Post-Removal Action Long Term Monitoring Report

Longshot Mine and Mill

December 3, 2014

COLVILLE NATIONAL FOREST, WASHINGTON





Prepared for:
USDA Forest Service
Region 6
10600 NE 51st Circle
Vancouver, WA 98682

Prepared by:
E W Wells Group
390 E Parkcenter Blvd, Ste 200
Boise, ID 83706

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1.0 INTRODUCTION

Millennium Science and Engineering (MSE), a division of E W Wells Group, LLC, was contracted by the United States Department of Agriculture, Forest Service (Forest Service) to complete a Removal Action (RA) at the Longshot Mine and Mill ("the Site") in the Colville National Forest, Washington. This work was performed under Task Order AG-05K3-D-11-0025 of MSE's Contract No. AG-046W-C-07-0006 with the Forest Service dated July 21, 2011. The Site location is provided in Figure 1. A Site Inspection (SI) was completed in 2005 (MSE), and an Engineering Evaluation/Cost Analysis (EE/CA) in 2008 (MSE). MSE conducted pre-removal inspection and data gathering activities at the Site, including a sampling event in October 2011. The RA was completed in late October 2011. MSE is conducting three years of annual post-removal monitoring at the Site as outlined in the Post-Removal Monitoring and Operations and Maintenance Plan (MSE, 2011). The first monitoring event was on April 25, 2012 and the second event was on April 30, 2013. The third post-removal monitoring event was conducted on April 19, 2014 and consisted of:

- A general visual inspection of areas disturbed during removal activities at the Site; and
- Collecting surface water, sediment and benthic macroinvertebrate samples.

This report presents results of the third post-removal monitoring event at the Site. Field forms completed during monitoring activities are provided in Appendix 1. Laboratory results of samples collected during the monitoring activities are provided in Appendix 2. Post-removal monitoring photographs are provided in Appendix 3.

1.1 Purpose and Objectives

The purpose of the RA was to abate, prevent, minimize, stabilize, mitigate or eliminate the release or threat of a release to the environment. The specific, overall objectives of the Longshot Mine RA were to: (1) eliminate direct contact with high concentrations of metals in the mine waste for all receptors; (2) reduce or eliminate the migration of contaminants to the environment; and (3) mitigate physical hazards at the Site. The primary objectives of post-RA sampling and monitoring are to compare post-RA mine waste area and aquatic habitat conditions to pre-RA conditions. This is being accomplished by:

- Assessing surface water samples collected from four locations for comparison with data collected during the pre-RA monitoring event. Sampling locations, presented on Figure 2, include: AD-1 (adit discharge), ET-3 (immediately below the lower tailings impoundment and a reservoir), BG-1 (ephemeral [background] stream east from the Site), and ET-4 (end of the ephemeral stream prior to discharge to Mill Creek);
- Assessing sediment samples collected from each of the four surface water sampling locations for comparison with data collection during the pre-removal monitoring event;
- Assessing one coeval benthic sample collected at ET-4 to evaluate potential impacts to the stream habitat, benthic macro-invertebrate community, and fish species. Note, benthic samples were not obtained from this location during the pre-RA monitoring event, because the location was dry; and
- Inspect the Site for revegetation success, evidence of erosion, slumps, or other damage as well as bat gate integrity.

1.2 Site Description

The Longshot Mine and Mill is an inactive lead-zinc mine located on the Colville National Forest, about 11 miles northeast of the town of Colville, Washington (Figure 1). The Site is in the South Fork Mill

Creek (SFMC) drainage, which is a tributary to Mill Creek and the Colville River. The Site is accessed via Forest Service Spur Road 150 by turning off County Road 4954 and traveling north for about 1 mile. Spur Road 150 leads to a turnaround at the mill and lower adit. A detailed site characterization can be found in the SI (MSE, 2005). Pre-removal site features include:

- Remnants of a concrete mill foundation and other wooden structures;
- Two open adits, including one with discharge (lower adit near the mill);
- One open stope (gloryhole) in the upper adit;
- One reservoir;
- One settling pond;
- A collapsed coarse (unprocessed) ore bin;
- Six waste rock piles; and
- Three tailings impoundments.

2.0 POST-REMOVAL MONITORING

2.1 General Site Inspection

Disturbed areas of the Site that were reclaimed during the RA were inspected to evaluate revegetation success. These include the repository, the Spur Road, waste rock piles, and the access road. The upper and lower bat gates were also inspected for vandalism and structural integrity.

- There were no signs of erosion or damage on reclaimed areas or roads. All receptors remain protected from direct contact with elevated metal concentrations.
- Access control logs on the road appear to have been cut to permit horse and trail bike access.
- The bat gate and bat culvert were intact and secure with no evidence of vandalism. At the lower adit, the portal had collapsed a few inches onto the bat culvert, yet its integrity remains.
- Emergent revegetation continues slowly and volunteer revegetation continues to be successful.

2.2 Sample Collection and Analysis

Surface water, sediment, and benthic samples were collected for comparison with pre-RA samples collected during the pre-RA monitoring event in 2011 and the post removal samples collected in 2012 and 2013. The sampling locations are shown on Figure 2 and a summary of the samples collected, laboratory analyses, and field parameters measured is provided in Table 1.

The sampling methodology and procedures are described in the Post-Removal Monitoring and Operations and Maintenance Plan (MSE, 2011). The presence of stakes imprinted with sample IDs installed to identify the sample locations for future monitoring events were located and checked. All surface water and sediment samples were shipped to SVL Analytical Laboratory (SVL) in Kellogg, Idaho for analyses. The benthic sample was submitted for analysis to Aquatic Biology Associates, Inc. in Corvallis, Oregon.

2.3 Surface Water

Four surface water samples were collected and locations included: AD-1 (adit discharge), ET-3 (immediately below the lower tailings), BG-1 (ephemeral [background] stream east from the Site), and ET-4 (end of the ephemeral stream prior to discharge to Mill Creek).

Surface water samples were collected by submerging a laboratory supplied 500-ml plastic bottle directly into the source. Samples designated to be analyzed for dissolved metals were sent to the laboratory for filtering and preserving. Three separate samples were obtained at each location:

1. A 500 ml unfiltered, unpreserved sample for total recoverable (total) metals analyses;
2. A 500 ml filtered sample preserved with nitric acid to pH <2 for dissolved metals analyses; and
3. A 500 ml unfiltered, unpreserved sample for major ion, total suspended solids (TSS), total dissolved solids (TDS), sulfate, and hardness analyses.

Field parameters were measured in the stream before surface water sample collection. At each sample location, the sample information and field parameters were documented on a Water Sample Collection Record (Appendix 1).

2.4 Sediment

Sediment sampling consisted of collecting a composite grab sample co-located with the surface water sample locations described above and shown on Figure 2. At each sampling location, the sediment sample was collected immediately following collection of the surface water sample. Gravel and organic media were removed, and samples were placed in glass jars and decanted so that the jar was filled with as much sediment as possible. The samples were documented on Sediment Sample Collection Records (Appendix 1).

2.5 Benthic Macro-invertebrates

One composite macro-invertebrate sample was collected at ET-4. The composite sample consisted of subsamples from different pool habitats within the intermittent/seasonal stream reach (no riffle habitats were present). Collection of macro-invertebrate samples from specific pool habitats is usually necessitated by the potential of tailings mobilizing into the streams and settling in areas of slower moving water. At location ET-4 there is no consistent surface flow connection with the Site; there is only a limited potential for overland flood flows during extreme spring rain-on-snow events. The dominant impact would occur from any contaminated base flow originating at the Site and discharging to surface as springs near ET-4.

The macro-invertebrate sample was collected using a D-ring kick net. Sampling techniques were in accordance with the "Benthic Macro-invertebrate Biological Monitoring Protocols for Rivers and Streams" (Plotnikoff and Wiseman, 2001). The sample was preserved in the field by 99 percent isopropyl alcohol and shipped to Aquatic Biology Associates in Corvallis, Oregon. The samples were documented on a Benthic Invertebrate Collection Record (Appendix 1).

The pond was approximately 9 meters in diameter, 20 cm deep, impounded by the County Road and directed to discharge by a culvert. This is not a typical, free-flowing stream benthic environment, but is rather the only possible location to evaluate potential impact of the Site on SFMC. The springs which supply this location discharge from the hillside base approximately 100 meters from the pool. The pool is also subject to contamination from free-range cattle. MSE personnel believe the pool only contains surface water in a typical year from March or April through June, the spring runoff period.

3.0 SAMPLE RESULTS

Analytical results of samples collected during the monitoring event and the corresponding field parameters are presented in Tables 2 through 5 and discussed below by media type. The laboratory reports are provided in Appendix 2.

3.1 Surface Water

Surface water analytical results are presented in Table 2 and associated field parameters are presented in Table 3. The laboratory analytical results are provided in Appendix 2. Concentrations were compared to Washington State and EPA human health and ecological screening criteria (EPA, 2009; NOAA, 1999; WDOE, 2010b).

- BG-1: During the 2014 sampling event, no criteria were exceeded as consistent with the previous events in 2011, 2012, and 2013.
- AD-1: During the 2014 sampling event, dissolved cadmium concentrations exceeded EPA ecological screening levels (ESLV). TDS slightly exceeded EPA ESLV and EPA human health screening criteria (HHSLV). Arsenic, lead, and silver were not detected at AD-1.
- ET-3: Zinc and barium were the only analytes detected, no analytes exceeded criteria at ET-3.
- ET-4: No criteria were exceeded as consistent with the previous events in 2011, 2012, and 2013.

As is indicated in Table 2 during the 2014 monitoring event, from BG-1 to AD-1, cadmium and zinc increased, while barium decreased. All other analytes were below laboratory detection limits in both samples. Between AD-1 and ET-3 all anlaytes were either below laboratory detection limits in both samples or decreased, with the exception of barium and zinc which increased. From ET-3 to ET-4 all constituents were either below laboratory detection limits in both samples or decreased in concentration to slightly greater than background concentrations, except barium which increased.

Project quality assurance/quality control (QA/QC) consisted of one duplicate sample as well as laboratory matrix spikes and duplicate analyses. Duplicate sample analyses were within the EPA requirements of less than ten percent variance. As shown in the SVL analytical reports in Appendix 2, all internal metal analyses in laboratory blanks, control standards, duplicates, and matrix spike analyses were within the respective EPA limits.

3.2 Sediment

Analytical results of the sediment samples are summarized in Table 4. Laboratory results are provided in Appendix 2. Concentrations were compared to Washington State and EPA human health and ecological screening criteria (EPA, 2012; NOAA, 1999; WDOE, 2004 and 2010a).

- BG-1: Copper was the only analyte exceeding the Washington and EPA ecological criteria. Barium, lead, and zinc were detected in this sediment sample but did not exceeded criteria.
- AD-1: All analytes except silver were detected in sediment at AD-1. Arsenic exceeded EPA HHSVL and both Washington and EPA ESLV. Cadmium concentrations, although still exceeding Washington HHSVL and ESLV, continued to remain below the higher 2011 event. Copper also exceeded Washington and EPA ESLV criteria. Similar to previous years, zinc exceeded ESLV. In 2014 the highest concentration of copper (49.2 mg/kg) and cadmium (3.65 mg/kg) were found at AD-1.
- ET-3: With the exception of barium, the remaining six analytes exceeded criteria at ET-3. Arsenic and cadmium exceeded both HHSVL and ESLV while silver, lead, copper, and zinc exceeded ESLV. Copper concentrations were below background at ET-3. The highest concentrations in 2014 of arsenic (7.5 mg/kg), lead (481 mg/kg), silver (5.8 mg/kg), and zinc (435 mg/kg) were found at ET-3.
- ET-4: During this event arsenic exceeded EPA HHSLV and copper exceeded ESLV, though copper concentrations were less than the background location (BG-1). Barium, lead, and zinc were detected at ET-4, but did not exceed criteria.

