg	0.008	0.037	0.041	22.3
JR-11	Upper Johnson	Copper, total (3050)	0.928	**4.161**		mg/Kg	0.132	0.592	0.330	22.3
JR-11	Upper Johnson	Lead, total (3050)	0.0199	**0.089**	B	mg/Kg	0.017	0.074	0.083	22.3
JR-11	Upper Johnson	Mercury by Direct Combustion AA	13.3	**59.641**	B	ng/g	2.840	12.735	14.200	22.3
JR-11	Upper Johnson	Selenium, total (3050)	0.616	**2.762**		mg/Kg	0.017	0.074	0.041	22.3
JR-11	Upper Johnson	Silver, total (3050)		**0.000**	U	mg/Kg	0.017	0.074	0.083	22.3
JR-11	Upper Johnson	Zinc, total (3050)	50.3	**225.561**		mg/Kg	0.990	4.439	2.480	22.3
JR-11	Upper Johnson	Arsenic, total (3050)	0.126	**0.565**	B	mg/Kg	0.033	0.148	0.165	22.3
JR-12	Upper Johnson	Arsenic, total (3050)	0.116	**0.545**	B	mg/Kg	0.033	0.155	0.165	21.3
JR-12	Upper Johnson	Cadmium, total (3050)	0.0783	**0.368**		mg/Kg	0.008	0.039	0.041	21.3
JR-12	Upper Johnson	Copper, total (3050)	1.08	**5.070**		mg/Kg	0.132	0.620	0.330	21.3
JR-12	Upper Johnson	Lead, total (3050)	0.0176	**0.083**	B	mg/Kg	0.017	0.077	0.083	21.3

CLIENTID	Sample Site	ANALYTE	RESULT	Dry Wt Result	QUAL	UNITS	MDL	Dry Wt MDL	PQL	% Solid
JR-12	Upper Johnson	Mercury by Direct Combustion AA	11.4	**53.521**	B	ng/g	3.280	15.399	16.400	21.3
JR-12	Upper Johnson	Selenium, total (3050)	0.573	**2.690**		mg/Kg	0.017	0.077	0.041	21.3
JR-12	Upper Johnson	Silver, total (3050)		**0.000**	U	mg/Kg	0.017	0.077	0.083	21.3
JR-12	Upper Johnson	Zinc, total (3050)	36.6	**171.831**		mg/Kg	0.990	4.648	2.480	21.3
JR-12	Upper Johnson	Arsenic, total (3050)	0.116	**0.545**	B	mg/Kg	0.033	0.155	0.165	21.3
JR-13	Upper Johnson	Arsenic, total (3050)	0.146	**0.716**	B	mg/Kg	0.050	0.245	0.250	20.4
JR-13	Upper Johnson	Cadmium, total (3050)	0.117	**0.574**		mg/Kg	0.013	0.061	0.063	20.4
JR-13	Upper Johnson	Copper, total (3050)	1.69	**8.284**		mg/Kg	0.200	0.980	0.500	20.4
JR-13	Upper Johnson	Lead, total (3050)	0.0290	**0.142**	B	mg/Kg	0.025	0.123	0.125	20.4
JR-13	Upper Johnson	Mercury by Direct Combustion AA	13.1	**64.216**	B	ng/g	3.030	14.853	15.150	20.4
JR-13	Upper Johnson	Selenium, total (3050)	0.946	**4.637**		mg/Kg	0.025	0.123	0.063	20.4
JR-13	Upper Johnson	Silver, total (3050)		**0.000**	U	mg/Kg	0.025	0.123	0.125	20.4
JR-13	Upper Johnson	Zinc, total (3050)	38.8	**190.196**		mg/Kg	1.500	7.353	3.750	20.4
JR-13	Upper Johnson	Arsenic, total (3050)	0.146	**0.716**	B	mg/Kg	0.050	0.245	0.250	20.4
JR-14	Upper Johnson	Arsenic, total (3050)	0.0914	**0.372**	B	mg/Kg	0.043	0.175	0.215	24.6
JR-14	Upper Johnson	Cadmium, total (3050)	0.207	**0.841**		mg/Kg	0.011	0.044	0.054	24.6
JR-14	Upper Johnson	Copper, total (3050)	1.14	**4.634**		mg/Kg	0.172	0.699	0.430	24.6
JR-14	Upper Johnson	Lead, total (3050)		**0.000**	U	mg/Kg	0.022	0.087	0.108	24.6
JR-14	Upper Johnson	Mercury by Direct Combustion AA	15.1	**61.382**	B	ng/g	3.310	13.455	16.550	24.6
JR-14	Upper Johnson	Selenium, total (3050)	0.612	**2.488**		mg/Kg	0.022	0.087	0.054	24.6
JR-14	Upper Johnson	Silver, total (3050)		**0.000**	U	mg/Kg	0.022	0.087	0.108	24.6
JR-14	Upper Johnson	Zinc, total (3050)	21.8	**88.618**		mg/Kg	1.290	5.244	3.230	24.6
JR-14	Upper Johnson	Arsenic, total (3050)	0.0914	**0.372**	B	mg/Kg	0.043	0.175	0.215	24.6
JR-15	Upper Johnson	Arsenic, total (3050)	0.0684	**0.259**	B	mg/Kg	0.035	0.133	0.175	26.4
JR-15	Upper Johnson	Cadmium, total (3050)	0.0409	**0.155**	B	mg/Kg	0.009	0.033	0.044	26.4
JR-15	Upper Johnson	Copper, total (3050)	0.780	**2.955**		mg/Kg	0.140	0.530	0.350	26.4
JR-15	Upper Johnson	Lead, total (3050)		**0.000**	U	mg/Kg	0.018	0.066	0.088	26.4
JR-15	Upper Johnson	Mercury by Direct Combustion AA	20.3	**76.894**		ng/g	3.640	13.788	18.200	26.4
JR-15	Upper Johnson	Selenium, total (3050)	0.640	**2.424**		mg/Kg	0.018	0.066	0.044	26.4
JR-15	Upper Johnson	Silver, total (3050)		**0.000**	U	mg/Kg	0.018	0.066	0.088	26.4
JR-15	Upper Johnson	Zinc, total (3050)	21.1	**79.924**		mg/Kg	1.050	3.977	2.630	26.4
JR-15	Upper Johnson	Arsenic, total (3050)	0.0684	**0.259**	B	mg/Kg	0.035	0.133	0.175	26.4
KC-1	Kona Creek	Arsenic, total (3050)	0.172	**0.729**	B	mg/Kg	0.044	0.186	0.220	23.6
KC-1	Kona Creek	Cadmium, total (3050)	0.161	**0.682**		mg/Kg	0.011	0.047	0.055	23.6
KC-1	Kona Creek	Copper, total (3050)	1.76	**7.458**		mg/Kg	0.176	0.746	0.440	23.6

CLIENTID	Sample Site	ANALYTE	RESULT	Dry Wt Result	QUAL	UNITS	MDL	Dry Wt MDL	PQL	% Solid
KC-1	Kona Creek	Lead, total (3050)	0.0885	**0.375**	B	mg/Kg	0.022	0.093	0.110	23.6
KC-1	Kona Creek	Mercury by Direct Combustion AA	15.6	**66.102**		ng/g	2.350	9.958	11.750	23.6
KC-1	Kona Creek	Selenium, total (3050)	0.775	**3.284**		mg/Kg	0.022	0.093	0.055	23.6
KC-1	Kona Creek	Silver, total (3050)		**0.000**	U	mg/Kg	0.022	0.093	0.110	23.6
KC-1	Kona Creek	Zinc, total (3050)	42.9	**181.780**		mg/Kg	1.320	5.593	3.300	23.6
KC-1	Kona Creek	Arsenic, total (3050)	0.172	**0.729**	B	mg/Kg	0.044	0.186	0.220	23.6
KC-2	Kona Creek	Arsenic, total (3050)	0.121	**0.540**	B	mg/Kg	0.042	0.188	0.210	22.4
KC-2	Kona Creek	Cadmium, total (3050)	0.0935	**0.417**		mg/Kg	0.011	0.047	0.053	22.4
KC-2	Kona Creek	Copper, total (3050)	1.78	**7.946**		mg/Kg	0.168	0.750	0.420	22.4
KC-2	Kona Creek	Lead, total (3050)	0.0394	**0.176**	B	mg/Kg	0.021	0.094	0.105	22.4
KC-2	Kona Creek	Mercury by Direct Combustion AA	13.8	**61.607**	B	ng/g	3.480	15.536	17.400	22.4
KC-2	Kona Creek	Selenium, total (3050)	0.726	**3.241**		mg/Kg	0.021	0.094	0.053	22.4
KC-2	Kona Creek	Silver, total (3050)		**0.000**	U	mg/Kg	0.021	0.094	0.105	22.4
KC-2	Kona Creek	Zinc, total (3050)	28.7	**128.125**		mg/Kg	1.260	5.625	3.150	22.4
KC-2	Kona Creek	Arsenic, total (3050)	0.121	**0.540**	B	mg/Kg	0.042	0.188	0.210	22.4
KC-3	Kona Creek	Arsenic, total (3050)	0.0422	**0.184**	B	mg/Kg	0.040	0.175	0.200	22.9
KC-3	Kona Creek	Cadmium, total (3050)	0.0328	**0.143**	B	mg/Kg	0.010	0.044	0.050	22.9
KC-3	Kona Creek	Copper, total (3050)	0.652	**2.847**		mg/Kg	0.160	0.699	0.400	22.9
KC-3	Kona Creek	Lead, total (3050)		**0.000**	U	mg/Kg	0.020	0.087	0.100	22.9
KC-3	Kona Creek	Mercury by Direct Combustion AA	14.8	**64.629**	B	ng/g	3.080	13.450	15.400	22.9
KC-3	Kona Creek	Selenium, total (3050)	0.616	**2.690**		mg/Kg	0.020	0.087	0.050	22.9
KC-3	Kona Creek	Silver, total (3050)		**0.000**	U	mg/Kg	0.020	0.087	0.100	22.9
KC-3	Kona Creek	Zinc, total (3050)	22.6	**98.690**		mg/Kg	1.200	5.240	3.000	22.9
KC-3	Kona Creek	Arsenic, total (3050)	0.0422	**0.184**	B	mg/Kg	0.040	0.175	0.200	22.9
KC-4	Kona Creek	Arsenic, total (3050)	0.0479	**0.230**	B	mg/Kg	0.044	0.212	0.220	20.8
KC-4	Kona Creek	Cadmium, total (3050)	0.0393	**0.189**	B	mg/Kg	0.011	0.053	0.055	20.8
KC-4	Kona Creek	Copper, total (3050)	0.638	**3.067**		mg/Kg	0.176	0.846	0.440	20.8
KC-4	Kona Creek	Lead, total (3050)		**0.000**	U	mg/Kg	0.022	0.106	0.110	20.8
KC-4	Kona Creek	Mercury by Direct Combustion AA	12	**57.692**	B	ng/g	3.130	15.048	15.650	20.8
KC-4	Kona Creek	Selenium, total (3050)	0.589	**2.832**		mg/Kg	0.022	0.106	0.055	20.8
KC-4	Kona Creek	Silver, total (3050)		**0.000**	U	mg/Kg	0.022	0.106	0.110	20.8
KC-4	Kona Creek	Zinc, total (3050)	36.8	**176.923**		mg/Kg	1.320	6.346	3.300	20.8
KC-4	Kona Creek	Arsenic, total (3050)	0.0479	**0.230**	B	mg/Kg	0.044	0.212	0.220	20.8
KC-5	Kona Creek	Arsenic, total (3050)	0.0525	**0.240**	B	mg/Kg	0.032	0.146	0.160	21.9
KC-5	Kona Creek	Cadmium, total (3050)	0.0451	**0.206**		mg/Kg	0.008	0.037	0.040	21.9

