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REMOVAL ACTION REPORT

Longshot Mine and Mill Site

October 2012

COLVILLE NATIONAL FOREST, WASHINGTON





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1.0 INTRODUCTION

Millennium Science and Engineering, Inc. (MSE) was contracted by the United States Department of Agriculture, Forest Service (USFS) to complete a Non-Time Critical Removal Action (RA) at the Longshot Mine on the Coleville National Forest in Stevens County, Washington (the "Site")(See **Figure 1**.). The RA was conducted in conformance with: the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); Superfund Amendments and Reauthorization Act (SARA); and the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). This report has been prepared to document the removal action construction activities that were completed at the Longshot Mine in October and November 2011. This work was conducted on behalf of the USDA Forest Service, Region 6 under Contract Number AG-046W-C-07-0006; Task Order Number AG-05K3-D-08-0008.

The remainder of this section provides a description of the Site, defines the project purpose and objectives, summarizes the RA action schedule, and lists previous work completed for the Site. Section 2 summarizes the removal action activities, while Section 3 discusses the confirmation sampling approach and results. Section 4 describes deviations from the RA work plan (MSE 2011 2012). Sections 5 and 6 describe RA costs and post-RA monitoring activities, respectively. **Figure 2** illustrates pre-RA conditions at the Site as well as general proposed RA activities. As-built drawings are provided in **Figures 3, 4, and 5**. **Appendix 1** incorporates all daily activity logs; **Appendix 2** provides sample field sheets; **Appendix 3** exhibits laboratory analytical data and Chains of Custody. Photographs taken prior to the Removal Action, during construction activities, and after completion of the Removal Action are provided in **Appendix 4**. **Appendix 5** contains "Post Removal Monitoring and O&M Plan, Longshot Mine and Mill Site" to provide post-RA monitoring detail and new sample locations.

1.1 Site Description

The Longshot Mine is an inactive lead-zinc mine and mill, located about 11 miles northeast of Colville, in Stevens County Washington. The site is located in the eastern half of Section 18, Township 36 North Range 41 East of the Willamette Meridian at an elevation range of about 3,420 to 3,650 feet (**Figure 1**). Site features included:

- Remnants of a mill and other wooden structures;
- Two open adits and one open stope;
- Two ponds;
- An unprocessed ore bin;
- Six waste rock piles; and
- Three tailings impoundments

Access to the site is via USFS Spur Road 150 from County Road 4954, an approximate distance of one mile. The site is on a hillside adjacent to an unnamed ephemeral tributary to South Fork Mill Creek (**Figure 1**). Pre-RA features and workings at the site are illustrated in **Figure 2**. Ore from two adits was processed at the mill, and tailings were deposited in a series of three impoundments in an ephemeral drainage downstream from the mill (TA-1, 2, and 3). Unprocessed ore was stockpiled in a collapsed coarse ore bin at the mill. Water discharges from the lower adit and flowed through a small settling pond (PD-1) before crossing the access road infiltrating beneath debris surrounding the mill structure. This infiltrate may have leached metals and transported the load an unknown distance downgradient. There is a second, larger pond (PD-2) in the ephemeral drainage below the last tailings impoundment (TA-3), which was probably a reservoir for make-up mill water. There are six waste rock piles: three near the upper adit (WR-4, 5, and 6), and three near the lower adit and mill (WR-1, 2, and 3). There was an open, vertical stope ("gloryhole") above the upper adit that extended into the underground workings. There

were several collapsed, small wooden buildings and piles of debris near the lower adit and along the road to the upper adit.

More detailed descriptions may be found in "Site Inspection Report, Longshot Mine and Mill Site, Longshot Mine and Mill Site, Coleville National Forest, Stevens County, Washington" (MSE 2005) and "Engineering Evaluation/Cost Analysis, Longshot Mine and Mill Site, Coleville National Forest, Stevens County, Washington" (MSE 2008).

1.2 Purpose and Objectives

This RA was conducted to address human health and ecological hazards at the Site that were identified in an Abbreviated Preliminary Assessment (APA) (USFS 2003); a Site Inspection (SI) completed by MSE (MSE 2005); and an Engineering Evaluation/Cost Analysis (EE/CA) prepared by MSE (MSE 2008). The overall objectives of the Longshot Mine Removal Action were to:

(1) Eliminate direct contact by receptors to high concentrations of metals in the mine waste;

(2) Reduce or eliminate the migration of contaminants to the environment; and

(3) Mitigate physical hazards at the Site.