The monitoring sample locations were specifically selected to compare up-gradient (background) sediment quality (BG-1) to mineralized areas at the site (AD-1) and evaluate the potential for transport of pre-removal mine waste down-gradient to the location below the Site (ET-3). It is highly unlikely any mine derived sediment was transported as far as the final impact measurement location (ET-4), because there is no surface transport flow path. The natural presence of a mineralized area of rock is expected to maintain a somewhat higher concentration over that of un-mineralized areas.

As is indicated in Table 4, during the 2014 monitoring event all sediment constituents tended to increase from BG-1 to AD-1. Between AD-1 and ET-3 arsenic, lead, silver, and zinc increased whereas barium, copper, and cadmium decreased. From ET-3 to ET-4 all metal constituents except barium decreased in concentration to slightly greater than background concentrations. Copper concentrations were below the background location concentrations at ET-3 and ET-4.

Because the pre-RA sampling was conducted during low flow and the post-RA at high flow, defensible temporal comparisons cannot be made.

3.3 Benthic Macro-invertebrates

Results of the benthic macro-invertebrate sampling are summarized in Table 5. Sampling was conducted at ET-4, which is an intermittent/seasonal stream. Sampling was done in accordance with the benthic sampling protocol set forth in EPA's "Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macro-invertebrates, and Fish, Second Edition" (Barbour, 1999). Adaptations to the sampling method were done in accordance to site-specific constraints and the samples were analyzed by Aquatic Biology Associates in Corvallis, Oregon.

The total amount of benthic macro-invertebrate taxa present in the sample collected at ET-4 was low, with 14 taxa present, in comparison to perennial streams which typically have 40 to 70 taxa. The taxa present at ET-4 are consistent with intermittent streams which are dominated by taxa that develop quickly over a narrow seasonal window and that have short life cycles.

Because ET-4 is predominately a pool habitat and an intermittent stream, it is inappropriate to apply the Karr Benthic Index of Biological Integrity (BIBI) since the BIBI is meant for riffle sample locations from perennial streams. It is also hard to quantify if the benthic macro-invertebrate community is impaired by historical mining activity.

4.0 CONCLUSIONS AND RECOMMENDATIONS

- In general, volunteer and planted re-vegetation at the Site continues to reestablish and improve.
  - Emergent grasses and native plant species were observed on the reclaimed areas.
  - There was no evidence of erosion or damage on reclaimed areas, and direct contact with mine waste remains inhibited.
  - The bat gate and culvert are fully intact and did not show any signs of disturbance.
- Slight recreation use impact is apparent near the site. Recreation remains limited to hiking and possibly trail biking and horseback riding (although tire or hoof trails were not seen at the site) with motorized access prevented above the old mill site.
- Sampling was conducted at the same locations during 2014 as in previous years. Location ET-4 was dry during the 2011 sampling; therefore no comparisons can be made between pre-removal and post-removal sampling.

- Analytical results of the 2014 post-removal surface water samples indicate the concentrations of most analytes remained similar to the 2013 and 2012 events. Most detected analytes at ET-3 are less than pre-removal concentrations.
    - Dissolved cadmium at AD-1 is the only analyte that exceeds the ESLV.
    - Sample location ET-4 was dry during the pre-removal sampling; therefore, no comparisons can be made between pre-removal and post-removal sampling.
- Analytical results of the 2014 sediment samples indicate the concentrations of most analytes remained similar to the post-removal events in 2013 and 2012.
    - Arsenic, cadmium, copper, lead, silver, and zinc exceed the HHSLV and/or ESLV.
- The general decreasing trend of post-removal metal concentrations in surface water indicates removal action activities have had a positive impact at the Site.
- Relatively low sulfate concentrations indicate that no acid is being generated at any location at the Site.

The 2014 Long Term Monitoring Report completes the authorized scope of work. No additional post-removal monitoring is scheduled.

5.0 REFERENCES

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FIGURES

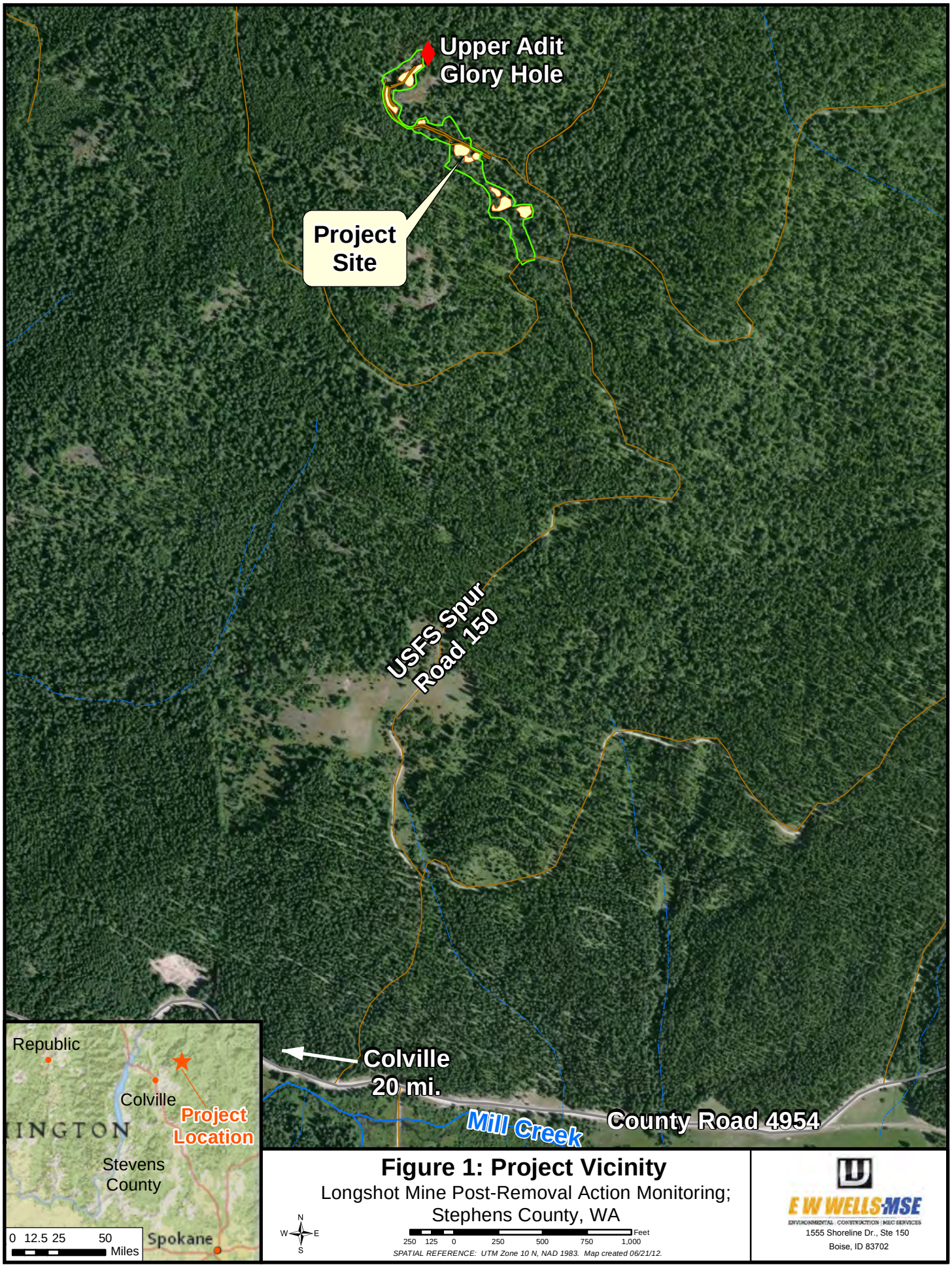


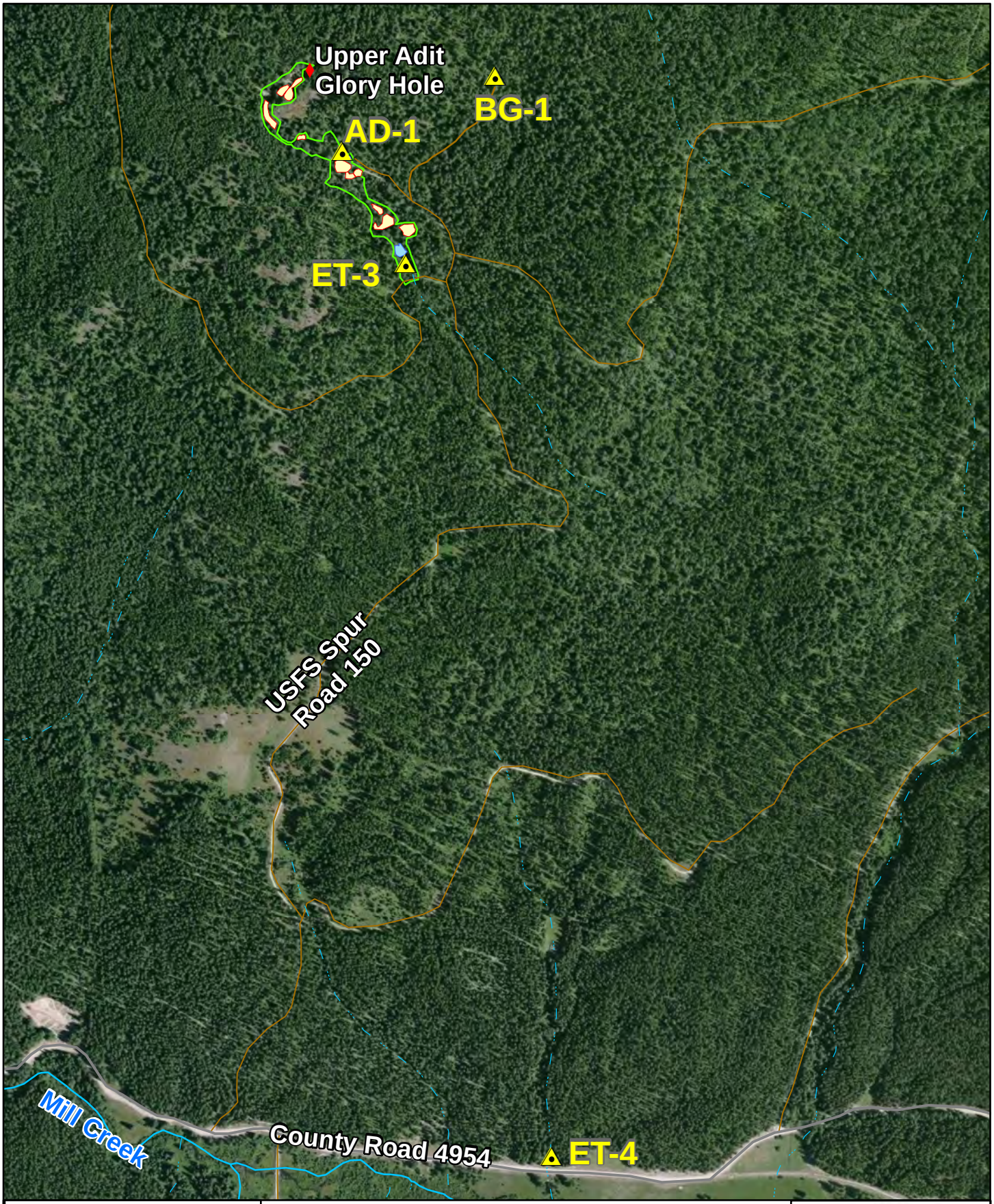
Figure 1: Project Vicinity

Longshot Mine Post-Removal Action Monitoring;
Stephens County, WA

SPATIAL REFERENCE: UTM Zone 10 N, NAD 1983. Map created 06/21/12.