CLIENTID	Sample Site	ANALYTE	RESULT	Dry Wt Result	QUAL	UNITS	MDL	Dry Wt MDL	PQL	% Solid
KC-5	Kona Creek	Copper, total (3050)	0.587	**2.680**		mg/Kg	0.128	0.584	0.320	21.9
KC-5	Kona Creek	Lead, total (3050)		**0.000**	U	mg/Kg	0.016	0.073	0.080	21.9
KC-5	Kona Creek	Mercury by Direct Combustion AA	13.8	**63.014**		ng/g	2.550	11.644	12.750	21.9
KC-5	Kona Creek	Selenium, total (3050)	0.468	**2.137**		mg/Kg	0.016	0.073	0.040	21.9
KC-5	Kona Creek	Silver, total (3050)		**0.000**	U	mg/Kg	0.016	0.073	0.080	21.9
KC-5	Kona Creek	Zinc, total (3050)	25.9	**118.265**		mg/Kg	0.960	4.384	2.400	21.9
KC-5	Kona Creek	Arsenic, total (3050)	0.0525	**0.240**	B	mg/Kg	0.032	0.146	0.160	21.9
KC-6	Kona Creek	Arsenic, total (3050)	0.0472	**0.212**	B	mg/Kg	0.038	0.170	0.190	22.3
KC-6	Kona Creek	Cadmium, total (3050)	0.0420	**0.188**	B	mg/Kg	0.010	0.043	0.048	22.3
KC-6	Kona Creek	Copper, total (3050)	0.814	**3.650**		mg/Kg	0.152	0.682	0.380	22.3
KC-6	Kona Creek	Lead, total (3050)		**0.000**	U	mg/Kg	0.019	0.085	0.095	22.3
KC-6	Kona Creek	Mercury by Direct Combustion AA	18.6	**83.408**		ng/g	3.050	13.677	15.250	22.3
KC-6	Kona Creek	Selenium, total (3050)	0.527	**2.363**		mg/Kg	0.019	0.085	0.048	22.3
KC-6	Kona Creek	Silver, total (3050)		**0.000**	U	mg/Kg	0.019	0.085	0.095	22.3
KC-6	Kona Creek	Zinc, total (3050)	36.1	**161.883**		mg/Kg	1.140	5.112	2.850	22.3
KC-6	Kona Creek	Arsenic, total (3050)	0.0472	**0.212**	B	mg/Kg	0.038	0.170	0.190	22.3
KC-7	Kona Creek	Arsenic, total (3050)		**0.000**	U	mg/Kg	0.044	0.195	0.220	22.6
KC-7	Kona Creek	Cadmium, total (3050)	0.0456	**0.202**	B	mg/Kg	0.011	0.049	0.055	22.6
KC-7	Kona Creek	Copper, total (3050)	1.08	**4.779**		mg/Kg	0.176	0.779	0.440	22.6
KC-7	Kona Creek	Lead, total (3050)		**0.000**	U	mg/Kg	0.022	0.097	0.110	22.6
KC-7	Kona Creek	Mercury by Direct Combustion AA	16.6	**73.451**		ng/g	3.200	14.159	16.000	22.6
KC-7	Kona Creek	Selenium, total (3050)	0.472	**2.088**		mg/Kg	0.022	0.097	0.055	22.6
KC-7	Kona Creek	Silver, total (3050)		**0.000**	U	mg/Kg	0.022	0.097	0.110	22.6
KC-7	Kona Creek	Zinc, total (3050)	30.7	**135.841**		mg/Kg	1.320	5.841	3.300	22.6
KC-7	Kona Creek	Arsenic, total (3050)		**0.000**	U	mg/Kg	0.044	0.195	0.220	22.6
KC-8	Kona Creek	Arsenic, total (3050)	0.0707	**0.320**	B	mg/Kg	0.046	0.208	0.230	22.1
KC-8	Kona Creek	Cadmium, total (3050)	0.0126	**0.057**	B	mg/Kg	0.012	0.052	0.058	22.1
KC-8	Kona Creek	Copper, total (3050)	0.522	**2.362**		mg/Kg	0.184	0.833	0.460	22.1
KC-8	Kona Creek	Lead, total (3050)		**0.000**	U	mg/Kg	0.023	0.104	0.115	22.1
KC-8	Kona Creek	Mercury by Direct Combustion AA	12.6	**57.014**	B	ng/g	2.550	11.538	12.750	22.1
KC-8	Kona Creek	Selenium, total (3050)	0.567	**2.566**		mg/Kg	0.023	0.104	0.058	22.1
KC-8	Kona Creek	Silver, total (3050)		**0.000**	U	mg/Kg	0.023	0.104	0.115	22.1
KC-8	Kona Creek	Zinc, total (3050)	31.1	**140.724**		mg/Kg	1.380	6.244	3.450	22.1
KC-8	Kona Creek	Arsenic, total (3050)	0.0707	**0.320**	B	mg/Kg	0.046	0.208	0.230	22.1
KC-9	Kona Creek	Arsenic, total (3050)	0.0511	**0.216**	B	mg/Kg	0.038	0.160	0.190	23.7

CLIENTID	Sample Site	ANALYTE	RESULT	Dry Wt Result	QUAL	UNITS	MDL	Dry Wt MDL	PQL	% Solid
KC-9	Kona Creek	Cadmium, total (3050)	0.0288	**0.122**	B	mg/Kg	0.010	0.040	0.048	23.7
KC-9	Kona Creek	Copper, total (3050)	0.746	**3.148**		mg/Kg	0.152	0.641	0.380	23.7
KC-9	Kona Creek	Lead, total (3050)		**0.000**	U	mg/Kg	0.019	0.080	0.095	23.7
KC-9	Kona Creek	Mercury by Direct Combustion AA	10.4	**43.882**	B	ng/g	2.740	11.561	13.700	23.7
KC-9	Kona Creek	Selenium, total (3050)	0.543	**2.291**		mg/Kg	0.019	0.080	0.048	23.7
KC-9	Kona Creek	Silver, total (3050)		**0.000**	U	mg/Kg	0.019	0.080	0.095	23.7
KC-9	Kona Creek	Zinc, total (3050)	24.9	**105.063**		mg/Kg	1.140	4.810	2.850	23.7
KC-9	Kona Creek	Arsenic, total (3050)	0.0511	**0.216**	B	mg/Kg	0.038	0.160	0.190	23.7
KC-10	Kona Creek	Arsenic, total (3050)	0.0670	**0.284**	B	mg/Kg	0.036	0.153	0.180	23.6
KC-10	Kona Creek	Cadmium, total (3050)	0.0455	**0.193**		mg/Kg	0.009	0.038	0.045	23.6
KC-10	Kona Creek	Copper, total (3050)	0.874	**3.703**		mg/Kg	0.144	0.610	0.360	23.6
KC-10	Kona Creek	Lead, total (3050)		**0.000**	U	mg/Kg	0.018	0.076	0.090	23.6
KC-10	Kona Creek	Mercury by Direct Combustion AA	17.9	**75.847**		ng/g	2.630	11.144	13.150	23.6
KC-10	Kona Creek	Selenium, total (3050)	0.594	**2.517**		mg/Kg	0.018	0.076	0.045	23.6
KC-10	Kona Creek	Silver, total (3050)		**0.000**	U	mg/Kg	0.018	0.076	0.090	23.6
KC-10	Kona Creek	Zinc, total (3050)	26.7	**113.136**		mg/Kg	1.080	4.576	2.700	23.6
KC-10	Kona Creek	Arsenic, total (3050)	0.0670	**0.284**	B	mg/Kg	0.036	0.153	0.180	23.6

B - Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.

U - The material was anlyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

PQL - Practical Quantitation Limit. Synonymous with the EPA term "minimum level"

MDL - Method Detection Limit.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

October 07, 2024

Report to:
Josh Brekken
Cantango Ore

,

Bill to:
Aris Morfopoulos
HighGold Mining Inc.
375 Water Street
Suite 405
Vancouver, BC V6B 5C6

cc: Allegra Cairns

Project ID:
ACZ Project ID: L89934

Josh Brekken:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on September 03, 2024. This project has been assigned to ACZ's project number, L89934. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L89934. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after November 06, 2024. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

Sue Webber has reviewed and approved this report.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Case Narrative

Cantango Ore

October 07, 2024

Project ID:
ACZ Project ID: L89934

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 25 fish tissue samples from Cantango Ore on September 3, 2024. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L89934. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times.

Sample Analysis

These samples were analyzed for inorganic parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The following required further explanation not provided by the Extended Qualifier Report:

1. The below is from WG598548, Qualifier: N1, Applies to: L89934-16 through -25/LEAD - Elevated Pb recovery of LFB/D. Data accepted as LCS recovery and matrix spike RPD within limits.

Cantango Ore
Project ID:
Sample ID: JR-1

ACZ Sample ID: ***L89934-01***
Date Sampled: *08/13/24 09:45*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	145	0.0871	B	*	mg/Kg	0.029	0.145	09/16/24 18:37	jrj
Cadmium, total (3050)	EPA 6020B	145	0.0625			mg/Kg	0.00725	0.0363	09/16/24 18:37	jrj
Copper, total (3050)	EPA 6020B	145	1.28		*	mg/Kg	0.116	0.29	09/26/24 19:41	jrj
Lead, total (3050)	EPA 6020B	145	0.0299	B		mg/Kg	0.0145	0.0725	09/16/24 18:37	jrj
Mercury by Direct Combustion AA	EPA 7473	1	24.2		*	ng/g	2.92	14.6	09/05/24 16:03	jrj
Selenium, total (3050)	EPA 6020B	145	0.605		*	mg/Kg	0.0145	0.0363	09/26/24 19:41	jrj
Silver, total (3050)	EPA 6020B	145	<0.0145	U	*	mg/Kg	0.0145	0.0725	09/16/24 18:37	jrj
Zinc, total (3050)	EPA 6020B	145	26.7		*	mg/Kg	0.87	2.18	09/16/24 18:37	jrj

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	78.8		*	%	0.1	0.5	09/09/24 9:30	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 8:00	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 10:00	jsa

Cantango Ore
Project ID:
Sample ID: JR-2

ACZ Sample ID: ***L89934-02***
Date Sampled: *08/13/24 09:45*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	230	0.131	B	*	mg/Kg	0.046	0.23	09/16/24 18:46	jrj
Cadmium, total (3050)	EPA 6020B	230	0.0584			mg/Kg	0.0115	0.0575	09/16/24 18:46	jrj
Copper, total (3050)	EPA 6020B	230	1.46		*	mg/Kg	0.184	0.46	09/26/24 19:50	jrj
Lead, total (3050)	EPA 6020B	230	0.0483	B		mg/Kg	0.023	0.115	09/16/24 18:46	jrj
Mercury by Direct Combustion AA	EPA 7473	1	28.1		*	ng/g	2.03	10.15	09/05/24 16:19	jrj
Selenium, total (3050)	EPA 6020B	230	0.535		*	mg/Kg	0.023	0.0575	09/26/24 19:50	jrj
Silver, total (3050)	EPA 6020B	230	<0.023	U	*	mg/Kg	0.023	0.115	09/16/24 18:46	jrj
Zinc, total (3050)	EPA 6020B	230	35.5		*	mg/Kg	1.38	3.45	09/16/24 18:46	jrj

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	77.5		*	%	0.1	0.5	09/09/24 11:44	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 9:21	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 10:05	jsa

Cantango Ore
Project ID:
Sample ID: JR-3

ACZ Sample ID: ***L89934-03***
Date Sampled: *08/13/24 09:45*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	220	0.110	B	*	mg/Kg	0.044	0.22	09/16/24 18:47	jrj
Cadmium, total (3050)	EPA 6020B	220	0.0502	B		mg/Kg	0.011	0.055	09/16/24 18:47	jrj
Copper, total (3050)	EPA 6020B	220	1.35		*	mg/Kg	0.176	0.44	09/26/24 19:52	jrj
Lead, total (3050)	EPA 6020B	220	0.0416	B		mg/Kg	0.022	0.11	09/16/24 18:47	jrj
Mercury by Direct Combustion AA	EPA 7473	1	24.5		*	ng/g	3.74	18.7	09/05/24 16:35	jrj
Selenium, total (3050)	EPA 6020B	220	0.637		*	mg/Kg	0.022	0.055	09/26/24 19:52	jrj
Silver, total (3050)	EPA 6020B	220	<0.022	U	*	mg/Kg	0.022	0.11	09/16/24 18:47	jrj
Zinc, total (3050)	EPA 6020B	220	39.5		*	mg/Kg	1.32	3.3	09/16/24 18:47	jrj

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	75.7		*	%	0.1	0.5	09/09/24 12:51	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 9:48	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 10:10	jsa

Cantango Ore
Project ID:
Sample ID: JR-4

ACZ Sample ID: ***L89934-04***
Date Sampled: *08/14/24 09:45*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	195	0.139	B	*	mg/Kg	0.039	0.195	09/16/24 18:49	jrj
Cadmium, total (3050)	EPA 6020B	195	0.0677			mg/Kg	0.00975	0.0488	09/16/24 18:49	jrj
Copper, total (3050)	EPA 6020B	195	1.20		*	mg/Kg	0.156	0.39	09/26/24 19:54	jrj
Lead, total (3050)	EPA 6020B	195	0.0197	B		mg/Kg	0.0195	0.0975	09/16/24 18:49	jrj
Mercury by Direct Combustion AA	EPA 7473	1	16.2		*	ng/g	2.99	14.95	09/05/24 16:43	jrj
Selenium, total (3050)	EPA 6020B	195	0.681		*	mg/Kg	0.0195	0.0488	09/26/24 19:54	jrj
Silver, total (3050)	EPA 6020B	195	<0.0195	U	*	mg/Kg	0.0195	0.0975	09/16/24 18:49	jrj
Zinc, total (3050)	EPA 6020B	195	32.7		*	mg/Kg	1.17	2.93	09/16/24 18:49	jrj

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	77.1		*	%	0.1	0.5	09/09/24 13:58	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 10:15	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 10:15	jsa

Cantango Ore
Project ID:
Sample ID: JR-5

ACZ Sample ID: ***L89934-05***
Date Sampled: *08/14/24 13:30*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	225	0.109	B	*	mg/Kg	0.045	0.225	09/16/24 18:51	jrj
Cadmium, total (3050)	EPA 6020B	225	0.0605			mg/Kg	0.0113	0.0563	09/16/24 18:51	jrj
Copper, total (3050)	EPA 6020B	225	1.000		*	mg/Kg	0.18	0.45	09/26/24 19:56	jrj
Lead, total (3050)	EPA 6020B	225	<0.0225	U		mg/Kg	0.0225	0.113	09/16/24 18:51	jrj
Mercury by Direct Combustion AA	EPA 7473	1	14.7	B	*	ng/g	3.42	17.1	09/05/24 16:51	jrj
Selenium, total (3050)	EPA 6020B	225	0.681		*	mg/Kg	0.0225	0.0563	09/26/24 19:56	jrj
Silver, total (3050)	EPA 6020B	225	<0.0225	U	*	mg/Kg	0.0225	0.113	09/16/24 18:51	jrj
Zinc, total (3050)	EPA 6020B	225	30.1		*	mg/Kg	1.35	3.38	09/16/24 18:51	jrj

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	74.5		*	%	0.1	0.5	09/09/24 15:05	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 10:42	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 10:20	jsa

Cantango Ore
Project ID:
Sample ID: JR-6

ACZ Sample ID: ***L89934-06***
Date Sampled: *08/14/24 13:30*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	250	0.107	B	*	mg/Kg	0.05	0.25	09/16/24 18:53	jrj
Cadmium, total (3050)	EPA 6020B	250	0.0525	B		mg/Kg	0.0125	0.0625	09/16/24 18:53	jrj
Copper, total (3050)	EPA 6020B	250	2.21		*	mg/Kg	0.2	0.5	09/26/24 19:57	jrj
Lead, total (3050)	EPA 6020B	250	0.0338	B		mg/Kg	0.025	0.125	09/16/24 18:53	jrj
Mercury by Direct Combustion AA	EPA 7473	1	30		*	ng/g	3.96	19.8	09/05/24 17:06	jrj
Selenium, total (3050)	EPA 6020B	250	0.601		*	mg/Kg	0.025	0.0625	09/26/24 19:57	jrj
Silver, total (3050)	EPA 6020B	250	<0.025	U	*	mg/Kg	0.025	0.125	09/16/24 18:53	jrj
Zinc, total (3050)	EPA 6020B	250	39.5		*	mg/Kg	1.5	3.75	09/16/24 18:53	jrj