These objectives were addressed by:

- Removing mine waste from the Ore Bin, the area beneath Wood and Metal Debris around the mill foundation, and waste rock piles WR1, WR2 and WR3 for disposal in the gloryhole;
- Assessing surface water samples collected from four locations: AD1 (Lower Adit discharge), ET3 (Immediately below the lower tailings and PD-2), BG1 (Ephemeral [background] stream east of the Site in a different drainage), and ET4 (The end of the ephemeral stream prior to discharge to Mill Creek) for comparison with data collected during the SI and pre-removal data gap investigation;
- Assessing sediment samples collected from each of the four surface water sampling locations for comparison with data collected during the SI;
- Assessing one benthic sample collected at ET4 to evaluate potential impacts to the stream habitat, benthic macroinvertebrate community, and fish species. Benthic samples were not obtained from this location during the SI; and
- Analyzing a bulk sample of wood debris collected from the demolition of the mill building to confirm that it is acceptable for solid waste landfill disposal.

The Site will also be inspected for revegetation success, evidence of erosion, slumps, or other damage during post-removal action monitoring events that are scheduled for the summer field seasons of 2012, 2013, and 2014.

1.3 Schedule and Key Personnel

Removal action activities, including mill debris and mine waste sampling and analysis were scheduled for the fall of 2011. RA activities began on October 28, 2011, and continued for 14 working days through November 7.

The first post-RA monitoring event is scheduled for spring or summer 2012. The second event is scheduled for 2013, and the third and final post-RA monitoring event is scheduled for 2014. Specific dates will depend on weather conditions, flow conditions, and Site access. If possible, the second and third monitoring events will be scheduled during the same time of year as the first event.

The project team consisted of the following personnel:

Bob Lambeth, P.E., MSE Project Manager/Project Engineer;
Eric Hieb, MSE Field Engineer;
Chelsea Maxfield, MSE Field Scientist;
Gerald Palm, G.L. Palm Construction Manager; and
G.L. Palm Construction, various equipment operators and laborers.

USFS project personnel included:

Rodney Lentz, Forest Service On-Scene Coordinator (OSC).

1.4 Previous Work

The USFS completed an APA of the Site in September 2003 (USFS 2003). The USFS performed the APA to determine the need for further site characterization. Soil samples were collected, from an ore bin at the mill and tailings impoundment for bench testing using a field-portable Niton X-Ray Fluorescence (XRF) unit. Water and sediment samples were not collected as part of this investigation. Lead was the only constituent of concern that exceeded EPA Region IX Preliminary Remediation Goals (PRGs) as to acceptable industrial levels in soil. Based on the lead concentrations at the millsite and tailings impoundment, the USFS recommended that a Site Inspection (SI) be performed.

MSE completed a Site Inspection (SI) of the Longshot Mine and Mill in 2005 (MSE 2005). Physical hazards at the Site (partially collapsed mill and other collapsed wooden structures, two open adits, an open stope, an unprocessed ore bin, six waste rock piles, three tailings impoundments, and two ponds) posed a significant public risk. A streamlined risk evaluation completed during the SI indicated potential risk to both human and ecological receptors from exposure to high concentrations of metals, particularly lead, in the waste rock. Maximum concentrations of lead in the mine waste (30,000 milligrams per kilogram [mg/kg]) exceeded human and ecological screening criteria by 30 and 600 times, respectively. While arsenic in mine waste also poses a slight human health risk at the Site, the maximum detected arsenic concentration is below a risk-based cleanup level that was calculated to be 52 mg/kg. Two areas were identified as hotspots: (1) unprocessed ore in the ore bin and (2) waste rock pile WR-3. Mine waste samples from these two areas contained the highest detected concentrations of several metals, including antimony, cadmium, copper, lead and zinc.

MSE prepared an EE/CA for the proposed Removal Action at the Site (MSE 2008). Four Removal Action alternatives were evaluated for the Longshot Mine and Mill:

- Alternative 1 – No Action;
- Alternative 2 – Excavation and Off-site Disposal of Hotspots;
- Alternative 3 – Excavation and On-site Containment of Hotspots; and
- Alternative 4 – In-place Capping of Hotspots.