E W WELLS-MSE
ENVIRONMENTAL · CONSTRUCTION | MEC SERVICES
1555 Shoreline Dr., Ste 150
Boise, ID 83702

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Legend

- Sample Points
- Project Limits
- Waste Area

N
W E
S

Figure 2: Sample Locations

Longshot Mine Post-Removal Action;
Stephens County, WA

0.25 0.125 0 0.25 Miles

SPATIAL REFERENCE: UTM Zone 10 N, NAD 1983. Map created 02/13/12. File: Fig2_Samples.mxd Pr. No. 3149

E W WELLS-MSE
ENVIRONMENTAL | CONSTRUCTION | MEC SERVICES
1555 Shoreline Dr., Ste 150
Boise, ID 83702

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TABLES

Table 1. Post-Removal Monitoring Sampling and Analysis Summary

Location	Medium	Number of Samples	Analyses
Adit Discharge (AD-1)	Surface Water Sediment	1 each	Total & Dissolved Metals: Ag, As, Ba, Cd, Pb, Zn Water only add: Sulfate, TDS, TSS, Hardness Field Parameters: pH, Temp, DO, EC, ORP/Eh
Ephemeral Stream East of site (BG-1, Background)	Surface Water Sediment	1 each	Total & Dissolved Metals: Ag, As, Ba, Cd, Pb, Zn Water only add: Sulfate, TDS, TSS, Hardness Field Parameters: pH, Temp, DO, EC, ORP/Eh
Ephemeral Stream Below Lower Tailings & Reservoir (ET-3)	Surface Water Sediment	1 each	Total & Dissolved Metals: Ag, As, Ba, Cd, Pb, Zn Water only add: Sulfate, TDS, TSS, Hardness Field Parameters: pH, Temp, DO, EC, ORP/Eh
Ephemeral Stream Before Discharge to Mill Creek (ET-4)	Surface Water Sediment	1 each	Total & Dissolved Metals: Ag, As, Ba, Cd, Pb, Zn Water only add: Sulfate, TDS, TSS, Hardness Field Parameters: pH, Temp, DO, EC, ORP/Eh
	Benthic Organisms	1	Taxonomy, generally to genus/species
Site	Water QA/QC	1 Blank, 1 MS/MSD	Total & Dissolved Metals: Ag, As, Ba, Cd, Pb, Zn Sulfate TDS, TSS, Hardness,

DO – Dissolved oxygen

EC – Electrical conductivity

MS/MSD – Matrix spike/matrix spike duplicate

ORP/Eh – Oxygen reduction potential

TDS – Total dissolved solids

Temp – Temperature

TSS – Total suspended solids

Table 2. Surface Water Sample Results

Sample ID	Date Collected	Hardness (mg/L)	Analyte Concentration (µg/L)												Total Recoverable Analyte Concentration (mg/L)				
			Ag		As		Ba		Cd		Pb		Zn						
			Tot	Diss	Tot	Diss	Tot	Diss	Tot	Diss	Tot	Diss	Tot	Diss	TDS	TSS	SO_4	Ca	Mg
Background																			
BG-1	10/19/2011	176	< 5.0	< 5.0	*< 3.0*	< 3.0	11.6	10.6	< 0.2	< 0.2	< 3.0	< 3.0	< 10.0	< 10.0	206	< 5.0	7.2	65.0	3.4
	4/25/2012	118	< 0.1	< 0.1	*< 3.0*	< 3.0	6.7	7.5	< 0.2	< 0.2	< 3.0	< 3.0	< 10.0	< 10.0	163	< 5.0	7.5	44.0	1.9
	4/30/2013	145	< 0.1	< 0.1	*< 3.0*	< 3.0	7.4	8.4	< 0.2	< 0.2	< 3.0	< 3.0	< 10.0	< 10.0	173	19	7.6	53.8	2.56
	4/19/2014	159	< 0.1	< 0.1	*< 3.0*	< 3.0	9.5	8.2	< 0.2	< 0.2	< 3.0	< 3.0	< 10.0	< 10.0	195	< 5.0	10.4	58.8	2.91
Site																			
AD-1	10/19/2011	215	< 5.0	< 5.0	*< 3.0*	< 3.0	2.9	2.7	0.58	**0.37**	**3.8**	< 3.0	42.7	29.8	230	< 5.0	23	80.7	3.4
	4/25/2012	212	< 0.1	< 0.1	*< 3.0*	< 3.0	5.1	5.8	1.3	**1.2**	< 3.0	< 3.0	81.0	73.7	**275**	< 5.0	31	78.6	3.9
	4/30/2013	224	< 0.1	< 0.1	*< 3.0*	< 3.0	6.2	4.8	1.1	**0.86**	< 3.0	< 3.0	65.6	47.3	**258**	6.0	23.7	83.6	3.6
	4/19/2014	212	< 0.1	< 0.1	*< 3.0*	< 3.0	4.9	4.4	0.98	**0.99**	< 3.0	< 3.0	71.4	58.6	**257**	37	27.5	77.6	4.3
ET-3	10/19/2011	248	< 5.0	< 5.0	**4.6**	< 3.0	48.0	10.0	1.0	< 0.2	**65.7**	< 3.0	163	< 10.0	**259**	89	10	87.6	7.2
	4/25/2012	167	< 0.1	< 0.1	*< 3.0*	< 3.0	15.5	12.9	< 0.2	< 0.2	7.9	< 3.0	12.8	< 10.0	220	< 5.0	19	59.1	4.8
	4/30/2013	194	0.10	< 0.1	*< 3.0*	< 3.0	14.6	12.3	0.21	< 0.2	**37.5**	< 3.0	33.5	< 10.0	212	8.0	20	68.4	5.7
	4/19/2014	198	< 0.1	< 0.1	*< 3.0*	< 3.0	11.3	10.9	< 0.2	< 0.2	< 3.0	< 3.0	24.5	19.4	247	< 5.0	31.6	69.4	6.1
ET-4	10/19/2011 (dry)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/25/2012	142	< 0.1	< 0.1	*< 3.0*	< 3.0	12.8	13.3	< 0.2	< 0.2	< 3.0	< 3.0	< 10.0	< 10.0	181	< 5.0	6.0	48.5	5.0
	4/30/2013	176	< 0.1	< 0.1	*< 3.0*	< 3.0	12.8	14.7	< 0.2	< 0.2	< 3.0	< 3.0	< 10.0	< 10.0	204	5.0	5.8	58.9	6.9
	4/19/2014	203	< 0.1	< 0.1	*< 3.0*	< 3.0	15.6	15.4	< 0.2	< 0.2	< 3.0	< 3.0	< 10.0	< 10.0	236	< 5.0	5.2	66.8	8.7
minimum (excluding background) =		142	0.1	< 0.1	4.6	< 3.0	2.9	2.70	0.21	0.37	3.8	< 3.0	12.8	19.4	181	5.0	5.2	48.5	3.4
maximum (excluding background) =		248	0.1	< 5.0	4.6	< 3.0	48.0	15.4	1.3	1.2	65.7	< 3.0	163	73.7	275	89	31.6	87.6	8.7
average (excluding background) =		199	0.1	NA	4.6	< 3.0	13.6	9.7	0.9	0.87	28.7	< 3.0	61.8	45.8	234	29	18.4	70.8	5.4
Human Health Screening Criteria																			
Washington Ambient Water Quality Criteria[a]		NS	NS	NS	**0.018**	NS	NS	NS	NS	NS	NS	NS	5,000	NS	NS	NS	NS	NS	NS
Washington Drinking Water Criteria[b]		NS	100	NS	10.0	NS	2,000	2,000	5.0	5.0	**15.0**	15.0	5,000	NS	500	NS	NS	NS	NS
EPA Chronic Ambient Water Quality Criteria[c]		NS	NS	NS	**0.018**	NS	1,000	NS	NS	NS	NS	NS	7,400	NS	**250**	NS	NS	NS	NS
Ecological Screening Criteria[d]																			
Washington Toxic Substances Criteria[e]		NS	NS	NS	NS	190	NS	NS	NS	1.36	NS	3.8	NS	144	NS	NS	230	NS	NS
EPA Chronic Ambient Water Quality Criteria[f]		NS	NS	NS	NS	150	NS	NS	NS	**0.32**	NS	3.8	NS	163	**250**	NS	230	NS	NS

[a]State of Washington ambient water quality criteria for protection of human health, TSDCALC.XLS spreadsheet, WDOE website, 2010

[b]State of Washington Drinking Water Criteria (MCLs) WAC 246-290-310 (WDOE 2010)

[c]EPA recommended chronic ambient water quality criteria for human consumption of water and fish (2009)

[d]Criteria for hardness dependent metals are based on an average hardness of 146 mg/L in the background stream site (BG-1)

[e]State of Washington Toxic Substances Criteria for Protection of Aquatic Life, Chronic Criterion, Table 240(3) - WAC 173-201A-240 (WDOE 2010)

[f]EPA recommended chronic ambient water quality criteria for freshwater aquatic life (EPA 2009); if none existed then used Tier II secondary chronic values (NOAA 1999)

Bold and shadded concentrations exceed screening criteria

italics - Reporting limit greater than criteria

< value - analyte is less than reporting limit

Diss - Dissolved concentration

DO - Dissolved oxygen

EC - Electrical conductivity in microsiemens per centimeter (ms/cm)

EPA - U.S. Environmental Protection Agency

µg/L - Microgram per liter

mg/L - Milligram per liter

NA - Not analyzed

NOAA - National Oceanic and Atmospheric Administration

NS - No standard

SO_4 - Sulfate

TDS - Total dissolved solids

TSS - Total suspended solids

WDOE - Washington Department of Ecology

Table 3. Field Parameter Results

Sample ID	Date Collected	Hardness (mg/L)	pH	Temperature (^{o}C)	ORP (mV)	DO (mg/L)	SC (µS/cm)
Background							
BG-1	10/19/2011	176	7.85	NA	457	NA	392
	4/25/2012	118	7.4	5.3	441[a]	11.2	221
	4/30/2013	145	7.8	4.9	205	12.4	229
	4/19/2014	159	8.1	5.2	33	10.9	336
Site							
AD-1	10/19/2011	215	7.95	NA	448	NA	467
	4/25/2012	212	7.2	8.0	485[a]	10.7	402
	4/30/2013	224	7.7	7.4	212	11.6	337
	4/19/2014	212	7.9	7.1	85	10.9	422
ET-3	10/19/2011	248	7.65	NA	462	NA	518
	4/25/2012	167	7.3	9.8	477[a]	8.3	309
	4/30/2013	194	7.6	6.7	130	10.3	291
	4/19/2014	198	7.9	6.3	56	10.0	400
ET-4	10/19/2011 (dry)	NA	NA	NA	NA	NA	NA
	4/25/2012	142	7.3	5.2	486[a]	96.1[b]	271
	4/30/2013	176	7.5	4.9	178	12.7	275
	4/19/2014	203	7.7	5.5	74	10.6	415