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	75.6		*	%	0.1	0.5	09/09/24 16:12	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 11:09	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 10:25	jsa

Cantango Ore
Project ID:
Sample ID: JR-7

ACZ Sample ID: ***L89934-07***
Date Sampled: *08/14/24 13:30*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	210	0.0963	B	*	mg/Kg	0.042	0.21	09/16/24 18:55	jrj
Cadmium, total (3050)	EPA 6020B	210	0.0278	B		mg/Kg	0.0105	0.0525	09/16/24 18:55	jrj
Copper, total (3050)	EPA 6020B	210	0.879		*	mg/Kg	0.168	0.42	09/26/24 19:59	jrj
Lead, total (3050)	EPA 6020B	210	<0.021	U		mg/Kg	0.021	0.105	09/16/24 18:55	jrj
Mercury by Direct Combustion AA	EPA 7473	1	30.1		*	ng/g	2.52	12.6	09/05/24 17:14	jrj
Selenium, total (3050)	EPA 6020B	210	0.672		*	mg/Kg	0.021	0.0525	09/26/24 19:59	jrj
Silver, total (3050)	EPA 6020B	210	<0.021	U	*	mg/Kg	0.021	0.105	09/16/24 18:55	jrj
Zinc, total (3050)	EPA 6020B	210	30.8		*	mg/Kg	1.26	3.15	09/16/24 18:55	jrj

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	78.3		*	%	0.1	0.5	09/09/24 17:20	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 11:36	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 10:30	jsa

Cantango Ore
Project ID:
Sample ID: JR-8

ACZ Sample ID: ***L89934-08***
Date Sampled: *08/14/24 13:30*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	245	0.0722	B	*	mg/Kg	0.049	0.245	09/16/24 18:56	jrj
Cadmium, total (3050)	EPA 6020B	245	0.0149	B		mg/Kg	0.0123	0.0613	09/16/24 18:56	jrj
Copper, total (3050)	EPA 6020B	245	1.07		*	mg/Kg	0.196	0.49	09/26/24 20:01	jrj
Lead, total (3050)	EPA 6020B	245	0.0281	B		mg/Kg	0.0245	0.123	09/16/24 18:56	jrj
Mercury by Direct Combustion AA	EPA 7473	1	31.4		*	ng/g	3.01	15.05	09/05/24 17:22	jrj
Selenium, total (3050)	EPA 6020B	245	0.677		*	mg/Kg	0.0245	0.0613	09/26/24 20:01	jrj
Silver, total (3050)	EPA 6020B	245	<0.0245	U	*	mg/Kg	0.0245	0.123	09/16/24 18:56	jrj
Zinc, total (3050)	EPA 6020B	245	38.1		*	mg/Kg	1.47	3.68	09/16/24 18:56	jrj

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	76.0		*	%	0.1	0.5	09/09/24 18:27	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 12:03	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 10:35	jsa

Cantango Ore
Project ID:
Sample ID: JR-9

ACZ Sample ID: ***L89934-09***
Date Sampled: *08/14/24 13:30*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	235	0.216	B	*	mg/Kg	0.047	0.235	09/16/24 18:58	jrj
Cadmium, total (3050)	EPA 6020B	235	0.141			mg/Kg	0.0118	0.0588	09/16/24 18:58	jrj
Copper, total (3050)	EPA 6020B	235	1.20		*	mg/Kg	0.188	0.47	09/26/24 20:03	jrj
Lead, total (3050)	EPA 6020B	235	0.0387	B		mg/Kg	0.0235	0.118	09/16/24 18:58	jrj
Mercury by Direct Combustion AA	EPA 7473	1	15.8	B	*	ng/g	3.48	17.4	09/05/24 17:31	jrj
Selenium, total (3050)	EPA 6020B	235	0.623		*	mg/Kg	0.0235	0.0588	09/26/24 20:03	jrj
Silver, total (3050)	EPA 6020B	235	<0.0235	U	*	mg/Kg	0.0235	0.118	09/16/24 18:58	jrj
Zinc, total (3050)	EPA 6020B	235	84.9		*	mg/Kg	1.41	3.53	09/16/24 18:58	jrj

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	77.8		*	%	0.1	0.5	09/09/24 19:34	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 12:30	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 10:40	jsa

Cantango Ore
Project ID:
Sample ID: JR-10

ACZ Sample ID: ***L89934-10***
Date Sampled: *08/14/24 13:30*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	230	0.142	B	*	mg/Kg	0.046	0.23	09/16/24 19:00	jrj
Cadmium, total (3050)	EPA 6020B	230	0.0899			mg/Kg	0.0115	0.0575	09/16/24 19:00	jrj
Copper, total (3050)	EPA 6020B	230	1.26		*	mg/Kg	0.184	0.46	09/26/24 20:05	jrj
Lead, total (3050)	EPA 6020B	230	0.0710	B		mg/Kg	0.023	0.115	09/16/24 19:00	jrj
Mercury by Direct Combustion AA	EPA 7473	1	15.2		*	ng/g	2.65	13.25	09/05/24 17:39	jrj
Selenium, total (3050)	EPA 6020B	230	0.841		*	mg/Kg	0.023	0.0575	09/26/24 20:05	jrj
Silver, total (3050)	EPA 6020B	230	<0.023	U	*	mg/Kg	0.023	0.115	09/16/24 19:00	jrj
Zinc, total (3050)	EPA 6020B	230	32.4		*	mg/Kg	1.38	3.45	09/16/24 19:00	jrj

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	78.0		*	%	0.1	0.5	09/09/24 20:41	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 12:57	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 10:45	jsa

Cantango Ore
Project ID:
Sample ID: JR-11

ACZ Sample ID: ***L89934-11***
Date Sampled: *08/14/24 13:30*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	165	0.126	B	*	mg/Kg	0.033	0.165	09/16/24 19:02	jrj
Cadmium, total (3050)	EPA 6020B	165	0.0658			mg/Kg	0.00825	0.0413	09/16/24 19:02	jrj
Copper, total (3050)	EPA 6020B	165	0.928		*	mg/Kg	0.132	0.33	09/26/24 20:07	jrj
Lead, total (3050)	EPA 6020B	165	0.0199	B		mg/Kg	0.0165	0.0825	09/16/24 19:02	jrj
Mercury by Direct Combustion AA	EPA 7473	1	13.3	B	*	ng/g	2.84	14.2	09/05/24 17:47	jrj
Selenium, total (3050)	EPA 6020B	165	0.616		*	mg/Kg	0.0165	0.0413	09/26/24 20:07	jrj
Silver, total (3050)	EPA 6020B	165	<0.0165	U	*	mg/Kg	0.0165	0.0825	09/16/24 19:02	jrj
Zinc, total (3050)	EPA 6020B	165	50.3		*	mg/Kg	0.99	2.48	09/16/24 19:02	jrj

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	77.7		*	%	0.1	0.5	09/09/24 21:48	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 13:24	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 10:50	jsa

Cantango Ore
Project ID:
Sample ID: JR-12

ACZ Sample ID: ***L89934-12***
Date Sampled: *08/14/24 13:30*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	165	0.116	B	*	mg/Kg	0.033	0.165	09/16/24 19:07	jrj
Cadmium, total (3050)	EPA 6020B	165	0.0783			mg/Kg	0.00825	0.0413	09/16/24 19:07	jrj
Copper, total (3050)	EPA 6020B	165	1.08		*	mg/Kg	0.132	0.33	09/26/24 20:12	jrj
Lead, total (3050)	EPA 6020B	165	0.0176	B		mg/Kg	0.0165	0.0825	09/16/24 19:07	jrj
Mercury by Direct Combustion AA	EPA 7473	1	11.4	B	*	ng/g	3.28	16.4	09/05/24 17:55	jrj
Selenium, total (3050)	EPA 6020B	165	0.573		*	mg/Kg	0.0165	0.0413	09/26/24 20:12	jrj
Silver, total (3050)	EPA 6020B	165	<0.0165	U	*	mg/Kg	0.0165	0.0825	09/16/24 19:07	jrj
Zinc, total (3050)	EPA 6020B	165	36.6		*	mg/Kg	0.99	2.48	09/16/24 19:07	jrj

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	78.7		*	%	0.1	0.5	09/09/24 22:55	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 13:51	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 10:55	jsa

Cantango Ore
Project ID:
Sample ID: JR-13

ACZ Sample ID: ***L89934-13***
Date Sampled: *08/14/24 13:30*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	250	0.146	B	*	mg/Kg	0.05	0.25	09/16/24 19:09	jrj
Cadmium, total (3050)	EPA 6020B	250	0.117			mg/Kg	0.0125	0.0625	09/16/24 19:09	jrj
Copper, total (3050)	EPA 6020B	250	1.69		*	mg/Kg	0.2	0.5	09/26/24 20:14	jrj
Lead, total (3050)	EPA 6020B	250	0.0290	B		mg/Kg	0.025	0.125	09/16/24 19:09	jrj
Mercury by Direct Combustion AA	EPA 7473	1	13.1	B	*	ng/g	3.03	15.15	09/05/24 18:03	jrj
Selenium, total (3050)	EPA 6020B	250	0.946		*	mg/Kg	0.025	0.0625	09/26/24 20:14	jrj
Silver, total (3050)	EPA 6020B	250	<0.025	U	*	mg/Kg	0.025	0.125	09/16/24 19:09	jrj
Zinc, total (3050)	EPA 6020B	250	38.8		*	mg/Kg	1.5	3.75	09/16/24 19:09	jrj

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	79.6		*	%	0.1	0.5	09/10/24 0:02	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 14:18	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 11:00	jsa

Cantango Ore
Project ID:
Sample ID: JR-14

ACZ Sample ID: ***L89934-14***
Date Sampled: *08/14/24 13:30*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	215	0.0914	B	*	mg/Kg	0.043	0.215	09/16/24 19:11	jrj
Cadmium, total (3050)	EPA 6020B	215	0.207			mg/Kg	0.0108	0.0538	09/16/24 19:11	jrj
Copper, total (3050)	EPA 6020B	215	1.14		*	mg/Kg	0.172	0.43	09/26/24 20:16	jrj
Lead, total (3050)	EPA 6020B	215	<0.0215	U		mg/Kg	0.0215	0.108	09/16/24 19:11	jrj
Mercury by Direct Combustion AA	EPA 7473	1	15.1	B	*	ng/g	3.31	16.55	09/05/24 18:11	jrj
Selenium, total (3050)	EPA 6020B	215	0.612		*	mg/Kg	0.0215	0.0538	09/26/24 20:16	jrj
Silver, total (3050)	EPA 6020B	215	<0.0215	U	*	mg/Kg	0.0215	0.108	09/16/24 19:11	jrj
Zinc, total (3050)	EPA 6020B	215	21.8		*	mg/Kg	1.29	3.23	09/16/24 19:11	jrj

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	75.4		*	%	0.1	0.5	09/10/24 1:10	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 14:45	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 11:05	jsa

Cantango Ore
Project ID:
Sample ID: JR-15

ACZ Sample ID: ***L89934-15***
Date Sampled: *08/14/24 13:30*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	175	0.0684	B	*	mg/Kg	0.035	0.175	09/16/24 19:13	jrj
Cadmium, total (3050)	EPA 6020B	175	0.0409	B		mg/Kg	0.00875	0.0438	09/16/24 19:13	jrj
Copper, total (3050)	EPA 6020B	175	0.780		*	mg/Kg	0.14	0.35	09/26/24 20:18	jrj
Lead, total (3050)	EPA 6020B	175	<0.0175	U		mg/Kg	0.0175	0.0875	09/16/24 19:13	jrj
Mercury by Direct Combustion AA	EPA 7473	1	20.3		*	ng/g	3.64	18.2	09/05/24 18:19	jrj
Selenium, total (3050)	EPA 6020B	175	0.640		*	mg/Kg	0.0175	0.0438	09/26/24 20:18	jrj
Silver, total (3050)	EPA 6020B	175	<0.0175	U	*	mg/Kg	0.0175	0.0875	09/16/24 19:13	jrj
Zinc, total (3050)	EPA 6020B	175	21.1		*	mg/Kg	1.05	2.63	09/16/24 19:13	jrj

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	73.6		*	%	0.1	0.5	09/10/24 2:17	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 15:12	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 11:10	jsa

Cantango Ore
Project ID:
Sample ID: KC-1

ACZ Sample ID: ***L89934-16***
Date Sampled: *08/13/24 14:00*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	220	0.172	B		mg/Kg	0.044	0.22	10/02/24 20:45	aps
Cadmium, total (3050)	EPA 6020B	220	0.161			mg/Kg	0.011	0.055	10/02/24 20:45	aps
Copper, total (3050)	EPA 6020B	220	1.76			mg/Kg	0.176	0.44	10/02/24 20:45	aps
Lead, total (3050)	EPA 6020B	220	0.0885	B	*	mg/Kg	0.022	0.11	10/02/24 20:45	aps
Mercury by Direct Combustion AA	EPA 7473	1	15.6		*	ng/g	2.35	11.75	09/05/24 18:34	jrj
Selenium, total (3050)	EPA 6020B	220	0.775		*	mg/Kg	0.022	0.055	10/02/24 20:45	aps
Silver, total (3050)	EPA 6020B	220	<0.022	U	*	mg/Kg	0.022	0.11	10/04/24 17:00	aps
Zinc, total (3050)	EPA 6020B	220	42.9		*	mg/Kg	1.32	3.3	10/02/24 20:45	aps

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	76.4		*	%	0.1	0.5	09/10/24 3:24	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 8:00	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 11:15	jsa

Cantango Ore
Project ID:
Sample ID: KC-2

ACZ Sample ID: ***L89934-17***
Date Sampled: *08/13/24 14:00*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	210	0.121	B		mg/Kg	0.042	0.21	10/02/24 20:50	aps
Cadmium, total (3050)	EPA 6020B	210	0.0935			mg/Kg	0.0105	0.0525	10/02/24 20:50	aps
Copper, total (3050)	EPA 6020B	210	1.78			mg/Kg	0.168	0.42	10/02/24 20:50	aps
Lead, total (3050)	EPA 6020B	210	0.0394	B	*	mg/Kg	0.021	0.105	10/02/24 20:50	aps
Mercury by Direct Combustion AA	EPA 7473	1	13.8	B	*	ng/g	3.48	17.4	09/05/24 18:42	jrj
Selenium, total (3050)	EPA 6020B	210	0.726		*	mg/Kg	0.021	0.0525	10/02/24 20:50	aps
Silver, total (3050)	EPA 6020B	210	<0.021	U	*	mg/Kg	0.021	0.105	10/04/24 17:06	aps
Zinc, total (3050)	EPA 6020B	210	28.7		*	mg/Kg	1.26	3.15	10/02/24 20:50	aps

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	77.6		*	%	0.1	0.5	09/10/24 4:31	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 9:48	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 11:20	jsa

Cantango Ore
Project ID:
Sample ID: KC-3

ACZ Sample ID: ***L89934-18***
Date Sampled: *08/13/24 14:00*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	200	0.0422	B		mg/Kg	0.04	0.2	10/02/24 20:52	aps
Cadmium, total (3050)	EPA 6020B	200	0.0328	B		mg/Kg	0.01	0.05	10/02/24 20:52	aps
Copper, total (3050)	EPA 6020B	200	0.652			mg/Kg	0.16	0.4	10/02/24 20:52	aps
Lead, total (3050)	EPA 6020B	200	<0.02	U	*	mg/Kg	0.02	0.1	10/02/24 20:52	aps
Mercury by Direct Combustion AA	EPA 7473	1	14.8	B	*	ng/g	3.08	15.4	09/05/24 18:51	jrj
Selenium, total (3050)	EPA 6020B	200	0.616		*	mg/Kg	0.02	0.05	10/02/24 20:52	aps
Silver, total (3050)	EPA 6020B	200	<0.02	U	*	mg/Kg	0.02	0.1	10/04/24 17:08	aps
Zinc, total (3050)	EPA 6020B	200	22.6		*	mg/Kg	1.2	3	10/02/24 20:52	aps

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	77.1		*	%	0.1	0.5	09/10/24 5:38	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 10:24	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 11:25	jsa

Cantango Ore
Project ID:
Sample ID: KC-4

ACZ Sample ID: ***L89934-19***
Date Sampled: *08/13/24 14:00*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	220	0.0479	B		mg/Kg	0.044	0.22	10/02/24 20:54	aps
Cadmium, total (3050)	EPA 6020B	220	0.0393	B		mg/Kg	0.011	0.055	10/02/24 20:54	aps
Copper, total (3050)	EPA 6020B	220	0.638			mg/Kg	0.176	0.44	10/02/24 20:54	aps
Lead, total (3050)	EPA 6020B	220	<0.022	U	*	mg/Kg	0.022	0.11	10/02/24 20:54	aps
Mercury by Direct Combustion AA	EPA 7473	1	12	B	*	ng/g	3.13	15.65	09/05/24 18:59	jrj
Selenium, total (3050)	EPA 6020B	220	0.589		*	mg/Kg	0.022	0.055	10/02/24 20:54	aps
Silver, total (3050)	EPA 6020B	220	<0.022	U	*	mg/Kg	0.022	0.11	10/04/24 17:09	aps
Zinc, total (3050)	EPA 6020B	220	36.8		*	mg/Kg	1.32	3.3	10/02/24 20:54	aps

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	79.2		*	%	0.1	0.5	09/10/24 6:45	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 11:00	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 11:30	jsa

Cantango Ore
Project ID:
Sample ID: KC-5

ACZ Sample ID: ***L89934-20***
Date Sampled: *08/13/24 14:00*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	160	0.0525	B		mg/Kg	0.032	0.16	10/02/24 20:59	aps
Cadmium, total (3050)	EPA 6020B	160	0.0451			mg/Kg	0.008	0.04	10/02/24 20:59	aps
Copper, total (3050)	EPA 6020B	160	0.587			mg/Kg	0.128	0.32	10/02/24 20:59	aps
Lead, total (3050)	EPA 6020B	160	<0.016	U	*	mg/Kg	0.016	0.08	10/02/24 20:59	aps
Mercury by Direct Combustion AA	EPA 7473	1	13.8		*	ng/g	2.55	12.75	09/05/24 19:31	jrj
Selenium, total (3050)	EPA 6020B	160	0.468		*	mg/Kg	0.016	0.04	10/02/24 20:59	aps
Silver, total (3050)	EPA 6020B	160	<0.016	U	*	mg/Kg	0.016	0.08	10/04/24 17:15	aps
Zinc, total (3050)	EPA 6020B	160	25.9		*	mg/Kg	0.96	2.4	10/02/24 20:59	aps

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	78.1		*	%	0.1	0.5	09/10/24 7:53	bdc

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 11:36	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 11:35	jsa

Cantango Ore
Project ID:
Sample ID: KC-6

ACZ Sample ID: ***L89934-21***
Date Sampled: *08/13/24 14:00*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	190	0.0472	B		mg/Kg	0.038	0.19	10/02/24 21:01	aps
Cadmium, total (3050)	EPA 6020B	190	0.0420	B		mg/Kg	0.0095	0.0475	10/02/24 21:01	aps
Copper, total (3050)	EPA 6020B	190	0.814			mg/Kg	0.152	0.38	10/02/24 21:01	aps
Lead, total (3050)	EPA 6020B	190	<0.019	U	*	mg/Kg	0.019	0.095	10/02/24 21:01	aps
Mercury by Direct Combustion AA	EPA 7473	1	18.6		*	ng/g	3.05	15.25	09/05/24 19:47	jrj
Selenium, total (3050)	EPA 6020B	190	0.527		*	mg/Kg	0.019	0.0475	10/02/24 21:01	aps
Silver, total (3050)	EPA 6020B	190	<0.019	U	*	mg/Kg	0.019	0.095	10/04/24 17:17	aps
Zinc, total (3050)	EPA 6020B	190	36.1		*	mg/Kg	1.14	2.85	10/02/24 21:01	aps

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	77.7		*	%	0.1	0.5	09/10/24 1:10	bat2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 12:12	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 11:40	jsa

Cantango Ore
Project ID:
Sample ID: KC-7

ACZ Sample ID: ***L89934-22***
Date Sampled: *08/13/24 14:00*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	220	<0.044	U		mg/Kg	0.044	0.22	10/02/24 21:03	aps
Cadmium, total (3050)	EPA 6020B	220	0.0456	B		mg/Kg	0.011	0.055	10/02/24 21:03	aps
Copper, total (3050)	EPA 6020B	220	1.08			mg/Kg	0.176	0.44	10/02/24 21:03	aps
Lead, total (3050)	EPA 6020B	220	<0.022	U	*	mg/Kg	0.022	0.11	10/02/24 21:03	aps
Mercury by Direct Combustion AA	EPA 7473	1	16.6		*	ng/g	3.2	16	09/05/24 20:10	jrj
Selenium, total (3050)	EPA 6020B	220	0.472		*	mg/Kg	0.022	0.055	10/02/24 21:03	aps
Silver, total (3050)	EPA 6020B	220	<0.022	U	*	mg/Kg	0.022	0.11	10/04/24 17:18	aps
Zinc, total (3050)	EPA 6020B	220	30.7		*	mg/Kg	1.32	3.3	10/02/24 21:03	aps

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	77.4		*	%	0.1	0.5	09/10/24 2:44	bat2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 12:48	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 11:45	jsa

Cantango Ore
Project ID:
Sample ID: KC-8

ACZ Sample ID: ***L89934-23***
Date Sampled: *08/13/24 14:00*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	230	0.0707	B		mg/Kg	0.046	0.23	10/02/24 21:05	aps
Cadmium, total (3050)	EPA 6020B	230	0.0126	B		mg/Kg	0.0115	0.0575	10/02/24 21:05	aps
Copper, total (3050)	EPA 6020B	230	0.522			mg/Kg	0.184	0.46	10/02/24 21:05	aps
Lead, total (3050)	EPA 6020B	230	<0.023	U	*	mg/Kg	0.023	0.115	10/02/24 21:05	aps
Mercury by Direct Combustion AA	EPA 7473	1	12.6	B	*	ng/g	2.55	12.75	09/05/24 20:18	jrj
Selenium, total (3050)	EPA 6020B	230	0.567		*	mg/Kg	0.023	0.0575	10/02/24 21:05	aps
Silver, total (3050)	EPA 6020B	230	<0.023	U	*	mg/Kg	0.023	0.115	10/04/24 17:20	aps
Zinc, total (3050)	EPA 6020B	230	31.1		*	mg/Kg	1.38	3.45	10/02/24 21:05	aps

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	77.9		*	%	0.1	0.5	09/10/24 4:18	bat2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 13:24	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 11:50	jsa

Cantango Ore
Project ID:
Sample ID: KC-9

ACZ Sample ID: ***L89934-24***
Date Sampled: *08/13/24 14:00*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	190	0.0511	B		mg/Kg	0.038	0.19	10/02/24 21:06	aps
Cadmium, total (3050)	EPA 6020B	190	0.0288	B		mg/Kg	0.0095	0.0475	10/02/24 21:06	aps
Copper, total (3050)	EPA 6020B	190	0.746			mg/Kg	0.152	0.38	10/02/24 21:06	aps
Lead, total (3050)	EPA 6020B	190	<0.019	U	*	mg/Kg	0.019	0.095	10/02/24 21:06	aps
Mercury by Direct Combustion AA	EPA 7473	1	10.4	B	*	ng/g	2.74	13.7	09/05/24 20:26	jrj
Selenium, total (3050)	EPA 6020B	190	0.543		*	mg/Kg	0.019	0.0475	10/02/24 21:06	aps
Silver, total (3050)	EPA 6020B	190	<0.019	U	*	mg/Kg	0.019	0.095	10/04/24 17:22	aps
Zinc, total (3050)	EPA 6020B	190	24.9		*	mg/Kg	1.14	2.85	10/02/24 21:06	aps

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	76.3		*	%	0.1	0.5	09/10/24 5:52	bat2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 14:00	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 11:55	jsa

Cantango Ore
Project ID:
Sample ID: KC-10

ACZ Sample ID: ***L89934-25***
Date Sampled: *08/13/24 14:00*
Date Received: *09/03/24*
Sample Matrix: *Fish Tissue*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	EPA 6020B	180	0.0670	B		mg/Kg	0.036	0.18	10/02/24 21:08	aps
Cadmium, total (3050)	EPA 6020B	180	0.0455			mg/Kg	0.009	0.045	10/02/24 21:08	aps
Copper, total (3050)	EPA 6020B	180	0.874			mg/Kg	0.144	0.36	10/02/24 21:08	aps
Lead, total (3050)	EPA 6020B	180	<0.018	U	*	mg/Kg	0.018	0.09	10/02/24 21:08	aps
Mercury by Direct Combustion AA	EPA 7473	1	17.9		*	ng/g	2.63	13.15	09/05/24 20:34	jrj
Selenium, total (3050)	EPA 6020B	180	0.594		*	mg/Kg	0.018	0.045	10/02/24 21:08	aps
Silver, total (3050)	EPA 6020B	180	<0.018	U	*	mg/Kg	0.018	0.09	10/04/24 17:24	aps
Zinc, total (3050)	EPA 6020B	180	26.7		*	mg/Kg	1.08	2.7	10/02/24 21:08	aps

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	D2216-80	1	76.4		*	%	0.1	0.5	09/10/24 7:26	bat2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	EPA 3050B								09/06/24 14:36	rsh / b
Fish Tissue Pulverization	EPA 600/4-81-055								09/04/24 12:00	jsa

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

REP001.03.15.02

HIGHGOLDMINING

ACZ Project ID: ***L89934***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Arsenic, total (3050) EPA 6020B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG597370													
WG597370ICV	ICV	09/16/24 18:18	MS240912-7	.05		.05254	mg/L	105	90	110			
WG597370ICB	ICB	09/16/24 18:20				U	mg/L		-0.0006	0.0006			
WG596709PBS	PBS	09/16/24 18:29				U	mg/Kg		-0.3	0.3			
WG596709LCSS	LCSS	09/16/24 18:31	PCN627354	34.6		35.13238	mg/Kg		27.68	41.52			
WG596709LFB	LFB	09/16/24 18:33	MS240613-4	.0501		.05593	mg/Kg	112	80	120			
WG596709LFBD	LFBD	09/16/24 18:35	MS240613-4	.0501		.06344	mg/Kg	127	80	120	13	20	RL
L89934-01MS	MS	09/16/24 18:38	MS240613-4	7.2645	.0871	7.97897	mg/Kg	109	75	125			
L89934-01MSD	MSD	09/16/24 18:40	MS240613-4	7.014	.0871	7.24483	mg/Kg	102	75	125	10	20	
WG598548													
WG598548ICV	ICV	10/02/24 20:25	MS240930-3	.05		.04809	mg/L	96	90	110			
WG598548ICB	ICB	10/02/24 20:27				U	mg/L		-0.0006	0.0006			
WG596711PBS	PBS	10/02/24 20:37				U	mg/Kg		-0.3	0.3			
WG596711LCSS	LCSS	10/02/24 20:39	PCN627354	34.6		36.15394	mg/Kg		27.68	41.52			
WG596711LFB	LFB	10/02/24 20:41	MS240613-4	.0501		.05523	mg/Kg	110	80	120			
WG596711LFBD	LFBD	10/02/24 20:43	MS240613-4	.0501		.056	mg/Kg	112	80	120	1	20	
L89934-16MS	MS	10/02/24 20:46	MS240613-4	11.2725	.172	12.91488	mg/Kg	113	75	125			
L89934-16MSD	MSD	10/02/24 20:48	MS240613-4	11.2725	.172	10.91378	mg/Kg	95	75	125	17	20	