[a] Sample received and analyzed past holding time

[b] Suspect data

DO - Dissolved oxygen

mg/L - Milligram per liter

NA - Not analyzed

ORP - Oxygen reduction potential in millivolts (mV)

SC - Specific conductivity in microsiemens per centimeter (µs/cm)

Table 4. Sediment Sample Results

Sample ID	Date Collected	% Solids	Analyte Concentration (mg/kg)						
			Ag	As	Ba	Cd	Cu	Pb	Zn
Background:									
BG-1	10/19/2011	24.7	< 0.5	< 2.5	18	< 0.2	**31**	3.2	13
	4/25/2012	16.3	< 0.5	< 2.5	15	< 0.2	**28**	1.9	10
	4/30/2013	22.1	< 0.5	< 2.5	24.2	< 0.2	NA[a]	3.1	15.1
	4/19/2014	17.5	< 0.5	< 2.5	21.7	< 0.2	**41.6**	2.5	11.8
Site:									
AD-1	10/19/2011	29.0	< 0.5	< 2.5	12	**13.4**	**23**	**60**	**577**
	4/25/2012	43.6	< 0.5	< 2.5	22	**3.23**	**32**	**37**	**154**
	4/30/2013	59.5	0.58	**11.5**	59.7	**2.14**	NA[a]	19.2	**202**
	4/19/2014	51.1	< 0.5	**6.6**	49.3	**3.65**	**49.2**	25.6	**272**
ET-3	10/19/2011	22.4	1.4	**8.4**	90	**2.07**	7.5	**80**	**287**
	4/25/2012	36.6	**4.2**	**7.8**	55	**2.09**	**19**	**639**	**378**
	4/30/2013	39.3	**2.8**	**4.0**	28.8	**2.1**	NA[a]	**552**	**384**
	4/19/2014	37.4	**5.8**	**7.5**	25.7	**2.93**	**26.2**	**481**	**435**
ET-4	10/19/2011 (dry)	NA	NA	NA	NA	NA	NA	NA	NA
	4/25/2012	71.2	< 0.5	**2.5**	79	0.33	**16**	9.7	56
	4/30/2013	55.1	< 0.5	**3.6**	99.8	< 0.2	NA[a]	13.7	84
	4/19/2014	54.0	< 0.5	**2.5**	88.8	< 0.2	**18.5**	11.6	59
minimum (excluding background) =		22.4	0.58	2.5	12	0.33	7.5	9.7	56
maximum (excluding background) =		71.20	5.76	11.5	99.8	13.4	49	639	577
average (excluding background) =		45.4	2.9	6.0	46.8	3.55	24	175	263
Human Health Screening Criteria:									
Washington MTCA Method A Industrial Soil Cleanup Levels[b]			NS	**20**	NS	**2.0**	NS	1000	NS
EPA Regional Screening Levels for Industrial Soil[c]			5,100	**1.6**	190000	800	41,000	800	310000
Ecological Screening Criteria:									
Washington Recommended Freshwater Sediment Quality Values[d]			**2.0**	**20**	NS	**0.6**	80	**335**	**140**
Washington Freshwater Sediment Quality Values in Development[e]			**3.9**	**5.9**	NS	**0.6**	**16**	**31**	**110**
EPA Threshold Effects Levels[f]			NS	**5.9**	NS	**0.6**	**35.7**	**35**	**123**
EPA Freshwater Probable Effects Level[g]			NS	**17**	NS	**3.53**	197	**91**	**315**

[a]Copper was not identified as a chemical of concern and not included as a chemical to be tested in the Post Removal Action Monitoring and O&M Plan (MSE 2011). Thus, it was not analyzed in 2013.

[b]WDOE MTCA Method A Industrial Soil Cleanup Levels – Human Receptors (WDOE 2010)

[c]EPA Regional Screening Levels, Industrial Soil (EPA 2012)

[d]State of Washington Development of Freshwater Sediment Quality Values (WDOE 2004) - recommended only

[e]State of Washington Development of Freshwater Sediment Quality Values (WDOE 2004) - in development

[f]EPA Threshold Effects Level (NOAA 1999)

[g]EPA Freshwater Probable Effects Level (NOAA 1999)

Bold and shadded concentrations exceed screening criteria

< value - analyte is less than reporting limit

EPA - U.S. Environmental Protection Agency

MTCA - Model Toxics Control Act

mg/kg - Milligram per kilogram

NOAA - National Oceanic and Atmospheric Administration

NA - Not analyzed

NS - No standard

WDOE - Washington Department of Ecology

Table 5. Benthic Macroinvertebrate Taxa Abundance

Taxon	ET-4					
	4/25/2012		4/30/2013		4/19/2014	
	Abundance	%	Abundance	%	Abundance	%
Turbellaria	6	0.35	0	0	0	0
Nemata	42	2.25	64	18.77	126	14.29
Oligochaeta	109	5.87	115	33.72	56	6.35
Lymnaeidae	13	0.69	0	0	0	0
Ostracoda	16	0.86	44	12.9	0	0
Acari	0	0	0	0	24	2.72
Non-Insect Total	**186**	**10.02**	**223**	**65.39**	**206**	**23.36**
Hydroporinae	0	0	0	0	2	0.23
Ochthebius	0	0	0	0	4	0.45
Hydrophilidae	0	0	0	0	2	0.23
Coleoptera Total	**0**	**0**	**0**	**0**	**8**	**1**
Prostoia besametsa	0	0	10	2.93	0	0
Plecoptera Total	**0**	**0**	**10**	**2.93**	**0**	**0**
Limnephilidae	106	5.7	1	0.29	0	0
Trichoptera Total	**106**	**5.7**	**1**	**0.29**	**0**	**0**
Ceratopogoninae	3	0.17	4	1.17	0	0
Dolichopodidae	3	0.17	0	0	0	0
Mycetophilidae	3	0.17	0	0	0	0
Dasyhelea	0	0	0	0	4	0.45
Ephydridae	0	0	0	0	2	0.23
Twinnia	122	6.56	14	4.11	74	8.39
Caloparyphus	3	0.17	0	0	0	0
Tipula	35	1.9	0	0	12	1.36
Chironomidae	0	0	1	0.29	0	0
Diamesa	19	1.04	0	0	0	0
Macropelopia	0	0	1	0.29	0	0
Metriocnemus	6	0.35	0	0	0	0
Orthocladius	1229	66.32	56	16.42	0	0
Pagastia	0	0	8	2.35	0	0
Pseudodiamesa	0	0	3	0.88	0	0
Psilometriocnemus	0	0	1	0.29	0	0
Chaetocladius	0	0	0	0	562	63.72
Hydrobaenus	0	0	0	0	2	0.23
Rheocricotopus	102	5.53	19	5.57	4	0.45
Smittia	35	1.9	0	0	8	0.91
Diptera Total	**1562**	**84.28**	**107**	**31.37**	**668**	**76**
Grand Total	**1853**	**100**	**341**	**100**	**882**	**100**

APPENDIX 1

Field Forms

Water Sample Collection Record

SAMPLE ID:	BG-1
Sample Location:	Longshot Mine
Description:	Background stream, east of the site
Date:	4/19/2014
Field Personnel:	B. Lambeth
Conditions:	warm, ~ 68 °F
Weather:	overcast

FIELD PARAMETER MEASUREMENT

Field Meter:	Field Parameters:	Observation 1	Observation 2	Observation 3
YSI	Temperature (Celcius)	5.2		
	pH (pH units)	8.1		
	SpCond (microS/cm)	336		
	Dissolved O_2 (mg/L)	10.9		
	ORP (mV)	33		

Method:	
Measurement START Time:	Measurement END Time:

FLOW MEASUREMENT

Method:	Flow Meter:	Flume:	Timed Volumetric:
Description:	visual observation		
Flow:	6-7 gpm		

SAMPLE COLLECTION

Sample Method:	Bottle	✓	Pump	Other:
Sample Collection Time:				

			Size		Filtration		Analysis						Preservative			
Sample ID	Time	# of Sample Containers	500-mL plastic bottle	250-mL plastic bottle	Filtered	Unfiltered	Total Metals	Dissolved Metals	Sulfate, TDS, TSS, hardness, Ca, Mg				HCl	HNO_3	NaOH	NONE
BG-1	15:00	**3**	**x**			**x**	**x**	**x**	**x**					**x**		

COMMENTS

Water Sample Collection Record

SAMPLE ID:	AD-1
Sample Location:	Longshot Mine
Description:	Adit discharge
Date:	4/19/2014
Field Personnel:	B. Lambeth
Conditions:	warm, ~ 68 °F
Weather:	hazy, overcast

FIELD PARAMETER MEASUREMENT

Field Meter:	**Field Parameters:**	**Observation 1**	**Observation 2**	**Observation 3**
YSI	Temperature (Celcius)	7.1		
	pH (pH units)	7.9		
	SpCond (microS/cm)	422		
	Dissolved O_2 (mg/L)	10.9		
	ORP (mV)	85		

Method:	
Measurement START Time:	Measurement END Time:

FLOW MEASUREMENT

Method:	Flow Meter:	Flume:	Timed Volumetric:
Description:	visual observation		
Flow:	3-4 gpm		

SAMPLE COLLECTION

Sample Method:	Bottle	✓	Pump	Other:
Sample Collection Time:				

			Size		Filtration		Analysis						Preservative			
Sample ID	Time	# of Sample Containers	500-mL plastic bottle	250-mL plastic bottle	Filtered	Unfiltered	Total Metals	Dissolved Metals	Sulfate, TDS, TSS, hardness, Ca, Mg				HCl	HNO_3	NaOH	NONE
AD-1	14:10	**3**	**x**			**x**	**x**	**x**	**x**					**x**		

COMMENTS

Water Sample Collection Record

SAMPLE ID:	ET-3
Sample Location:	Longshot Mine
Description:	area below lower tailings impoundment and pond/reservoir
Date:	4/19/2014
Field Personnel:	B. Lambeth
Conditions:	warm, ~ 68 °F
Weather:	overcast

FIELD PARAMETER MEASUREMENT

Field Meter:	Field Parameters:	Observation 1	Observation 2	Observation 3
YSI	Temperature (Celcius)	6.3		
	pH (pH units)	7.9		
	SpCond (microS/cm)	400		
	Dissolved O_2 (mg/L)	10.0		
	ORP (mV)	56		

Method:	
Measurement START Time:	Measurement END Time:

FLOW MEASUREMENT

Method:	Flow Meter:	Flume:	Timed Volumetric:
Description:	visual observation		
Flow:	7-9 gpm		

SAMPLE COLLECTION

Sample Method:	Bottle	✓	Pump	Other:
Sample Collection Time:				

			Size		Filtration		Analysis						Preservative			
Sample ID	Time	# of Sample Containers	500-mL plastic bottle	250-mL plastic bottle	Filtered	Unfiltered	Total Metals	Dissolved Metals	Sulfate, TDS, TSS, hardness, Ca, Mg				HCl	HNO_3	NaOH	NONE
ET-3	15:45	**3**	**x**			**x**	**x**	**x**	**x**					**x**		

COMMENTS

Water Sample Collection Record

SAMPLE ID:	ET-4
Sample Location:	Longshot Mine
Description:	pond N of Country Road, prior to discharge to Mill Creek
Date:	4/19/2014
Field Personnel:	B. Lambeth
Conditions:	warm, ~ 68 °F
Weather:	overcast

FIELD PARAMETER MEASUREMENT

Field Meter:	Field Parameters:	Observation 1	Observation 2	Observation 3
YSI	Temperature (Celcius)	5.5		
	pH (pH units)	7.7		
	SpCond (microS/cm)	415		
	Dissolved O_2 (mg/L)	10.6		
	ORP (mV)	74		

Method:	
Measurement START Time:	Measurement END Time:

FLOW MEASUREMENT

Method:	Flow Meter:	Flume:	Timed Volumetric:
Description:	0.3 m/s depth = 5.25 inches width of flow = 16 inches		
Flow:			

SAMPLE COLLECTION

Sample Method:	Bottle	✓	Pump	Other:
Sample Collection Time:				

Sample ID	Time	# of Sample Containers	Size		Filtration		Analysis						Preservative			
			500-mL plastic bottle	250-mL plastic bottle	Filtered	Unfiltered	Total Metals	Dissolved Metals	Sulfate, TDS, TSS, hardness, Ca, Mg				HCl	HNO_3	NaOH	NONE
ET-4	16:30	**3**	**x**			**x**	**x**	**x**	**x**					**x**		
ET-5 (duplicate)	16:45	**3**	**x**			**x**	**x**	**x**	**x**					**x**		

COMMENTS

- duplicate sample (ET-5) taken here at 16:45

Soil / Sediment Sample Collection Record

SAMPLE ID:	BG-1
Sample Location:	Longshot Mine
Description:	Background stream, east of the site
Date:	4/19/2014
Field Personnel:	B. Lambeth
Conditions:	warm, ~ 68 °F
Weather:	overcast

METHOD

Grab: Depth: ~ 6 inches

Composite:

Habitat	Depth	Comments

SAMPLE COLLECTION

Equipment: Trowel Push Sampler Other: spoon

Sample Collection Time: 15:00

Sample ID	# Sample Containers	Size			Analysis								Other			
		8 oz glass jar	4 oz glass jar	zip-lock bag	Total Metals											
BG-1	**1**			**x**	**x**											

DESCRIPTION/COMMENTS

Soil / Sediment Sample Collection Record

SAMPLE ID:	AD-1
Sample Location:	Longshot Mine
Description:	Adit discharge
Date:	4/19/2014
Field Personnel:	B. Lambeth
Conditions:	warm, ~ 68 °F
Weather:	overcast

METHOD

Grab: Depth: ~ 6 inches

Composite:	Habitat	Depth	Comments

SAMPLE COLLECTION

Equipment: Trowel Push Sampler Other: spoon

Sample Collection Time: 14:10

Sample ID	# Sample Containers	Size			Analysis								Other			
		8 oz glass jar	4 oz glass jar	zip-lock bag	Total Metals											
AD-1	**1**			**x**	**x**											

DESCRIPTION/COMMENTS

Soil / Sediment Sample Collection Record

SAMPLE ID:	ET-3
Sample Location:	Longshot Mine
Description:	area below lower tailings impoundment and pond/reservoir
Date:	4/19/2014
Field Personnel:	B. Lambeth
Conditions:	warm, ~ 68 °F
Weather:	overcast

METHOD

Grab: Depth: ~ 6 inches

Composite:

Habitat	Depth	Comments

SAMPLE COLLECTION

Equipment: Trowel Push Sampler Other: spoon

Sample Collection Time: 15:45

Sample ID	# Sample Containers	Size: 8 oz glass jar	Size: 4 oz glass jar	Size: zip-lock bag	Analysis: Total Metals	Analysis	Analysis	Analysis	Analysis	Analysis	Analysis	Analysis	Other	Other	Other	Other
ET-3	**1**			**x**	**x**											

DESCRIPTION/COMMENTS

Soil / Sediment Sample Collection Record

SAMPLE ID:	ET-4
Sample Location:	Longshot Mine
Description:	pond N of Country Road, prior to discharge to Mill Creek
Date:	4/19/2014
Field Personnel:	B. Lambeth
Conditions:	warm, ~ 68 °F
Weather:	overcast

METHOD

Grab: Depth: ~ 6 inches

Composite:

Habitat	Depth	Comments

SAMPLE COLLECTION

Equipment: Trowel Push Sampler Other: spoon

Sample Collection Time: 16:30

Sample ID	# Sample Containers	Size			Analysis								Other			
		8 oz glass jar	4 oz glass jar	zip-lock bag	Total Metals											
ET-4	**1**			**x**	**x**											
ET-5 (duplicate)	**1**			**x**	**x**											

DESCRIPTION/COMMENTS

- duplicate sample (ET-5) taken here at 16:45

Benthic Invertebrate Collection Record

Sample ID:	ET-4				
Project:	Longshot Mine				
Location:	pond N of Country Road, prior to discharge to Mill Creek				
Field Personnel:	B. Lambeth				
Date:	4/19/2014	Time:	16:30	Weather:	overcast, ~ 68 °F

SAMPLE COLLECTION

Gear Used:	✓ D-frame	kick-net	other:	
How were the samples collected?	wading	✓ from bank	from boat	
Indicate the number of jabs/kicks taken from each habitat type:				
	cobble ___	snags ___	vegetated banks ___	sand ___
	submerged macrophytes ___	other: ~20 jabs/kicks around pond and discharge point		

HABITAT TYPES

Indicate each habitat type present:				
	cobble ___	snags ___	vegetated banks: ✓	sand ___
	submerged macrophytes ___	other: grass and sediment bottom		

COMMENTS

- seasonal pond, approximately 30 square feet in size

APPENDIX 2

Laboratory Results

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

MSE - Boise
1555 Shoreline Dr. #150
Boise, ID 83702

Project Name: Long Shot 2012
Work Order: **W4D0366**
Reported: 30-Apr-14 10:07

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Sampled By	Date Received
AD-1	W4D0366-01	Surface Water	19-Apr-14 14:10	RHL	21-Apr-2014
ET-3	W4D0366-02	Surface Water	19-Apr-14 15:45	RHL	21-Apr-2014
BG-1	W4D0366-03	Surface Water	19-Apr-14 15:00	RHL	21-Apr-2014
ET-4	W4D0366-04	Surface Water	19-Apr-14 16:30	RHL	21-Apr-2014
ET-5	W4D0366-05	Surface Water	19-Apr-14 16:45	RHL	21-Apr-2014
AD-1	W4D0366-06	Sediment	19-Apr-14 00:00	RHL	21-Apr-2014
ET-3	W4D0366-07	Sediment	19-Apr-14 00:00	RHL	21-Apr-2014
BG-1	W4D0366-08	Sediment	19-Apr-14 00:00	RHL	21-Apr-2014
ET-4	W4D0366-09	Sediment	19-Apr-14 00:00	RHL	21-Apr-2014
ET-5	W4D0366-10	Sediment	19-Apr-14 00:00	RHL	21-Apr-2014

Solid samples are analyzed on an as-received, wet-weight basis, unless otherwise requested. Non-Detects are reported at the MDL.
Sample preparation is defined by the client as per their Data Quality Objectives.
This report supercedes any previous reports for this Work Order. The complete report includes pages for each sample, a full QC report, and a notes section.
The results presented in this report relate only to the samples, and meet all requirements of the NELAC Standards unless otherwise noted.

Case Narrative

The client requested SVL filter and preserve the samples in the lab for dissolved metals.

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

MSE - Boise
1555 Shoreline Dr. #150
Boise, ID 83702

Project Name: Long Shot 2012
Work Order: **W4D0366**
Reported: 30-Apr-14 10:07

Client Sample ID: **AD-1**
SVL Sample ID: **W4D0366-01 (Surface Water)**

Sample Report Page 1 of 1

Sampled: 19-Apr-14 14:10
Received: 21-Apr-14
Sampled By: RHL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Barium**	0.0049	mg/L	0.0020	0.0002		W417079	MCE	04/24/14 11:59	
EPA 200.7	**Calcium**	77.6	mg/L	0.040	0.009		W417079	MCE	04/24/14 11:59	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.003		W417079	MCE	04/24/14 11:59	
EPA 200.7	**Magnesium**	4.33	mg/L	0.200	0.020		W417079	MCE	04/24/14 11:59	
EPA 200.7	**Zinc**	0.0714	mg/L	0.0100	0.0012		W417079	MCE	04/24/14 11:59	
EPA 200.8	Arsenic	< 0.0030	mg/L	0.0030	0.0004	2.5	W417089	KWH	04/24/14 07:59	
EPA 200.8	**Cadmium**	0.00098	mg/L	0.00020	0.00004	2.5	W417089	KWH	04/24/14 07:59	
EPA 200.8	Lead	< 0.00300	mg/L	0.00300	0.000044	2.5	W417089	KWH	04/24/14 07:59	
EPA 200.8	Silver	< 0.000100	mg/L	0.000100	0.000022	2.5	W417089	KWH	04/24/14 07:59	
SM 2340B	**Hardness (as CaCO3)**	212	mg/L	0.923	0.103		N/A		04/24/14 11:59	
Metals (Dissolved)										
EPA 200.7	**Barium**	0.0044	mg/L	0.0020	0.0005		W417081	AS	04/27/14 10:00	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.006		W417081	AS	04/27/14 10:00	
EPA 200.7	**Zinc**	0.0586	mg/L	0.0100	0.0023		W417081	AS	04/27/14 10:00	
EPA 200.8	Arsenic	< 0.0030	mg/L	0.0030	0.0003		W417091	KWH	04/23/14 10:03	
EPA 200.8	**Cadmium**	0.00099	mg/L	0.00020	0.000031		W417091	KWH	04/23/14 10:03	
EPA 200.8	Lead	< 0.00300	mg/L	0.00300	0.000035		W417091	KWH	04/23/14 10:03	
EPA 200.8	Silver	< 0.000100	mg/L	0.000100	0.000018		W417091	KWH	04/23/14 10:03	
Classical Chemistry Parameters										
SM 2540 C	**Total Diss. Solids**	257	mg/L	10			W417097	RS	04/23/14 09:55	
SM 2540 D	**Total Susp. Solids**	37.0	mg/L	5.0			W417096	RS	04/23/14 09:55	
Anions by Ion Chromatography										
EPA 300.0	**Sulfate as SO4**	27.5	mg/L	0.30	0.06		W417062	AEW	04/22/14 11:46	M1