Cadmium, total (3050) EPA 6020B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG597370													
WG597370ICV	ICV	09/16/24 18:18	MS240912-7	.05		.053824	mg/L	108	90	110			
WG597370ICB	ICB	09/16/24 18:20				U	mg/L		-0.00015	0.00015			
WG596709PBS	PBS	09/16/24 18:29				U	mg/Kg		-0.075	0.075			
WG596709LCSS	LCSS	09/16/24 18:31	PCN627354	14.5		14.459893	mg/Kg		11.6	17.4			
WG596709LFB	LFB	09/16/24 18:33	MS240613-4	.05005		.051161	mg/Kg	102	80	120			
WG596709LFBD	LFBD	09/16/24 18:35	MS240613-4	.05005		.056644	mg/Kg	113	80	120	10	20	
L89934-01MS	MS	09/16/24 18:38	MS240613-4	7.25725	.0625	7.397043	mg/Kg	101	75	125			
L89934-01MSD	MSD	09/16/24 18:40	MS240613-4	7.007	.0625	6.995817	mg/Kg	99	75	125	6	20	
WG598548													
WG598548ICV	ICV	10/02/24 20:25	MS240930-3	.05		.048994	mg/L	98	90	110			
WG598548ICB	ICB	10/02/24 20:27				.000087	mg/L		-0.00015	0.00015			
WG596711PBS	PBS	10/02/24 20:37				U	mg/Kg		-0.075	0.075			
WG596711LCSS	LCSS	10/02/24 20:39	PCN627354	14.5		15.786446	mg/Kg		11.6	17.4			
WG596711LFB	LFB	10/02/24 20:41	MS240613-4	.05005		.055251	mg/Kg	110	80	120			
WG596711LFBD	LFBD	10/02/24 20:43	MS240613-4	.05005		.057009	mg/Kg	114	80	120	3	20	
L89934-16MS	MS	10/02/24 20:46	MS240613-4	11.26125	.161	13.437143	mg/Kg	118	75	125			
L89934-16MSD	MSD	10/02/24 20:48	MS240613-4	11.26125	.161	11.243605	mg/Kg	98	75	125	18	20	

HIGHGOLDMINING

ACZ Project ID: ***L89934***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Copper, total (3050) EPA 6020B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG598115													
WG598115ICV	ICV	09/26/24 19:22	MS240912-7	.05		.05327	mg/L	107	90	110			
WG598115ICB	ICB	09/26/24 19:24				U	mg/L		-0.0024	0.0024			
WG596709PBS	PBS	09/26/24 19:33				.76468	mg/Kg		-1.2	1.2			
WG596709LCSS	LCSS	09/26/24 19:35	PCN627354	35		35.29318	mg/Kg		28	42			
WG596709LFB	LFB	09/26/24 19:37	MS240613-4	.05005		.05391	mg/Kg	108	80	120			
WG596709LFBD	LFBD	09/26/24 19:39	MS240613-4	.05005		.0535	mg/Kg	107	80	120	1	20	
L89934-01MS	MS	09/26/24 19:43	MS240613-4	7.25725	1.28	8.90388	mg/Kg	105	75	125			
L89934-01MSD	MSD	09/26/24 19:45	MS240613-4	7.007	1.28	8.63255	mg/Kg	105	75	125	3	20	
WG598548													
WG598548ICV	ICV	10/02/24 20:25	MS240930-3	.05		.04928	mg/L	99	90	110			
WG598548ICB	ICB	10/02/24 20:27				U	mg/L		-0.0024	0.0024			
WG596711PBS	PBS	10/02/24 20:37				U	mg/Kg		-1.2	1.2			
WG596711LCSS	LCSS	10/02/24 20:39	PCN627354	35		38.45657	mg/Kg		28	42			
WG596711LFB	LFB	10/02/24 20:41	MS240613-4	.05005		.05737	mg/Kg	115	80	120			
WG596711LFBD	LFBD	10/02/24 20:43	MS240613-4	.05005		.05816	mg/Kg	116	80	120	1	20	
L89934-16MS	MS	10/02/24 20:46	MS240613-4	11.26125	1.76	14.34091	mg/Kg	112	75	125			
L89934-16MSD	MSD	10/02/24 20:48	MS240613-4	11.26125	1.76	12.23358	mg/Kg	93	75	125	16	20	

Lead, total (3050) EPA 6020B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG597370													
WG597370ICV	ICV	09/16/24 18:18	MS240912-7	.05		.05368	mg/L	107	90	110			
WG597370ICB	ICB	09/16/24 18:20				U	mg/L		-0.0003	0.0003			
WG596709PBS	PBS	09/16/24 18:29				.11091	mg/Kg		-0.15	0.15			
WG596709LFB	LFB	09/16/24 18:33	MS240613-4	.05005		.05384	mg/Kg	108	80	120			
WG596709LFBD	LFBD	09/16/24 18:35	MS240613-4	.05005		.05965	mg/Kg	119	80	120	10	20	
L89934-01MS	MS	09/16/24 18:38	MS240613-4	7.25725	.0299	7.68739	mg/Kg	106	75	125			
L89934-01MSD	MSD	09/16/24 18:40	MS240613-4	7.007	.0299	7.13901	mg/Kg	101	75	125	7	20	
WG598548													
WG598548ICV	ICV	10/02/24 20:25	MS240930-3	.05		.05255	mg/L	105	90	110			
WG598548ICB	ICB	10/02/24 20:27				.00019	mg/L		-0.0003	0.0003			
WG596711PBS	PBS	10/02/24 20:37				U	mg/Kg		-0.15	0.15			
WG596711LCSS	LCSS	10/02/24 20:39	PCN627354	.162		.14032	mg/Kg		0.1296	0.1944			
WG596711LFB	LFB	10/02/24 20:41	MS240613-4	.05005		.06176	mg/Kg	123	80	120			N1
WG596711LFBD	LFBD	10/02/24 20:43	MS240613-4	.05005		.06313	mg/Kg	126	80	120	2	20	N1
L89934-16MS	MS	10/02/24 20:46	MS240613-4	11.26125	.0885	14.34417	mg/Kg	127	75	125			MA
L89934-16MSD	MSD	10/02/24 20:48	MS240613-4	11.26125	.0885	12.45484	mg/Kg	110	75	125	14	20	

HIGHGOLDMINING

ACZ Project ID: ***L89934***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Mercury by Direct Combustion AA EPA 7473

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG594631													
WG594631ICV1	ICV	08/06/24 14:46	HG240805-4	100		106	ng/g	106	90	110			
WG594631ICV2	ICV	08/06/24 14:53	HG240805-4	100		106	ng/g	106	90	110			
WG594631ICV3	ICV	08/06/24 15:01	HG240805-3	1000		1030	ng/g	103	90	110			
WG594631ICV4	ICV	08/06/24 15:10	HG240805-2	10000		10500	ng/g	105	90	110			
WG596676													
WG596676ICV1	ICV	09/05/24 14:41	HG240805-4	100		109	ng/g	109	90	110			
WG596676ICV2	ICV	09/05/24 14:48	HG240805-4	100		107	ng/g	107	90	110			
WG596676ICV3	ICV	09/05/24 14:54	HG240805-3	1000		1050	ng/g	105	90	110			
WG596676ICV4	ICV	09/05/24 15:01	HG240805-2	10000		10800	ng/g	108	90	110			
WG596676PBS1	PBS	09/05/24 15:39				U	ng/g		-8.76	8.76			
WG596676LCSS1	LCSS	09/05/24 15:47	PCN65989	316		290	ng/g		80	120			
WG596676LCSSD1	LCSSD	09/05/24 15:55	PCN65989	316		296	ng/g		80	120	2	20	
L89934-01MS	MS	09/05/24 16:11	HG240805-3				ng/g	105	80	120			
L89934-02DUP	DUP	09/05/24 16:27			28.1	37	ng/g				27	20	RD
WG596676PBS2	PBS	09/05/24 19:07				U	ng/g		-9.3	9.3			
WG596676LCSS2	LCSS	09/05/24 19:15	PCN65989	316		278	ng/g		80	120			
WG596676LCSSD2	LCSSD	09/05/24 19:23	PCN65989	316		289	ng/g		80	120	4	20	
L89934-20MS	MS	09/05/24 19:39	HG240805-3				ng/g	98	80	120			
L89934-21DUP	DUP	09/05/24 20:02			18.6	19.2	ng/g				3	20	RA

Moisture Content D2216-80

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG596830													
L89934-01DUP	DUP	09/09/24 10:37			78.8	78.4	%				1	20	
WG596831													
L89821-01DUP	DUP	09/09/24 11:04			77	76	%				1	20	

Selenium, total (3050) EPA 6020B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG598115													
WG598115ICV	ICV	09/26/24 19:22	MS240912-7	.05		.05175	mg/L	104	90	110			
WG598115ICB	ICB	09/26/24 19:24				U	mg/L		-0.0003	0.0003			
WG596709PBS	PBS	09/26/24 19:33				.05865	mg/Kg		-0.15	0.15			
WG596709LCSS	LCSS	09/26/24 19:35	PCN627354	8.3		7.77825	mg/Kg		6.64	9.96			
WG596709LFB	LFB	09/26/24 19:37	MS240613-4	.025025		.02463	mg/Kg	98	80	120			
WG596709LFBD	LFBD	09/26/24 19:39	MS240613-4	.025025		.02441	mg/Kg	98	80	120	1	20	
L89934-01MS	MS	09/26/24 19:43	MS240613-4	3.628625	.605	4.29514	mg/Kg	102	75	125			
L89934-01MSD	MSD	09/26/24 19:45	MS240613-4	3.5035	.605	4.1604	mg/Kg	101	75	125	3	20	
WG598548													
WG598548ICV	ICV	10/02/24 20:25	MS240930-3	.05		.05211	mg/L	104	90	110			
WG598548ICB	ICB	10/02/24 20:27				U	mg/L		-0.0003	0.0003			
WG596711PBS	PBS	10/02/24 20:37				U	mg/Kg		-0.15	0.15			
WG596711LCSS	LCSS	10/02/24 20:39	PCN627354	8.3		9.12513	mg/Kg		6.64	9.96			
WG596711LFB	LFB	10/02/24 20:41	MS240613-4	.025025		.0284	mg/Kg	113	80	120			
WG596711LFBD	LFBD	10/02/24 20:43	MS240613-4	.025025		.02809	mg/Kg	112	80	120	1	20	
L89934-16MS	MS	10/02/24 20:46	MS240613-4	5.630625	.775	7.60262	mg/Kg	121	75	125			
L89934-16MSD	MSD	10/02/24 20:48	MS240613-4	5.630625	.775	6.32671	mg/Kg	99	75	125	18	20	

HIGHGOLDMINING

ACZ Project ID: ***L89934***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Silver, total (3050) EPA 6020B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG597370													
WG597370ICV	ICV	09/16/24 18:18	MS240912-7	.02		.02072	mg/L	104	90	110			
WG597370ICB	ICB	09/16/24 18:20				U	mg/L		-0.0003	0.0003			
WG596709PBS	PBS	09/16/24 18:29				U	mg/Kg		-0.15	0.15			
WG596709LCSS	LCSS	09/16/24 18:31	PCN627354	2.05		1.95648	mg/Kg		1.64	2.46			
WG596709LFB	LFB	09/16/24 18:33	MS240613-4	.01		.00825	mg/Kg	83	80	120			
WG596709LFBD	LFBD	09/16/24 18:35	MS240613-4	.01		.00919	mg/Kg	92	80	120	11	20	
L89934-01MS	MS	09/16/24 18:38	MS240613-4	1.45	U	1.14933	mg/Kg	79	75	125			
L89934-01MSD	MSD	09/16/24 18:40	MS240613-4	1.4	U	1.07385	mg/Kg	77	75	125	7	20	
WG598687													
WG598687ICV	ICV	10/04/24 16:40	MS240930-3	.02		.02081	mg/L	104	90	110			
WG598687ICB	ICB	10/04/24 16:42				U	mg/L		-0.0003	0.0003			
WG596711PBS	PBS	10/04/24 16:53				U	mg/Kg		-0.15	0.15			
WG596711LCSS	LCSS	10/04/24 16:55	PCN627354	2.05		2.24996	mg/Kg		1.64	2.46			
WG596711LFB	LFB	10/04/24 16:57	MS240613-4	.01		.00967	mg/Kg	97	80	120			
WG596711LFBD	LFBD	10/04/24 16:58	MS240613-4	.01		.00874	mg/Kg	87	80	120	10	20	
L89934-16MS	MS	10/04/24 17:02	MS240613-4	2.25	U	2.0247	mg/Kg	90	75	125			
L89934-16MSD	MSD	10/04/24 17:04	MS240613-4	2.25	U	1.94855	mg/Kg	87	75	125	4	20	

Zinc, total (3050) EPA 6020B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG597370													
WG597370ICV	ICV	09/16/24 18:18	MS240912-7	.05		.0545	mg/L	109	90	110			
WG597370ICB	ICB	09/16/24 18:20				U	mg/L		-0.018	0.018			
WG596709PBS	PBS	09/16/24 18:29				U	mg/Kg		-9	9			
WG596709LCSS	LCSS	09/16/24 18:31	PCN627354	105.3		110.7837	mg/Kg		84.24	126.36			
WG596709LFB	LFB	09/16/24 18:33	MS240613-4	.050015		.054	mg/Kg	108	80	120			
WG596709LFBD	LFBD	09/16/24 18:35	MS240613-4	.050015		.0591	mg/Kg	118	80	120	9	20	
L89934-01MS	MS	09/16/24 18:38	MS240613-4	7.252175	26.7	37.3392	mg/Kg	147	75	125			M1
L89934-01MSD	MSD	09/16/24 18:40	MS240613-4	7.0021	26.7	40.7005	mg/Kg	200	75	125	9	20	M1
WG598548													
WG598548ICV	ICV	10/02/24 20:25	MS240930-3	.05		.0499	mg/L	100	90	110			
WG598548ICB	ICB	10/02/24 20:27				U	mg/L		-0.018	0.018			
WG596711PBS	PBS	10/02/24 20:37				U	mg/Kg		-9	9			
WG596711LCSS	LCSS	10/02/24 20:39	PCN627354	105.3		111.7927	mg/Kg		84.24	126.36			
WG596711LFB	LFB	10/02/24 20:41	MS240613-4	.050015		.0543	mg/Kg	109	80	120			
WG596711LFBD	LFBD	10/02/24 20:43	MS240613-4	.050015		.0557	mg/Kg	111	80	120	3	20	
L89934-16MS	MS	10/02/24 20:46	MS240613-4	11.253375	42.9	54.1351	mg/Kg	100	75	125			
L89934-16MSD	MSD	10/02/24 20:48	MS240613-4	11.253375	42.9	39.058	mg/Kg	-34	75	125	32	20	M3 R4

Cantango Ore

ACZ Project ID: ***L89934***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L89934-01	WG597370	Arsenic, total (3050)	EPA 6020B	RL	Recovery for either the LCS or LCS duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG598115	Copper, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG597370	Zinc, total (3050)	EPA 6020B	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
L89934-02	WG597370	Arsenic, total (3050)	EPA 6020B	RL	Recovery for either the LCS or LCS duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG598115	Copper, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG597370	Zinc, total (3050)	EPA 6020B	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
L89934-03	WG597370	Arsenic, total (3050)	EPA 6020B	RL	Recovery for either the LCS or LCS duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG598115	Copper, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG597370	Zinc, total (3050)	EPA 6020B	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
L89934-04	WG597370	Arsenic, total (3050)	EPA 6020B	RL	Recovery for either the LCS or LCS duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG598115	Copper, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG597370	Zinc, total (3050)	EPA 6020B	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.