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

MSE - Boise
1555 Shoreline Dr. #150
Boise, ID 83702

Project Name: Long Shot 2012
Work Order: **W4D0366**
Reported: 30-Apr-14 10:07

Client Sample ID: **ET-3**
SVL Sample ID: **W4D0366-02 (Surface Water)**

Sample Report Page 1 of 1

Sampled: 19-Apr-14 15:45
Received: 21-Apr-14
Sampled By: RHL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Barium**	0.0113	mg/L	0.0020	0.0002		W417079	MCE	04/24/14 12:07	
EPA 200.7	**Calcium**	69.4	mg/L	0.040	0.009		W417079	MCE	04/24/14 12:07	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.003		W417079	MCE	04/24/14 12:07	
EPA 200.7	**Magnesium**	6.05	mg/L	0.200	0.020		W417079	MCE	04/24/14 12:07	
EPA 200.7	**Zinc**	0.0245	mg/L	0.0100	0.0012		W417079	MCE	04/24/14 12:07	
EPA 200.8	Arsenic	< 0.0030	mg/L	0.0030	0.0004	2.5	W417089	KWH	04/24/14 07:36	
EPA 200.8	Cadmium	< 0.00020	mg/L	0.00020	0.00004	2.5	W417089	KWH	04/24/14 07:36	
EPA 200.8	Lead	< 0.00300	mg/L	0.00300	0.000044	2.5	W417089	KWH	04/24/14 07:36	
EPA 200.8	Silver	< 0.000100	mg/L	0.000100	0.000022	2.5	W417089	KWH	04/24/14 07:36	
SM 2340B	**Hardness (as CaCO3)**	198	mg/L	0.923	0.103		N/A		04/24/14 12:07	
Metals (Dissolved)										
EPA 200.7	**Barium**	0.0109	mg/L	0.0020	0.0005		W417081	AS	04/27/14 10:03	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.006		W417081	AS	04/27/14 10:03	
EPA 200.7	**Zinc**	0.0194	mg/L	0.0100	0.0023		W417081	AS	04/27/14 10:03	
EPA 200.8	Arsenic	< 0.0030	mg/L	0.0030	0.0003		W417091	KWH	04/23/14 10:07	
EPA 200.8	Cadmium	< 0.00020	mg/L	0.00020	0.000031		W417091	KWH	04/23/14 10:07	
EPA 200.8	Lead	< 0.00300	mg/L	0.00300	0.000035		W417091	KWH	04/23/14 10:07	
EPA 200.8	Silver	< 0.000100	mg/L	0.000100	0.000018		W417091	KWH	04/23/14 10:07	
Classical Chemistry Parameters										
SM 2540 C	**Total Diss. Solids**	247	mg/L	10			W417097	RS	04/23/14 09:55	
SM 2540 D	Total Susp. Solids	< 5.0	mg/L	5.0			W417096	RS	04/23/14 09:55	
Anions by Ion Chromatography										
EPA 300.0	**Sulfate as SO4**	31.6	mg/L	0.30	0.06		W417062	AEW	04/22/14 12:14	

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John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

MSE - Boise
1555 Shoreline Dr. #150
Boise, ID 83702

Project Name: Long Shot 2012
Work Order: **W4D0366**
Reported: 30-Apr-14 10:07

Client Sample ID: **BG-1**
SVL Sample ID: **W4D0366-03 (Surface Water)**

Sampled: 19-Apr-14 15:00
Received: 21-Apr-14
Sampled By: RHL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Barium**	0.0095	mg/L	0.0020	0.0002		W417079	MCE	04/24/14 12:10	
EPA 200.7	**Calcium**	58.8	mg/L	0.040	0.009		W417079	MCE	04/24/14 12:10	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.003		W417079	MCE	04/24/14 12:10	
EPA 200.7	**Magnesium**	2.91	mg/L	0.200	0.020		W417079	MCE	04/24/14 12:10	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0012		W417079	MCE	04/24/14 12:10	
EPA 200.8	Arsenic	< 0.0030	mg/L	0.0030	0.0004	2.5	W417089	KWH	04/24/14 07:38	
EPA 200.8	Cadmium	< 0.00020	mg/L	0.00020	0.00004	2.5	W417089	KWH	04/24/14 07:38	
EPA 200.8	Lead	< 0.00300	mg/L	0.00300	0.000044	2.5	W417089	KWH	04/24/14 07:38	
EPA 200.8	Silver	< 0.000100	mg/L	0.000100	0.000022	2.5	W417089	KWH	04/24/14 07:38	
SM 2340B	**Hardness (as CaCO3)**	159	mg/L	0.923	0.103		N/A		04/24/14 12:10	
Metals (Dissolved)										
EPA 200.7	**Barium**	0.0082	mg/L	0.0020	0.0005		W417081	AS	04/27/14 10:07	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.006		W417081	AS	04/27/14 10:07	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0023		W417081	AS	04/27/14 10:07	
EPA 200.8	Arsenic	< 0.0030	mg/L	0.0030	0.0003		W417091	KWH	04/23/14 10:09	
EPA 200.8	Cadmium	< 0.00020	mg/L	0.00020	0.000031		W417091	KWH	04/23/14 10:09	
EPA 200.8	Lead	< 0.00300	mg/L	0.00300	0.000035		W417091	KWH	04/23/14 10:09	
EPA 200.8	Silver	< 0.000100	mg/L	0.000100	0.000018		W417091	KWH	04/23/14 10:09	
Classical Chemistry Parameters										
SM 2540 C	**Total Diss. Solids**	195	mg/L	10			W417097	RS	04/23/14 09:55	
SM 2540 D	Total Susp. Solids	< 5.0	mg/L	5.0			W417096	RS	04/23/14 09:55	
Anions by Ion Chromatography										
EPA 300.0	**Sulfate as SO4**	10.4	mg/L	0.30	0.06		W417062	AEW	04/22/14 12:23	

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John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

MSE - Boise
1555 Shoreline Dr. #150
Boise, ID 83702

Project Name: Long Shot 2012
Work Order: **W4D0366**
Reported: 30-Apr-14 10:07

Client Sample ID: **ET-4**
SVL Sample ID: **W4D0366-04 (Surface Water)**

Sample Report Page 1 of 1

Sampled: 19-Apr-14 16:30
Received: 21-Apr-14
Sampled By: RHL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Barium**	0.0156	mg/L	0.0020	0.0002		W417079	MCE	04/24/14 12:13	
EPA 200.7	**Calcium**	66.8	mg/L	0.040	0.009		W417079	MCE	04/24/14 12:13	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.003		W417079	MCE	04/24/14 12:13	
EPA 200.7	**Magnesium**	8.72	mg/L	0.200	0.020		W417079	MCE	04/24/14 12:13	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0012		W417079	MCE	04/24/14 12:13	
EPA 200.8	Arsenic	< 0.0030	mg/L	0.0030	0.0004	2.5	W417089	KWH	04/24/14 07:39	
EPA 200.8	Cadmium	< 0.00020	mg/L	0.00020	0.00004	2.5	W417089	KWH	04/24/14 07:39	
EPA 200.8	Lead	< 0.00300	mg/L	0.00300	0.000044	2.5	W417089	KWH	04/24/14 07:39	
EPA 200.8	Silver	< 0.000100	mg/L	0.000100	0.000022	2.5	W417089	KWH	04/24/14 07:39	
SM 2340B	**Hardness (as CaCO3)**	203	mg/L	0.923	0.103		N/A		04/24/14 12:13	
Metals (Dissolved)										
EPA 200.7	**Barium**	0.0154	mg/L	0.0020	0.0005		W417081	AS	04/27/14 10:10	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.006		W417081	AS	04/27/14 10:10	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0023		W417081	AS	04/27/14 10:10	
EPA 200.8	Arsenic	< 0.0030	mg/L	0.0030	0.0003		W417091	KWH	04/23/14 10:11	
EPA 200.8	Cadmium	< 0.00020	mg/L	0.00020	0.000031		W417091	KWH	04/23/14 10:11	
EPA 200.8	Lead	< 0.00300	mg/L	0.00300	0.000035		W417091	KWH	04/23/14 10:11	
EPA 200.8	Silver	< 0.000100	mg/L	0.000100	0.000018		W417091	KWH	04/23/14 10:11	
Classical Chemistry Parameters										
SM 2540 C	**Total Diss. Solids**	236	mg/L	10			W417097	RS	04/23/14 09:55	
SM 2540 D	Total Susp. Solids	< 5.0	mg/L	5.0			W417096	RS	04/23/14 09:55	
Anions by Ion Chromatography										
EPA 300.0	**Sulfate as SO4**	5.21	mg/L	0.30	0.06		W417062	AEW	04/22/14 12:33	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

SVL holds the following certifications:
AZ:0538, **CA**:2080, **FL**(**NELAC**):E87993, **ID**:ID00019 & ID00965 (Microbiology), **NV**:ID000192007A, **WA**:C573

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

MSE - Boise
1555 Shoreline Dr. #150
Boise, ID 83702

Project Name: Long Shot 2012
Work Order: **W4D0366**
Reported: 30-Apr-14 10:07

Client Sample ID: **ET-5**
SVL Sample ID: **W4D0366-05 (Surface Water)**

Sampled: 19-Apr-14 16:45
Received: 21-Apr-14
Sampled By: RHL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Barium**	0.0161	mg/L	0.0020	0.0002		W417079	MCE	04/24/14 12:16	
EPA 200.7	**Calcium**	69.5	mg/L	0.040	0.009		W417079	MCE	04/24/14 12:16	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.003		W417079	MCE	04/24/14 12:16	
EPA 200.7	**Magnesium**	9.21	mg/L	0.200	0.020		W417079	MCE	04/24/14 12:16	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0012		W417079	MCE	04/24/14 12:16	
EPA 200.8	Arsenic	< 0.0030	mg/L	0.0030	0.0004	2.5	W417089	KWH	04/24/14 07:40	
EPA 200.8	Cadmium	< 0.00020	mg/L	0.00020	0.00004	2.5	W417089	KWH	04/24/14 07:40	
EPA 200.8	Lead	< 0.00300	mg/L	0.00300	0.000044	2.5	W417089	KWH	04/24/14 07:40	
EPA 200.8	Silver	< 0.000100	mg/L	0.000100	0.000022	2.5	W417089	KWH	04/24/14 07:40	
SM 2340B	**Hardness (as CaCO3)**	211	mg/L	0.923	0.103		N/A		04/24/14 12:16	
Metals (Dissolved)										
EPA 200.7	**Barium**	0.0154	mg/L	0.0020	0.0005		W417081	AS	04/27/14 10:13	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.006		W417081	AS	04/27/14 10:13	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0023		W417081	AS	04/27/14 10:13	
EPA 200.8	Arsenic	< 0.0030	mg/L	0.0030	0.0003		W417091	KWH	04/23/14 10:12	
EPA 200.8	Cadmium	< 0.00020	mg/L	0.00020	0.000031		W417091	KWH	04/23/14 10:12	
EPA 200.8	Lead	< 0.00300	mg/L	0.00300	0.000035		W417091	KWH	04/23/14 10:12	
EPA 200.8	Silver	< 0.000100	mg/L	0.000100	0.000018		W417091	KWH	04/23/14 10:12	
Classical Chemistry Parameters										
SM 2540 C	**Total Diss. Solids**	241	mg/L	10			W417097	RS	04/23/14 09:55	
SM 2540 D	Total Susp. Solids	< 5.0	mg/L	5.0			W417096	RS	04/23/14 09:55	
Anions by Ion Chromatography										
EPA 300.0	**Sulfate as SO4**	5.28	mg/L	0.30	0.06		W417062	AEW	04/22/14 12:42	

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John Kern
Laboratory Director

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MSE - Boise
1555 Shoreline Dr. #150
Boise, ID 83702

Project Name: Long Shot 2012
Work Order: **W4D0366**
Reported: 30-Apr-14 10:07

Client Sample ID: **AD-1**
SVL Sample ID: **W4D0366-06 (Sediment)**

Sampled: 19-Apr-14 00:00
Received: 21-Apr-14
Sampled By: RHL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	**Arsenic**	6.6	mg/kg	2.5	0.8		W417107	MCE	04/29/14 13:09	
EPA 6010B	**Barium**	49.3	mg/kg	0.200	0.038		W417107	MCE	04/29/14 13:09	
EPA 6010B	**Cadmium**	3.65	mg/kg	0.20	0.04		W417107	MCE	04/29/14 13:09	
EPA 6010B	**Copper**	49.2	mg/kg	1.00	0.35		W417107	MCE	04/29/14 13:09	M1
EPA 6010B	**Lead**	25.6	mg/kg	0.75	0.25		W417107	MCE	04/29/14 13:09	
EPA 6010B	Silver	< 0.50	mg/kg	0.50	0.08		W417107	MCE	04/29/14 13:09	
EPA 6010B	**Zinc**	272	mg/kg	1.00	0.18		W417107	MCE	04/29/14 13:09	M2
Percent Solids										
Percent Solids	**% Solids**	51.1	%	0.1			W417112	HC	04/25/14 08:30	

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John Kern
Laboratory Director

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MSE - Boise
1555 Shoreline Dr. #150
Boise, ID 83702

Project Name: Long Shot 2012
Work Order: **W4D0366**
Reported: 30-Apr-14 10:07

Client Sample ID: **ET-3**
SVL Sample ID: **W4D0366-07 (Sediment)**

Sampled: 19-Apr-14 00:00
Received: 21-Apr-14
Sampled By: RHL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	**Arsenic**	7.5	mg/kg	2.5	0.8		W417107	MCE	04/29/14 13:27	
EPA 6010B	**Barium**	25.7	mg/kg	0.200	0.038		W417107	MCE	04/29/14 13:27	
EPA 6010B	**Cadmium**	2.93	mg/kg	0.20	0.04		W417107	MCE	04/29/14 13:27	
EPA 6010B	**Copper**	26.2	mg/kg	1.00	0.35		W417107	MCE	04/29/14 13:27	
EPA 6010B	**Lead**	481	mg/kg	0.75	0.25		W417107	MCE	04/29/14 13:27	
EPA 6010B	**Silver**	5.76	mg/kg	0.50	0.08		W417107	MCE	04/29/14 13:27	
EPA 6010B	**Zinc**	435	mg/kg	1.00	0.18		W417107	MCE	04/29/14 13:27	
Percent Solids										
Percent Solids	**% Solids**	37.4	%	0.1			W417112	HC	04/25/14 08:30	

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John Kern
Laboratory Director

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MSE - Boise
1555 Shoreline Dr. #150
Boise, ID 83702

Project Name: Long Shot 2012
Work Order: **W4D0366**
Reported: 30-Apr-14 10:07

Client Sample ID: **BG-1**
SVL Sample ID: **W4D0366-08 (Sediment)**

Sampled: 19-Apr-14 00:00
Received: 21-Apr-14
Sampled By: RHL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Arsenic	< 2.5	mg/kg	2.5	0.8		W417107	MCE	04/29/14 13:34	
EPA 6010B	**Barium**	21.7	mg/kg	0.200	0.038		W417107	MCE	04/29/14 13:34	
EPA 6010B	Cadmium	< 0.20	mg/kg	0.20	0.04		W417107	MCE	04/29/14 13:34	
EPA 6010B	**Copper**	41.6	mg/kg	1.00	0.35		W417107	MCE	04/29/14 13:34	
EPA 6010B	**Lead**	2.46	mg/kg	0.75	0.25		W417107	MCE	04/29/14 13:34	
EPA 6010B	Silver	< 0.50	mg/kg	0.50	0.08		W417107	MCE	04/29/14 13:34	
EPA 6010B	**Zinc**	11.8	mg/kg	1.00	0.18		W417107	MCE	04/29/14 13:34	
Percent Solids										
Percent Solids	**% Solids**	17.5	%	0.1			W417112	HC	04/25/14 08:30	

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John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

MSE - Boise
1555 Shoreline Dr. #150
Boise, ID 83702

Project Name: Long Shot 2012
Work Order: **W4D0366**
Reported: 30-Apr-14 10:07

Client Sample ID: **ET-4**
SVL Sample ID: **W4D0366-09 (Sediment)**

Sampled: 19-Apr-14 00:00
Received: 21-Apr-14
Sampled By: RHL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	**Arsenic**	2.5	mg/kg	2.5	0.8		W417107	MCE	04/29/14 13:40	
EPA 6010B	**Barium**	88.8	mg/kg	0.200	0.038		W417107	MCE	04/29/14 13:40	
EPA 6010B	Cadmium	< 0.20	mg/kg	0.20	0.04		W417107	MCE	04/29/14 13:40	
EPA 6010B	**Copper**	18.5	mg/kg	1.00	0.35		W417107	MCE	04/29/14 13:40	
EPA 6010B	**Lead**	11.6	mg/kg	0.75	0.25		W417107	MCE	04/29/14 13:40	
EPA 6010B	Silver	< 0.50	mg/kg	0.50	0.08		W417107	MCE	04/29/14 13:40	
EPA 6010B	**Zinc**	59.0	mg/kg	1.00	0.18		W417107	MCE	04/29/14 13:40	
Percent Solids										
Percent Solids	**% Solids**	54.0	%	0.1			W417112	HC	04/25/14 08:30	

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John Kern
Laboratory Director

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MSE - Boise
1555 Shoreline Dr. #150
Boise, ID 83702

Project Name: Long Shot 2012
Work Order: **W4D0366**
Reported: 30-Apr-14 10:07

Client Sample ID: **ET-5**
SVL Sample ID: **W4D0366-10 (Sediment)**

Sampled: 19-Apr-14 00:00
Received: 21-Apr-14
Sampled By: RHL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Arsenic	< 2.5	mg/kg	2.5	0.8		W417107	MCE	04/29/14 13:46	
EPA 6010B	**Barium**	92.3	mg/kg	0.200	0.038		W417107	MCE	04/29/14 13:46	
EPA 6010B	Cadmium	< 0.20	mg/kg	0.20	0.04		W417107	MCE	04/29/14 13:46	
EPA 6010B	**Copper**	19.4	mg/kg	1.00	0.35		W417107	MCE	04/29/14 13:46	
EPA 6010B	**Lead**	11.5	mg/kg	0.75	0.25		W417107	MCE	04/29/14 13:46	
EPA 6010B	Silver	< 0.50	mg/kg	0.50	0.08		W417107	MCE	04/29/14 13:46	
EPA 6010B	**Zinc**	59.6	mg/kg	1.00	0.18		W417107	MCE	04/29/14 13:46	
Percent Solids										
Percent Solids	**% Solids**	59.1	%	0.1			W417112	HC	04/25/14 08:30	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

MSE - Boise
1555 Shoreline Dr. #150
Boise, ID 83702

Project Name: Long Shot 2012
Work Order: **W4D0366**
Reported: 30-Apr-14 10:07

Quality Control - BLANK Data

Method	Analyte	Units	Result	MDL	MRL	Batch ID	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods								
EPA 6010B	Arsenic	mg/kg	<2.5	0.8	2.5	W417107	29-Apr-14	
EPA 6010B	Barium	mg/kg	<0.200	0.038	0.200	W417107	29-Apr-14	
EPA 6010B	Cadmium	mg/kg	<0.20	0.04	0.20	W417107	29-Apr-14	
EPA 6010B	Copper	mg/kg	<1.00	0.35	1.00	W417107	29-Apr-14	
EPA 6010B	Lead	mg/kg	<0.75	0.25	0.75	W417107	29-Apr-14	
EPA 6010B	Silver	mg/kg	<0.50	0.08	0.50	W417107	29-Apr-14	
EPA 6010B	Zinc	mg/kg	<1.00	0.18	1.00	W417107	29-Apr-14	
Metals (Total Recoverable--reportable as Total per 40 CFR 136)								
EPA 200.7	Barium	mg/L	<0.0020	0.0002	0.0020	W417079	24-Apr-14	
EPA 200.7	Calcium	mg/L	<0.040	0.009	0.040	W417079	24-Apr-14	
EPA 200.7	Copper	mg/L	<0.010	0.003	0.010	W417079	24-Apr-14	
EPA 200.7	Magnesium	mg/L	<0.200	0.020	0.200	W417079	24-Apr-14	
EPA 200.7	Zinc	mg/L	<0.0100	0.0012	0.0100	W417079	24-Apr-14	
EPA 200.8	Arsenic	mg/L	<0.0030	0.0004	0.0030	W417089	24-Apr-14	
EPA 200.8	Cadmium	mg/L	<0.00020	0.00004	0.00020	W417089	24-Apr-14	
EPA 200.8	Lead	mg/L	<0.00300	0.000044	0.00300	W417089	24-Apr-14	
EPA 200.8	Silver	mg/L	<0.000100	0.000022	0.000100	W417089	24-Apr-14	
Metals (Dissolved)								
EPA 200.7	Barium	mg/L	<0.0020	0.0005	0.0020	W417081	27-Apr-14	
EPA 200.7	Copper	mg/L	<0.010	0.006	0.010	W417081	27-Apr-14	
EPA 200.7	Zinc	mg/L	<0.0100	0.0023	0.0100	W417081	27-Apr-14	
EPA 200.8	Arsenic	mg/L	<0.0030	0.0003	0.0030	W417091	23-Apr-14	
EPA 200.8	Cadmium	mg/L	<0.00020	0.000031	0.00020	W417091	23-Apr-14	
EPA 200.8	Lead	mg/L	<0.00300	0.000035	0.00300	W417091	23-Apr-14	
EPA 200.8	Silver	mg/L	<0.000100	0.000018	0.000100	W417091	23-Apr-14	
Classical Chemistry Parameters								
SM 2540 C	Total Diss. Solids	mg/L	<10		10	W417097	23-Apr-14	
SM 2540 D	Total Susp. Solids	mg/L	<5.0		5.0	W417096	23-Apr-14	
Anions by Ion Chromatography								
EPA 300.0	Sulfate as SO4	mg/L	<0.30	0.06	0.30	W417062	22-Apr-14	

Quality Control - LABORATORY CONTROL SAMPLE Data

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods									
EPA 6010B	Arsenic	mg/kg	89.9	100	89.9	80 - 120	W417107	29-Apr-14	
EPA 6010B	Barium	mg/kg	102	100	102	80 - 120	W417107	29-Apr-14	
EPA 6010B	Cadmium	mg/kg	93.0	100	93.0	80 - 120	W417107	29-Apr-14	
EPA 6010B	Copper	mg/kg	108	100	108	80 - 120	W417107	29-Apr-14	
EPA 6010B	Lead	mg/kg	94.0	100	94.0	80 - 120	W417107	29-Apr-14	
EPA 6010B	Silver	mg/kg	5.09	5.00	102	80 - 120	W417107	29-Apr-14	
EPA 6010B	Zinc	mg/kg	88.4	100	88.4	80 - 120	W417107	29-Apr-14	
Metals (Total Recoverable--reportable as Total per 40 CFR 136)									
EPA 200.7	Barium	mg/L	1.03	1.00	103	85 - 115	W417079	24-Apr-14	
EPA 200.7	Calcium	mg/L	19.7	20.0	98.4	85 - 115	W417079	24-Apr-14	
EPA 200.7	Copper	mg/L	1.03	1.00	103	85 - 115	W417079	24-Apr-14	
EPA 200.7	Magnesium	mg/L	20.7	20.0	104	85 - 115	W417079	24-Apr-14	
EPA 200.7	Zinc	mg/L	1.01	1.00	101	85 - 115	W417079	24-Apr-14	
EPA 200.8	Arsenic	mg/L	0.0240	0.0250	96.0	85 - 115	W417089	24-Apr-14	