Cantango Ore

ACZ Project ID: ***L89934***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L89934-05	WG597370	Arsenic, total (3050)	EPA 6020B	RL	Recovery for either the LCS or LCS duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG598115	Copper, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG597370	Zinc, total (3050)	EPA 6020B	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
L89934-06	WG597370	Arsenic, total (3050)	EPA 6020B	RL	Recovery for either the LCS or LCS duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG598115	Copper, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG597370	Zinc, total (3050)	EPA 6020B	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
L89934-07	WG597370	Arsenic, total (3050)	EPA 6020B	RL	Recovery for either the LCS or LCS duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG598115	Copper, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG597370	Zinc, total (3050)	EPA 6020B	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
L89934-08	WG597370	Arsenic, total (3050)	EPA 6020B	RL	Recovery for either the LCS or LCS duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG598115	Copper, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG597370	Zinc, total (3050)	EPA 6020B	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.

Cantango Ore

ACZ Project ID: ***L89934***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L89934-09	WG597370	Arsenic, total (3050)	EPA 6020B	RL	Recovery for either the LCS or LCS duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG598115	Copper, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG597370	Zinc, total (3050)	EPA 6020B	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
L89934-10	WG597370	Arsenic, total (3050)	EPA 6020B	RL	Recovery for either the LCS or LCS duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG598115	Copper, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG597370	Zinc, total (3050)	EPA 6020B	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
L89934-11	WG597370	Arsenic, total (3050)	EPA 6020B	RL	Recovery for either the LCS or LCS duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG598115	Copper, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG597370	Zinc, total (3050)	EPA 6020B	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
L89934-12	WG597370	Arsenic, total (3050)	EPA 6020B	RL	Recovery for either the LCS or LCS duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG598115	Copper, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG597370	Zinc, total (3050)	EPA 6020B	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.

Cantango Ore

ACZ Project ID: ***L89934***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L89934-13	WG597370	Arsenic, total (3050)	EPA 6020B	RL	Recovery for either the LCS or LCS duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG598115	Copper, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG597370	Zinc, total (3050)	EPA 6020B	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
L89934-14	WG597370	Arsenic, total (3050)	EPA 6020B	RL	Recovery for either the LCS or LCS duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG598115	Copper, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG597370	Zinc, total (3050)	EPA 6020B	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
L89934-15	WG597370	Arsenic, total (3050)	EPA 6020B	RL	Recovery for either the LCS or LCS duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG598115	Copper, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG597370	Zinc, total (3050)	EPA 6020B	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
L89934-16	WG598548	Lead, total (3050)	EPA 6020B	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
			EPA 6020B	N1	See Case Narrative.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG598548	Selenium, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
		Zinc, total (3050)	EPA 6020B	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.

Cantango Ore

ACZ Project ID: ***L89934***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L89934-17	WG598548	Lead, total (3050)	EPA 6020B	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
			EPA 6020B	N1	See Case Narrative.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG598548	Selenium, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
		Zinc, total (3050)	EPA 6020B	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.
L89934-18	WG598548	Lead, total (3050)	EPA 6020B	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
			EPA 6020B	N1	See Case Narrative.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG598548	Selenium, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
		Zinc, total (3050)	EPA 6020B	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.
L89934-19	WG598548	Lead, total (3050)	EPA 6020B	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
			EPA 6020B	N1	See Case Narrative.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG598548	Selenium, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
		Zinc, total (3050)	EPA 6020B	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.

Cantango Ore

ACZ Project ID: ***L89934***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L89934-20	WG598548	Lead, total (3050)	EPA 6020B	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
			EPA 6020B	N1	See Case Narrative.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG598548	Selenium, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
		Zinc, total (3050)	EPA 6020B	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.
L89934-21	WG598548	Lead, total (3050)	EPA 6020B	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
			EPA 6020B	N1	See Case Narrative.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG598548	Selenium, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
		Zinc, total (3050)	EPA 6020B	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.
L89934-22	WG598548	Lead, total (3050)	EPA 6020B	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
			EPA 6020B	N1	See Case Narrative.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG598548	Selenium, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
		Zinc, total (3050)	EPA 6020B	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.

Cantango Ore

ACZ Project ID: ***L89934***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L89934-23	WG598548	Lead, total (3050)	EPA 6020B	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
			EPA 6020B	N1	See Case Narrative.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG598548	Selenium, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
		Zinc, total (3050)	EPA 6020B	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.
L89934-24	WG598548	Lead, total (3050)	EPA 6020B	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
			EPA 6020B	N1	See Case Narrative.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG598548	Selenium, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
		Zinc, total (3050)	EPA 6020B	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.
L89934-25	WG598548	Lead, total (3050)	EPA 6020B	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
			EPA 6020B	N1	See Case Narrative.
	WG596676	Mercury by Direct Combustion AA	EPA 7473	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG598548	Selenium, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
		Zinc, total (3050)	EPA 6020B	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			EPA 6020B	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.

Cantango Ore ACZ Project ID: ***L89934***

Metals Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Mercury by Direct Combustion AA	EPA 7473
Selenium, total (3050)	EPA 6020B
Silver, total (3050)	EPA 6020B

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Moisture Content	D2216-80

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Cantango Ore

ACZ Project ID: L89934
Date Received: 09/03/2024 10:28
Received By:
Date Printed: 9/4/2024

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? [1]			X
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
UNKNOWN		NA		

Was ice present in the shipment container(s)?

Yes - Gel ice was present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Cantango Ore

ACZ Project ID: L89934
Date Received: 09/03/2024 10:28
Received By:
Date Printed: 9/4/2024

[1] The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).

L89819 Chain of Custod

L89934

ACZ LABORATORIES | Accredited Environmental Testing | [illegible] Drive, Steamboat Springs, CO 80487, (970) 879-6590

CHAIN of CUSTODY

L89819 8/27/24 13:24

L89934 Chain of Custod

Report to:

Name: Allegra Cairns	Address: 405-375 Water Street West
Company: Contango Ore	Vancouver, BC Canada V6B 5C6
E-mail: acairns@highgoldmining.com	Telephone: 1.604.629.1165

Copy of Report to:

Name: Josh Brekken	E-mail: josh.brekken@alaska.gov
Company: Alaska Department of Fish and Game	Telephone: 1 (907) 267-2113

Invoice to:

Name: Allegra Cairns	Address: 405-375 Water Street West
Company: Contango Ore	Vancouver, BC Canada V6B 5C6
E-mail: acairns@highgoldmining.com	Telephone: 1.604.629.1165

Copy of Invoice to:

Name:	Address:
Company:	
E-mail: ap@highgoldmining.com	Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ✓ NO

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes ☐ No ✓

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: Josh Brekken **Sampler's Site Information** **State** Alaska **Zip code** 99518 **Time Zone** AKTZ

***Sampler's Signature:** JBrekken

*I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION ANALYSES REQUESTED (Attach list or use quote number)

Quote #: WHOLE-BODY-FISH-2024

PO#:

Reporting state for compliance testing.

Check box if samples include NRC licensed material? ☐

SAMPLE IDENTIFICATION	DATE TIME	Matrix	# of Containers	Metals	(As, Cd, Cu	Pb, Hg, Se	Ag, Zn)	see quote			
Johnson River Aq. St. - Upper Johnson (1-3)	8/13/2024 09:45	Other		✓							
Johnson River Aq. St. - Upper Johnson (4-15)	8/14/2024 13:30	Other		✓							
Johnson River Aq. St. - Kona Creek (1-10)	8/13/2024 14:00	Other		✓							

1-3
4-15
1-10

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Other: Whole Fish Samples
Metals analysis for whole fish samples should include: Ag, Cd, Cu, Hg, Pb, Se, As, and Zn
Fish were weighed and measured at time of collection and these numbers can be provided to the lab upon request.
15 fish are provided for Upper Johnson and 10 fish are provided for Kona Creek

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Josh Brekken JB	8/26/24 12:00		8/27/24 09:30

Quattrax ID: 1984 Revision #: 2 White - Return with sample. Yellow - Retain for your records.

FW: Question on fish for Contango

Chris Abercrombie <chrisa@acz.com>
Thu 8/29/2024 11:54 AM
To:SoilsEmail <SoilsEmail@acz.com>
See below

From: Sue Webber <suew@acz.com>
Sent: Thursday, August 29, 2024 11:32 AM
To: Chris Abercrombie <chrisa@acz.com>
Subject: FW: Question on fish for Contango

They need to be run individually. See below. I think they will need to be return to login. They can start over and label them all.

Sue

From: Brekken, Josh M (DFG) <josh.brekken@alaska.gov>
Sent: Thursday, August 29, 2024 11:30 AM
To: Sue Webber <suew@acz.com>
Subject: RE: Question on fish for Contango

Please analyze individually like last year. There should be 10 fish for the Kona Creek site and 15 fish for the Upper Johnson River site. They can just be numbered JR-1 through JR-15 and KC-1 through KC-10. I guess I should have listed them individually on the COC.
Hopefully that makes sense. Sorry for the confusion and thanks for checking.
Josh

From: Sue Webber <suew@acz.com>
Sent: Thursday, August 29, 2024 8:48 AM
To: Brekken, Josh M (DFG) <josh.brekken@alaska.gov>
Subject: Question on fish for Contango

CAUTION: This email originated from outside the State of Alaska mail system. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Josh,

For fish samples, we logged with IDs shown on the chain of custody. The analyst has found more than one fish in the bags, and they have different IDs. Are we supposed to composite them? COC attached.

Thanks!

Sue Webber
Senior Project Manager
ACZ Laboratories, Inc.
2773 Downhill Drive
Steamboat Springs, CO 80487

APPENDIX 4. ANALYTICAL LABORATORY REPORTS SEDIMENT ANALYSIS, JOHNSON TRACT 2024.

Wet Weight to Dry Weight Conversion Table – Sediment 2024

CLIENTID	SITE	ANALYTE	RESULT	Dry Wt Result	QUAL	UNITS	MDL	Dry Wt MDL	PQL	% Solid
JR SED-ADFG	Upper Johnson	Aluminum, total (3050)	20600	**25307.125**		mg/Kg	7.000	8.600	25.000	81.4
JR SED-ADFG	Upper Johnson	Arsenic, total (3050)	5.82	**7.150**		mg/Kg	0.100	0.123	0.500	81.4
JR SED-ADFG	Upper Johnson	Cadmium, total (3050)	0.130	**0.160**		mg/Kg	0.025	0.031	0.125	81.4
JR SED-ADFG	Upper Johnson	Copper, total (3050)	38.1	**46.806**		mg/Kg	0.400	0.491	1.000	81.4
JR SED-ADFG	Upper Johnson	Iron, total (3050)	36500	**44840.295**		mg/Kg	6.000	7.371	15.000	81.4
JR SED-ADFG	Upper Johnson	Lead, total (3050)	1.47	**1.806**		mg/Kg	0.050	0.061	0.250	81.4
JR SED-ADFG	Upper Johnson	Mercury by Direct Combustion AA	14.5	**17.813**	B	ng/g	4.310	5.295	21.550	81.4
JR SED-ADFG	Upper Johnson	Selenium, total (3050)	0.0763	**0.094**	B	mg/Kg	0.050	0.061	0.125	81.4
JR SED-ADFG	Upper Johnson	Silver, total (3050)		**0.000**	U	mg/Kg	0.050	0.061	0.250	81.4
JR SED-ADFG	Upper Johnson	Zinc, total (3050)	33.7	**41.400**		mg/Kg	2.000	2.457	5.000	81.4
KC SED-ADFG	Kona Creek	Aluminum, total (3050)	24100	**30976.864**		mg/Kg	7.140	9.177	25.500	77.8
KC SED-ADFG	Kona Creek	Arsenic, total (3050)	5.05	**6.491**		mg/Kg	0.102	0.131	0.510	77.8
KC SED-ADFG	Kona Creek	Cadmium, total (3050)	0.504	**0.648**		mg/Kg	0.026	0.033	0.128	77.8
KC SED-ADFG	Kona Creek	Copper, total (3050)	26.0	**33.419**		mg/Kg	0.408	0.524	1.020	77.8
KC SED-ADFG	Kona Creek	Iron, total (3050)	29800	**38303.342**		mg/Kg	6.120	7.866	15.300	77.8
KC SED-ADFG	Kona Creek	Lead, total (3050)	7.59	**9.756**		mg/Kg	0.051	0.066	0.255	77.8
KC SED-ADFG	Kona Creek	Mercury by Direct Combustion AA	74.7	**96.015**		ng/g	4.670	6.003	23.350	77.8
KC SED-ADFG	Kona Creek	Selenium, total (3050)	0.524	**0.674**		mg/Kg	0.051	0.066	0.128	77.8
KC SED-ADFG	Kona Creek	Silver, total (3050)		**0.000**	U	mg/Kg	0.051	0.066	0.255	77.8
KC SED-ADFG	Kona Creek	Zinc, total (3050)	82.4	**105.913**		mg/Kg	2.040	2.622	5.100	77.8

B - Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.