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MSE - Boise
1555 Shoreline Dr. #150
Boise, ID 83702

Project Name: Long Shot 2012
Work Order: **W4D0366**
Reported: 30-Apr-14 10:07

Quality Control - LABORATORY CONTROL SAMPLE Data (Continued)

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136) (Continued)									
EPA 200.8	Cadmium	mg/L	0.0244	0.0250	97.7	85 - 115	W417089	24-Apr-14	
EPA 200.8	Lead	mg/L	0.0241	0.0250	96.3	85 - 115	W417089	24-Apr-14	
EPA 200.8	Silver	mg/L	0.0248	0.0250	99.4	85 - 115	W417089	24-Apr-14	
Metals (Dissolved)									
EPA 200.7	Barium	mg/L	1.04	1.00	104	85 - 115	W417081	27-Apr-14	
EPA 200.7	Copper	mg/L	1.04	1.00	104	85 - 115	W417081	27-Apr-14	
EPA 200.7	Zinc	mg/L	1.01	1.00	101	85 - 115	W417081	27-Apr-14	
EPA 200.8	Arsenic	mg/L	0.0264	0.0250	106	85 - 115	W417091	23-Apr-14	
EPA 200.8	Cadmium	mg/L	0.0258	0.0250	103	85 - 115	W417091	23-Apr-14	
EPA 200.8	Lead	mg/L	0.0242	0.0250	96.8	85 - 115	W417091	23-Apr-14	
EPA 200.8	Silver	mg/L	0.0243	0.0250	97.3	85 - 115	W417091	23-Apr-14	
Anions by Ion Chromatography									
EPA 300.0	Sulfate as SO4	mg/L	10.4	10.0	104	90 - 110	W417062	22-Apr-14	

Quality Control - DUPLICATE Data

Method	Analyte	Units	Duplicate Result	Sample Result	RPD	RPD Limit	Batch ID	Analyzed	Notes
Classical Chemistry Parameters									
SM 2540 C	Total Diss. Solids	mg/L	242	242	0.0	10	W417097	23-Apr-14	
SM 2540 C	Total Diss. Solids	mg/L	250	249	0.4	10	W417097	23-Apr-14	
SM 2540 D	Total Susp. Solids	mg/L	<5.0	<5.0	<RL	10	W417096	23-Apr-14	
SM 2540 D	Total Susp. Solids	mg/L	68.0	67.0	1.5	10	W417096	23-Apr-14	

Quality Control - MATRIX SPIKE Data

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Arsenic	mg/kg	100	6.6	100	93.8	75 - 125	W417107	29-Apr-14	
EPA 6010B	Barium	mg/kg	146	49.3	100	96.4	75 - 125	W417107	29-Apr-14	
EPA 6010B	Cadmium	mg/kg	97.9	3.65	100	94.3	75 - 125	W417107	29-Apr-14	
EPA 6010B	Copper	mg/kg	161	49.2	100	112	75 - 125	W417107	29-Apr-14	M1
EPA 6010B	Lead	mg/kg	119	25.6	100	93.5	75 - 125	W417107	29-Apr-14	
EPA 6010B	Silver	mg/kg	5.64	<0.50	5.00	108	75 - 125	W417107	29-Apr-14	
EPA 6010B	Zinc	mg/kg	338	272	100	65.7	75 - 125	W417107	29-Apr-14	M2
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	Barium	mg/L	1.02	0.0049	1.00	102	70 - 130	W417079	24-Apr-14	
EPA 200.7	Calcium	mg/L	97.4	77.6	20.0	99.0	70 - 130	W417079	24-Apr-14	
EPA 200.7	Copper	mg/L	1.05	<0.010	1.00	105	70 - 130	W417079	24-Apr-14	
EPA 200.7	Magnesium	mg/L	25.3	4.33	20.0	105	70 - 130	W417079	24-Apr-14	
EPA 200.7	Zinc	mg/L	1.03	0.0714	1.00	96.2	70 - 130	W417079	24-Apr-14	
EPA 200.8	Arsenic	mg/L	0.0257	<0.0030	0.0250	99.8	70 - 130	W417089	24-Apr-14	
EPA 200.8	Cadmium	mg/L	0.0252	0.00098	0.0250	97.1	70 - 130	W417089	24-Apr-14	
EPA 200.8	Lead	mg/L	0.0238	<0.00300	0.0250	92.4	70 - 130	W417089	24-Apr-14	
EPA 200.8	Silver	mg/L	0.0244	<0.000100	0.0250	97.7	70 - 130	W417089	24-Apr-14	
Metals (Dissolved)										
EPA 200.7	Barium	mg/L	1.02	0.0427	1.00	97.6	70 - 130	W417081	27-Apr-14	

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MSE - Boise
1555 Shoreline Dr. #150
Boise, ID 83702

Project Name: Long Shot 2012
Work Order: **W4D0366**
Reported: 30-Apr-14 10:07

Quality Control - MATRIX SPIKE Data (Continued)

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Dissolved) (Continued)										
EPA 200.7	Copper	mg/L	0.969	<0.010	1.00	96.9	70 - 130	W417081	27-Apr-14	
EPA 200.7	Zinc	mg/L	0.970	<0.0100	1.00	97.0	70 - 130	W417081	27-Apr-14	
EPA 200.8	Arsenic	mg/L	0.0317	<0.0030	0.0250	127	70 - 130	W417091	23-Apr-14	
EPA 200.8	Cadmium	mg/L	0.0274	0.00099	0.0250	106	70 - 130	W417091	23-Apr-14	
EPA 200.8	Lead	mg/L	0.0240	<0.00300	0.0250	94.9	70 - 130	W417091	23-Apr-14	
EPA 200.8	Silver	mg/L	0.0239	<0.000100	0.0250	95.8	70 - 130	W417091	23-Apr-14	
Anions by Ion Chromatography										
EPA 300.0	Sulfate as SO4	mg/L	39.0	27.5	10.0	115	90 - 110	W417062	22-Apr-14	M1

Quality Control - MATRIX SPIKE DUPLICATE Data

Method	Analyte	Units	MSD Result	Spike Result	Spike Level	%R	RPD	RPD Limit	Batch ID	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods											
EPA 6010B	Arsenic	mg/kg	104	100	100	97.5	3.6	20	W417107	29-Apr-14	
EPA 6010B	Barium	mg/kg	161	146	100	111	9.7	20	W417107	29-Apr-14	
EPA 6010B	Cadmium	mg/kg	98.7	97.9	100	95.1	0.8	20	W417107	29-Apr-14	
EPA 6010B	Copper	mg/kg	181	161	100	132	11.5	20	W417107	29-Apr-14	M1
EPA 6010B	Lead	mg/kg	126	119	100	100	5.3	20	W417107	29-Apr-14	
EPA 6010B	Silver	mg/kg	5.79	5.64	5.00	111	2.6	20	W417107	29-Apr-14	
EPA 6010B	Zinc	mg/kg	382	338	100	109	12.2	20	W417107	29-Apr-14	M2
Metals (Total Recoverable--reportable as Total per 40 CFR 136)											
EPA 200.7	Barium	mg/L	1.02	1.02	1.00	101	0.5	20	W417079	24-Apr-14	
EPA 200.7	Calcium	mg/L	99.7	97.4	20.0	111	2.4	20	W417079	24-Apr-14	
EPA 200.7	Copper	mg/L	1.05	1.05	1.00	105	0.5	20	W417079	24-Apr-14	
EPA 200.7	Magnesium	mg/L	26.0	25.3	20.0	108	2.9	20	W417079	24-Apr-14	
EPA 200.7	Zinc	mg/L	1.03	1.03	1.00	95.7	0.5	20	W417079	24-Apr-14	
EPA 200.8	Arsenic	mg/L	0.0266	0.0257	0.0250	103	3.5	20	W417089	24-Apr-14	
EPA 200.8	Cadmium	mg/L	0.0254	0.0252	0.0250	97.7	0.6	20	W417089	24-Apr-14	
EPA 200.8	Lead	mg/L	0.0238	0.0238	0.0250	92.4	0.0	20	W417089	24-Apr-14	
EPA 200.8	Silver	mg/L	0.0241	0.0244	0.0250	96.4	1.4	20	W417089	24-Apr-14	
Metals (Dissolved)											
EPA 200.7	Barium	mg/L	1.02	1.02	1.00	97.5	0.2	20	W417081	27-Apr-14	
EPA 200.7	Copper	mg/L	0.980	0.969	1.00	98.0	1.1	20	W417081	27-Apr-14	
EPA 200.7	Zinc	mg/L	0.973	0.970	1.00	97.3	0.4	20	W417081	27-Apr-14	
EPA 200.8	Arsenic	mg/L	0.0311	0.0317	0.0250	124	1.8	20	W417091	23-Apr-14	
EPA 200.8	Cadmium	mg/L	0.0276	0.0274	0.0250	106	0.6	20	W417091	23-Apr-14	
EPA 200.8	Lead	mg/L	0.0236	0.0240	0.0250	93.5	1.4	20	W417091	23-Apr-14	
EPA 200.8	Silver	mg/L	0.0238	0.0239	0.0250	95.2	0.6	20	W417091	23-Apr-14	
Anions by Ion Chromatography											
EPA 300.0	Sulfate as SO4	mg/L	39.1	39.0	10.0	116	0.3	20	W417062	22-Apr-14	M1

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MSE - Boise
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Boise, ID 83702

Project Name: Long Shot 2012
Work Order: **W4D0366**
Reported: 30-Apr-14 10:07

Quality Control - POST DIGESTION SPIKE Data

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Copper	mg/kg	162	49.2	100	113	75 - 125	W417107	29-Apr-14	
EPA 6010B	Zinc	mg/kg	343	272	100	70.5	75 - 125	W417107	29-Apr-14	M2

Notes and Definitions

M1	Matrix spike recovery was high, but the LCS recovery was acceptable.
M2	Matrix spike recovery was low, but the LCS recovery was acceptable.
LCS	Laboratory Control Sample (Blank Spike)
RPD	Relative Percent Difference
UDL	A result is less than the detection limit
R > 4S	% recovery not applicable, sample concentration more than four times greater than spike level
<RL	A result is less than the reporting limit
MRL	Method Reporting Limit
MDL	Method Detection Limit
N/A	Not Applicable

APPENDIX 3

Photographs



Photo 1. AD-1 (lower adit discharge) post-reclamation in 2012.



Photo 2. AD-1 (lower adit discharge) post-reclamation in 2013.



Photo 3. ET-3 post-reclamation in 2012.



Photo 4. ET-3 post-reclamation in 2013.



Photo 5. ET-4 in 2012.



Photo 6. ET-4 in 2013.



Photo 7. BG-1 (background) in 2012.



Photo 8. Filled glory hole in 2013.



Photo 8. Reclaimed access road to filled glory hole in 2013.