U - The material was anlyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

PQL - Practical Quantitation Limit. Synonymous with the EPA term "minimum level"

MDL - Method Detection Limit.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

September 17, 2024

Report to:
Josh Brekken
Cantango Ore

,

Bill to:
Aris Morfopoulos
HighGold Mining Inc.
375 Water Street
Suite 405
Vancouver, BC V6B 5C6

cc: Allegra Cairns

Project ID:
ACZ Project ID: L89820

Josh Brekken:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on August 27, 2024. This project has been assigned to ACZ's project number, L89820. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L89820. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after October 17, 2024. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

Sue Webber has reviewed and approved this report.

Cantango Ore
Project ID:
Sample ID: JR SEDIMENT-ADFG

ACZ Sample ID: ***L89820-01***
Date Sampled: *08/13/24 11:12*
Date Received: *08/27/24*
Sample Matrix: *Sediment*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	EPA 6010D	100	20600		*	mg/Kg	7	25	09/10/24 9:21	aeh
Arsenic, total (3050)	EPA 6020B	500	5.82		*	mg/Kg	0.1	0.5	09/15/24 18:34	jrj
Cadmium, total (3050)	EPA 6020B	500	0.130			mg/Kg	0.025	0.125	09/15/24 18:34	jrj
Copper, total (3050)	EPA 6020B	500	38.1		*	mg/Kg	0.4	1	09/15/24 18:34	jrj
Iron, total (3050)	EPA 6010D	100	36500		*	mg/Kg	6	15	09/11/24 8:14	aeh
Lead, total (3050)	EPA 6020B	500	1.47			mg/Kg	0.05	0.25	09/15/24 18:34	jrj
Mercury by Direct Combustion AA	EPA 7473	1	14.5	B	*	ng/g	4.31	21.55	08/28/24 16:27	jrj
Selenium, total (3050)	EPA 6020B	500	0.0763	B	*	mg/Kg	0.05	0.125	09/15/24 18:34	jrj
Silver, total (3050)	EPA 6020B	500	<0.05	U	*	mg/Kg	0.05	0.25	09/15/24 18:34	jrj
Zinc, total (3050)	EPA 6010D	100	33.7			mg/Kg	2	5	09/10/24 9:21	aeh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	81.4		*	%	0.1	0.5	09/05/24 21:42	rsh

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								08/28/24 23:04	bat2 /
Digestion - Hot Plate	EPA 3050B								09/04/24 13:45	bdc
Digestion - Hot Plate	EPA 3050B								09/04/24 13:45	bdc
Sieve-2000 um (2.0mm)	ASA No.9 15-4.2.2								08/29/24 10:50	jsa

Cantango Ore
Project ID:
Sample ID: KONA CRK SEDIMENT-ADFG

ACZ Sample ID: ***L89820-02***
Date Sampled: *08/13/24 13:35*
Date Received: *08/27/24*
Sample Matrix: *Sediment*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	EPA 6010D	102	24100		*	mg/Kg	7.14	25.5	09/10/24 9:24	aeh
Arsenic, total (3050)	EPA 6020B	510	5.05		*	mg/Kg	0.102	0.51	09/15/24 18:36	jrj
Cadmium, total (3050)	EPA 6020B	510	0.504			mg/Kg	0.0255	0.128	09/15/24 18:36	jrj
Copper, total (3050)	EPA 6020B	510	26.0		*	mg/Kg	0.408	1.02	09/15/24 18:36	jrj
Iron, total (3050)	EPA 6010D	102	29800		*	mg/Kg	6.12	15.3	09/11/24 8:18	aeh
Lead, total (3050)	EPA 6020B	510	7.59			mg/Kg	0.051	0.255	09/15/24 18:36	jrj
Mercury by Direct Combustion AA	EPA 7473	1	74.7		*	ng/g	4.67	23.35	08/28/24 16:35	jrj
Selenium, total (3050)	EPA 6020B	510	0.524		*	mg/Kg	0.051	0.128	09/15/24 18:36	jrj
Silver, total (3050)	EPA 6020B	510	<0.051	U	*	mg/Kg	0.051	0.255	09/15/24 18:36	jrj
Zinc, total (3050)	EPA 6010D	102	82.4			mg/Kg	2.04	5.1	09/10/24 9:24	aeh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	77.8		*	%	0.1	0.5	09/05/24 22:57	rsh

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								08/29/24 0:25	bat2 /
Digestion - Hot Plate	EPA 3050B								09/04/24 14:01	bdc
Digestion - Hot Plate	EPA 3050B								09/04/24 14:01	bdc
Sieve-2000 um (2.0mm)	ASA No.9 15-4.2.2								08/29/24 11:00	jsa

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

REP001.03.15.02

HIGHGOLDMINING

ACZ Project ID: ***L89820***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Aluminum, total (3050) EPA 6010D

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG596910													
WG596910ICV	ICV	09/10/24 7:45	II240829-1	2		1.988	mg/L	99	90	110			
WG596910ICB	ICB	09/10/24 7:49				U	mg/L		-0.15	0.15			
WG596508PBS	PBS	09/10/24 8:12				U	mg/Kg		-15	15			
WG596508LCSS1	LCSS	09/10/24 8:16	PCN626458	10600		10590	mg/Kg		4480	12800			
WG596508LCSSD1	LCSSD	09/10/24 8:20	PCN626458	10600		10740	mg/Kg		4480	12800	1	20	
L89754-02MS	MS	09/10/24 8:57	II240808-3	102.255	18200	23684.4	mg/Kg	5363	75	125			M3
L89754-02MSD	MSD	09/10/24 9:01	II240808-3	102.255	18200	23868	mg/Kg	5543	75	125	1	20	M3

Arsenic, total (3050) EPA 6020B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG597265													
WG597265ICV	ICV	09/15/24 17:56	MS240912-7	.05		.0519	mg/L	104	90	110			
WG597265ICB	ICB	09/15/24 17:58				U	mg/L		-0.0006	0.0006			
WG596508PBS	PBS	09/15/24 18:07				U	mg/Kg		-0.3	0.3			
WG596508LCSS1	LCSS	09/15/24 18:09	PCN626458	180		192.656	mg/Kg		157	228			
WG596508LCSSD1	LCSSD	09/15/24 18:10	PCN626458	180		194.87085	mg/Kg		157	228	1	20	
L89797-01MS	MS	09/15/24 18:29	MS240613-4	25.3005	5.06	29.27362	mg/Kg	96	75	125			
L89797-01MSD	MSD	09/15/24 18:31	MS240613-4	25.3005	5.06	29.07008	mg/Kg	95	75	125	1	20	

Cadmium, total (3050) EPA 6020B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG597265													
WG597265ICV	ICV	09/15/24 17:56	MS240912-7	.05		.051901	mg/L	104	90	110			
WG597265ICB	ICB	09/15/24 17:58				U	mg/L		-0.00015	0.00015			
WG596508PBS	PBS	09/15/24 18:07				U	mg/Kg		-0.075	0.075			
WG596508LCSS1	LCSS	09/15/24 18:09	PCN626458	199		207.951093	mg/Kg		167	237			
WG596508LCSSD1	LCSSD	09/15/24 18:10	PCN626458	199		212.13167	mg/Kg		167	237	2	20	
L89797-01MS	MS	09/15/24 18:29	MS240613-4	25.27525	.432	24.758227	mg/Kg	96	75	125			
L89797-01MSD	MSD	09/15/24 18:31	MS240613-4	25.27525	.432	25.285595	mg/Kg	98	75	125	2	20	

Copper, total (3050) EPA 6020B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG597265													
WG597265ICV	ICV	09/15/24 17:56	MS240912-7	.05		.05318	mg/L	106	90	110			
WG597265ICB	ICB	09/15/24 17:58				U	mg/L		-0.0024	0.0024			
WG596508PBS	PBS	09/15/24 18:07				U	mg/Kg		-1.2	1.2			
WG596508LCSS1	LCSS	09/15/24 18:09	PCN626458	229		222.08763	mg/Kg		180	253			
WG596508LCSSD1	LCSSD	09/15/24 18:10	PCN626458	229		223.50301	mg/Kg		180	253	1	20	
L89797-01MS	MS	09/15/24 18:29	MS240613-4	25.27525	9.29	34.66518	mg/Kg	100	75	125			
L89797-01MSD	MSD	09/15/24 18:31	MS240613-4	25.27525	9.29	33.72814	mg/Kg	97	75	125	3	20	

HIGHGOLDMINING

ACZ Project ID: ***L89820***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Iron, total (3050) EPA 6010D

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG596973													
WG596973ICV	ICV	09/11/24 6:45	II240829-1	2		2.002	mg/L	100	90	110			
WG596973ICB	ICB	09/11/24 6:49				U	mg/L		-0.18	0.18			
WG596508PBS	PBS	09/11/24 7:13				6.02	mg/Kg		-18	18			
WG596508LCSS1	LCSS	09/11/24 7:17	PCN626458	9280		9257	mg/Kg		4620	11200			
WG596508LCSSD1	LCSSD	09/11/24 7:21	PCN626458	9280		9302	mg/Kg		4620	11200	0	20	
L89754-02MS	MS	09/11/24 7:44	II5XSOIL	102.1734	20500	21868.8	mg/Kg	1340	75	125			M3
L89754-02MSD	MSD	09/11/24 7:47	II5XSOIL	102.1734	20500	21302.7	mg/Kg	786	75	125	3	20	M3

Lead, total (3050) EPA 6020B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG597265													
WG597265ICV	ICV	09/15/24 17:56	MS240912-7	.05		.05294	mg/L	106	90	110			
WG597265ICB	ICB	09/15/24 17:58				U	mg/L		-0.0003	0.0003			
WG596508PBS	PBS	09/15/24 18:07				.05727	mg/Kg		-0.15	0.15			
WG596508LCSS1	LCSS	09/15/24 18:09	PCN626458	261		271.74842	mg/Kg		204	297			
WG596508LCSSD1	LCSSD	09/15/24 18:10	PCN626458	261		271.62625	mg/Kg		204	297	0	20	
L89797-01MS	MS	09/15/24 18:29	MS240613-4	25.27525	6.18	31.07511	mg/Kg	98	75	125			
L89797-01MSD	MSD	09/15/24 18:31	MS240613-4	25.27525	6.18	30.29208	mg/Kg	95	75	125	3	20	

Mercury by Direct Combustion AA EPA 7473

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG594631													
WG594631ICV1	ICV	08/06/24 14:46	HG240805-4	100		106	ng/g	106	90	110			
WG594631ICV2	ICV	08/06/24 14:53	HG240805-4	100		106	ng/g	106	90	110			
WG594631ICV3	ICV	08/06/24 15:01	HG240805-3	1000		1030	ng/g	103	90	110			
WG594631ICV4	ICV	08/06/24 15:10	HG240805-2	10000		10500	ng/g	105	90	110			
WG596164													
WG596164ICV1	ICV	08/28/24 13:18	HG240805-4	100		107	ng/g	107	90	110			
WG596164ICV2	ICV	08/28/24 13:25	HG240805-4	100		106	ng/g	106	90	110			
WG596164ICV3	ICV	08/28/24 13:32	HG240805-3	1000		1050	ng/g	105	90	110			
WG596164ICV4	ICV	08/28/24 13:39	HG240805-2	10000		10600	ng/g	106	90	110			
WG596164PBS	PBS	08/28/24 13:47				4.21	ng/g		-8.28	8.28			
WG596164LCSS	LCSS	08/28/24 14:10	PCN60050	90		89.4	ng/g		80	120			
WG596164LCSSD	LCSSD	08/28/24 14:18	PCN60050	90		93	ng/g		80	120	4	20	
L89555-01MS	MS	08/28/24 14:35	HG240805-3				ng/g	100	80	120			
L89600-01DUP	DUP	08/28/24 14:51			16.4	18.2	ng/g				10	20	RA

Selenium, total (3050) EPA 6020B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG597265													
WG597265ICV	ICV	09/15/24 17:56	MS240912-7	.05		.05209	mg/L	104	90	110			
WG597265ICB	ICB	09/15/24 17:58				U	mg/L		-0.0003	0.0003			
WG596508PBS	PBS	09/15/24 18:07				U	mg/Kg		-0.15	0.15			
WG596508LCSS1	LCSS	09/15/24 18:09	PCN626458	117		130.04813	mg/Kg		97.2	149			
WG596508LCSSD1	LCSSD	09/15/24 18:10	PCN626458	117		132.00486	mg/Kg		97.2	149	1	20	
L89797-01MS	MS	09/15/24 18:29	MS240613-4	12.637625	.144	11.97333	mg/Kg	94	75	125			
L89797-01MSD	MSD	09/15/24 18:31	MS240613-4	12.637625	.144	11.991	mg/Kg	94	75	125	0	20	

HIGHGOLDMINING

ACZ Project ID: ***L89820***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Silver, total (3050) EPA 6020B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG597265													
WG597265ICV	ICV	09/15/24 17:56	MS240912-7	.02		.02062	mg/L	103	90	110			
WG597265ICB	ICB	09/15/24 17:58				U	mg/L		-0.0003	0.0003			
WG596508PBS	PBS	09/15/24 18:07				U	mg/Kg		-0.15	0.15			
WG596508LCSS1	LCSS	09/15/24 18:09	PCN626458	65.5		70.66313	mg/Kg		54.2	82.9			
WG596508LCSSD1	LCSSD	09/15/24 18:10	PCN626458	65.5		71.90913	mg/Kg		54.2	82.9	2	20	
L89797-01MS	MS	09/15/24 18:29	MS240613-4	5.05	U	4.07525	mg/Kg	81	75	125			
L89797-01MSD	MSD	09/15/24 18:31	MS240613-4	5.05	U	4.17436	mg/Kg	83	75	125	2	20	

Solids, Percent D2216-80

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG596609													
WG596609PBS	PBS	09/05/24 10:25				U	%		-0.1	0.1			
L89797-02DUP	DUP	09/05/24 20:27			74.1	73.4	%				1	20	

Zinc, total (3050) EPA 6010D

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG596910													
WG596910ICV	ICV	09/10/24 7:45	II240829-1	2		1.94	mg/L	97	90	110			
WG596910ICB	ICB	09/10/24 7:49				U	mg/L		-0.06	0.06			
WG596508PBS	PBS	09/10/24 8:12				U	mg/Kg		-6	6			
WG596508LCSS1	LCSS	09/10/24 8:16	PCN626458	264		265.1	mg/Kg		217	319			
WG596508LCSSD1	LCSSD	09/10/24 8:20	PCN626458	264		273	mg/Kg		217	319	3	20	
L89754-02MS	MS	09/10/24 8:57	II240808-3	51.0459	51.3	96.808	mg/Kg	89	75	125			
L89754-02MSD	MSD	09/10/24 9:01	II240808-3	51.0459	51.3	96.4	mg/Kg	88	75	125	0	20	

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Extended Qualifier Report

Cantango Ore

ACZ Project ID: ***L89820***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L89820-01	WG596910	Aluminum, total (3050)	EPA 6010D	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG597265	Arsenic, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
		Copper, total (3050)	EPA 6020B	ZH	Serial Dilution exceeded the acceptance criteria. Matrix interference [physical or chemical] is suspected.
	WG596973	Iron, total (3050)	EPA 6010D	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG596164	Mercury by Direct Combustion AA	EPA 7473	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG597265	Selenium, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
L89820-02	WG596910	Aluminum, total (3050)	EPA 6010D	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG597265	Arsenic, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
		Copper, total (3050)	EPA 6020B	ZH	Serial Dilution exceeded the acceptance criteria. Matrix interference [physical or chemical] is suspected.
	WG596973	Iron, total (3050)	EPA 6010D	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG596164	Mercury by Direct Combustion AA	EPA 7473	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG597265	Selenium, total (3050)	EPA 6020B	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.

Certification Qualifiers

Cantango Ore ACZ Project ID: ***L89820***

Metals Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Silver, total (3050)	EPA 6020B

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Solids, Percent	D2216-80

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Cantango Ore

ACZ Project ID: L89820
Date Received: 08/27/2024 09:54
Received By:
Date Printed: 8/28/2024

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? [1]			X
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
NA42734	2.5	<=6.0	15	N/A

Was ice present in the shipment container(s)?

Yes - Gel ice was present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Cantango Ore

ACZ Project ID:	L89820
Date Received:	08/27/2024 09:54
Received By:	
Date Printed:	8/28/2024

[1] The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).

L89820 Chain of Custod

ACZ LABORATORIES | Accredited Environmental Testing | 2773 Downhill Drive Steamboat Springs, CO 80487 (970) 879-6590 | 189820

CHAIN of CUSTODY

Report to:

Name: Allegra Cairns	Address: 405-375 Water Street West
Company: Contango Ore	Vancouver, BC Canada V6B 5C6
E-mail: acairns@highgoldmining.com	Telephone: 1.604.629.1165

Copy of Report to:

Name: Josh Brekken	E-mail: josh.brekken@alaska.gov
Company: Alaska Department of Fish and Game	Telephone: 1 (907) 267-2113

Invoice to:

Name: Allegra Cairns	Address: 405-375 Water Street West
Company: Contango Ore	Vancouver, BC Canada V6B 5C6
E-mail: acairns@highgoldmining.com	Telephone: 1.604.629.1165

Copy of Invoice to:

Name:	Address:
Company:	
E-mail: ap@highgoldmining.com	Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ✓ NO

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes ☐ No ✓

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: Josh Brekken **Sampler's Site Information** **State** Alaska **Zip code** 99518 **Time Zone** AKTZ

***Sampler's Signature:** JB

*I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

Quote #: SEDIMENT-2024

PO#:

Reporting state for compliance testing:

Check box if samples include NRC licensed material? ☐

ANALYSES REQUESTED (attach list or use quote number)

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Metals	(Al, As, Cd	Cu, Fe, Pb	Hg, Se, Ag	Zn)			
JR Sediment - ADFG	8/13/2024 11:12	SO	1	✓							
Kona Crk Sediment - ADFG	8/13/2024 13:35	SO	1	✓							

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Samples are sediment grab samples from Upper Johnson River and Kona Creek sites.

Metals analysis for sediment samples should include: Ag, Al, As, Cd, Cu, Fe, Hg, Pb, Se, and Zn (Cu was not included in the quote, but please include analysis of Cu)

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Josh Brekken JB	8/26/24 1200		8/27/24 0954

Qualtrax ID: 1984 Revision #: 2 White - Return with sample. Yellow - Retain for your records.

APPENDIX 5. MINNOW TRAPPING RESULTS, JOHNSON TRACT 2024.

Upper Johnson - Mainstem

Site	Trap ID	Set Date	Set Time	Pick Date	Pick Time	Total Time Fished (hours)	DV	CPUE - DV
Upper Johnson	1.1	8/12/2024	14:15	8/13/2024	9:15	19.00	0	0.00
Upper Johnson	1.2	8/12/2024	14:20	8/13/2024	9:18	18.98	0	0.00
Upper Johnson	1.3	8/12/2024	14:25	8/13/2024	9:20	18.92	0	0.00
Upper Johnson	1.4	8/12/2024	14:30	8/13/2024	9:26	18.10	0	0.00
Upper Johnson	1.5	8/12/2024	14:45	8/13/2024	9:30	18.75	0	0.00
Upper Johnson	1.6	8/12/2024	14:55	8/13/2024	9:36	18.68	1	1.28
Upper Johnson	1.7	8/12/2024	14:55	8/13/2024	9:45	18.83	3	3.82
Upper Johnson	1.8	8/12/2024	15:00	8/13/2024	9:59	18.98	3	3.79
					TOTAL	150.25	7.00	
					AVG	18.78	0.88	**1.11**

Upper Johnson - Side Channel

Stream	Trap ID	Set Date	Set Time	Pick Date	Pick Time	Total Time Fished (hours)	DV	CPUE - DV
Upper Johnson	2.1	8/13/2024	17:17	8/14/2024	13:16	19.98	1	1.20
Upper Johnson	2.2	8/13/2024	17:20	8/14/2024	13:20	20.00	0	0.00
Upper Johnson	2.3	8/13/2024	17:24	8/14/2024	13:27	20.05	4	4.79
Upper Johnson	2.4	8/13/2024	17:27	8/14/2024	13:33	20.10	0	0.00
Upper Johnson	2.5	8/13/2024	17:30	8/14/2024	13:36	20.10	4	4.78
Upper Johnson	2.6	8/13/2024	17:40	8/14/2024	13:49	20.15	1	1.19
Upper Johnson	2.7	8/13/2024	17:46	8/14/2024	13:53	20.12	8	9.54
Upper Johnson	2.8	8/13/2024	17:50	8/14/2024	14:06	20.27	10	11.84
Upper Johnson	2.9	8/13/2024	17:52	8/14/2024	14:20	20.47	1	1.17
Upper Johnson	2.10	8/13/2024	17:55	8/14/2024	14:23	20.47	3	3.52
					TOTAL	201.70	32.00	
					AVG	20.17	3.20	**3.80**

Upper Johnson - Combined

Stream	Trap ID	Set Date	Set Time	Pick Date	Pick Time	Total Time Fished (hours)	DV	CPUE - DV
Upper Johnson	1.1	8/12/2024	14:15	8/13/2024	9:15	19.00	0	0.00
Upper Johnson	1.2	8/12/2024	14:20	8/13/2024	9:18	18.98	0	0.00
Upper Johnson	1.3	8/12/2024	14:25	8/13/2024	9:20	18.92	0	0.00
Upper Johnson	1.4	8/12/2024	14:30	8/13/2024	9:26	18.10	0	0.00
Upper Johnson	1.5	8/12/2024	14:45	8/13/2024	9:30	18.75	0	0.00
Upper Johnson	1.6	8/12/2024	14:55	8/13/2024	9:36	18.68	1	1.28
Upper Johnson	1.7	8/12/2024	14:55	8/13/2024	9:45	18.83	3	3.82
Upper Johnson	1.8	8/12/2024	15:00	8/13/2024	9:59	18.98	3	3.79
Upper Johnson	2.1	8/13/2024	17:17	8/14/2024	13:16	19.98	1	1.20
Upper Johnson	2.2	8/13/2024	17:20	8/14/2024	13:20	20.00	0	0.00
Upper Johnson	2.3	8/13/2024	17:24	8/14/2024	13:27	20.05	4	4.79
Upper Johnson	2.4	8/13/2024	17:27	8/14/2024	13:33	20.10	0	0.00
Upper Johnson	2.5	8/13/2024	17:30	8/14/2024	13:36	20.10	4	4.78
Upper Johnson	2.6	8/13/2024	17:40	8/14/2024	13:49	20.15	1	1.19
Upper Johnson	2.7	8/13/2024	17:46	8/14/2024	13:53	20.12	8	9.54
Upper Johnson	2.8	8/13/2024	17:50	8/14/2024	14:06	20.27	10	11.84
Upper Johnson	2.9	8/13/2024	17:52	8/14/2024	14:20	20.47	1	1.17
Upper Johnson	2.10	8/13/2024	17:55	8/14/2024	14:23	20.47	3	3.52
					TOTAL	351.95	39.00	
					AVG	19.55	2.17	**2.61**

Kona Creek

Site	Trap ID	Set Date	Set Time	Pick Date	Pick Time	Total Time Fished (hours)	DV	CPUE - DV
Kona Creek	1.1	8/12/2024	15:35	8/13/2024	13:30	21.92	0	0.00
Kona Creek	1.2	8/12/2024	15:40	8/13/2024	13:35	21.92	1	1.10
Kona Creek	1.3	8/12/2024	15:45	8/13/2024	13:41	21.93	3	3.28
Kona Creek	1.4	8/12/2024	15:50	8/13/2024	13:51	22.02	0	0.00
Kona Creek	1.5	8/12/2024	15:55	8/13/2024	13:55	22.00	1	1.09
Kona Creek	1.6	8/12/2024	16:00	8/13/2024	13:57	21.95	0	0.00
Kona Creek	1.7	8/12/2024	16:05	8/13/2024	14:05	22.00	7	7.64
Kona Creek	1.8	8/12/2024	16:10	8/13/2024	14:10	22.00	2	2.18
					TOTAL	175.73	14.00	
					AVG	21.97	1.75	**1.91**

Trap ID number represents Day and Trap (e.g., Trap 1.8 is the 8th trap set on the 1st day and Trap 2.8 is the 8th trap set on the 2nd day).

JOHNSON TRACT MINNOW TRAPPING RESULTS - 2024 – FISH CONDITION

Upper Johnson

Fish ID	Weight (g)	Length (FL in mm)	L^3	K
1.6-1	16.60	127	2048383	0.8104
1.7-1	9.60	109	1295029	0.7413
1.7-2	3.10	80	512000	0.6055
1.7-3	2.10	61	226981	0.9252
1.8-1	15.30	125	1953125	0.7834
1.8-2	3.90	76	438976	0.8884
1.8-3	3.80	77	456533	0.8324
2.1-1	15.30	115	1520875	1.0060
2.3-1	13.90	115	1520875	0.9139
2.3-2	17.80	121	1771561	1.0048
2.3-3	9.30	96	884736	1.0512
2.3-4	4.60	71	357911	1.2852
2.5-1	11.11	107	1225043	0.9069
2.5-2	13.70	115	1520875	0.9008
2.5-3	14.50	112	1404928	1.0321
2.5-4	9.10	100	1000000	0.9100
2.6-1	6.70	83	571787	1.1718
2.7-1	3.70	68	314432	1.1767
2.7-2	12.10	110	1331000	0.9091
2.7-3	10.70	98	941192	1.1369
2.7-4	4.20	65	274625	1.5294
2.7-5	5.60	83	571787	0.9794
2.7-6	4.20	68	314432	1.3357
2.7-7	4.20	68	314432	1.3357
2.7-8	14.90	110	1331000	1.1195
2.8-1	6.20	83	571787	1.0843
2.8-2	13.30	113	1442897	0.9218
2.8-3	18.80	117	1601613	1.1738
2.8-4	8.80	97	912673	0.9642
2.8-5	19.50	128	2097152	0.9298
2.8-6	16.00	126	2000376	0.7998
2.8-7	14.70	115	1520875	0.9665
2.8-8	14.50	116	1560896	0.9290
2.8-9	30.20	145	3048625	0.9906
2.8-10	15.90	109	1295029	1.2278
2.9-1	12.50	110	1331000	0.9391
2.10-1	10.50	103	1092727	0.9609
2.10-2	15.20	120	1728000	0.8796
2.10-3	14.10	116	1560896	0.9033
AVERAGE	**11.3**	**101.5**		**0.9990**

Kona Creek

Fish ID	Weight (g)	Length (FL in mm)	L3	K
1.2-1	17.60	120	1728000	1.0185
1.3-1	17.90	121	1771561	1.0104
1.3-2	17.30	121	1771561	0.9765
1.3-3	11.20	113	1442897	0.7762
1.5-1	34.90	147	3176523	1.0987
1.7-1	18.90	124	1906624	0.9913
1.7-2	25.40	142	2863288	0.8871
1.7-3	8.20	100	1000000	0.8200
1.7-4	4.80	80	512000	0.9375
1.7-5	7.20	80	512000	1.4063
1.7-6	3.70	85	614125	0.6025
1.7-7	3.80	76	438976	0.8657
1.8-1	12.00	110	1331000	0.9016
1.8-2	16.90	122	1815848	0.9307
AVERAGE	**14.3**	**110.1**		**0.9445**

Fish ID number represents Day and Trap followed by order fish were processed (e.g., Fish 1.8-2 is the 2nd fish processed from the 8th trap set on the 1st day and Fish 2.8-2 is the 2nd fish process from the 8th trap set on the 2nd day).