Alternative 3 was recommended as the preferred RA Alternative. Approximately 500 bank cubic yards (bcy) of unprocessed ore and mine waste rock were identified for excavation and placement in the gloryhole. The excavated waste areas would be covered with topsoil, seeded, and hydromulched. Trees and brush cleared during the RA would be used to generate slash and cover for seeded areas. Physical hazards would be addressed by installing bat gates in the open upper and lower adits. The partially collapsed wooden mill structure would be demolished and approximately 20 loose cubic yards (lcy) of wood and metal debris would be removed and hauled to the Stevens County Landfill two miles southwest of Kettle Falls, Washington, for disposal.

2.0 REMOVAL ACTION IMPLEMENTATION

Proposed RA activities are described in detail in "Work Plan, Longshot Mine and Mill Site, Colville National Forest, Stevens County, Washington" (MSE 2011 2012).

Mine waste rock is the primary contaminant source at the Site. Fine-grained materials (i.e., sediment) that may have been deposited in or migrated to the ponds and ephemeral tributary are considered a secondary contaminant source. The ephemeral drainage is heavily vegetated and the large pond and surrounding area form a sensitive riparian habitat. Removal of sediment from these areas would result in significant collateral damage to the riparian habitat; therefore, sediment was eliminated from the scope of this removal action. Surface and groundwater were also eliminated from the scope of this RA, because surface water at the Site is not impaired and groundwater is not used for drinking water at the Site, nor is future use as a drinking source anticipated. If future water quality monitoring indicates a risk from surface water or sediment, additional RA may be necessary. The proposed Scope of Work (SOW) is based on the preferred alternative (Alternative #3 – Excavation and On-site Disposal, Open Stope Repository) presented in the EE/CA. The RA work activities consisted of the four tasks listed below and described in the following paragraphs.

MSE contracted with G. L. Palm Construction of Winthrop, Washington (Palm) to complete the RA. During RA activities, appropriate safety measures were taken to minimize potential exposure of employees and the public to contamination at the Site. On-site personnel had completed 40-hour OSHA HAZWOPER training. The work was performed under the supervision of personnel experienced in the removal and handling of hazardous materials and in accordance with the Health and Safety Plan (HASP) that was prepared for the project. Periodic "tailgate" safety briefings were held to discuss potential hazards. Modified Level D personal protective equipment was determined to be appropriate for the work activities. RA construction activities consisted of:

- Improving site access;
- Excavating and disposing of mine waste and debris;
- Mitigating physical hazards; and
- Providing removal action oversight.

These activities are discussed further in the following subsections.

Many tasks were worked simultaneously. However, the following general order was followed:

1. Open and improve access roads and transport debris to the landfill (**Appendix 4, Photos 15-24**);
2. Raze the mill structures (**Appendix 4, Photos 25-27**);
3. Excavate and place waste in the gloryhole (**Appendix 4, Photos 28 & 45**);
4. Complete verification sampling (**Appendix 4, Photos 30-33, 35, 37-39**);
5. Install the bat gate and culvert (**Appendix 4, Photos 34, 47-48, 53-54, 68-69**);
6. Excavate permanent drains for the Lower Adit and the diversion trench above the Upper Adit (**Appendix 4, Photos 34, 51, 42**);
7. Place cover soil on the removal areas (**Appendix 4, Photos 44,46,49, 50**);
8. Place mulch, fertilizer and seed (**Appendix 4,Photos 29, 40, 41, 43, 49, 50, 56, 58-67**);
9. Put access controls in place (**Appendix 4, Photo 52**);
10. Demobilize; and
11. Final Site Survey.

Photos documenting pre-removal site conditions are presented in **Appendix 4, Photos 1-13**.

Daily logs of field activities are provided in **Appendix 1**. Logs include volumes of materials moved and disposed each day. **Figure 2** illustrates the proposed removal activities in the work plan for comparison with actual closure with field modifications at the end of RA construction. As will be discussed in Section 4, differences were minor.

2.1 Pre-Removal Action Sampling

In order to establish temporal baseline site conditions a pre-RA sampling event was conducted on October 18, 2011 by Bob Lambeth, Chelsea Maxfield, and Eric Hieb. Results are presented in "Pre-Removal Action Inspection and Monitoring Report, Colville National Forest, Stevens County Washington (MSE 2011 2012). Following mobilization, work progressed on the following tasks.

2.2 Mobilization

Palm initiated mobilization to the Site on October 21, 2011. All equipment was inspected by Bob Lambeth and Rod Lentz in Colville, Washington prior to traveling to the Site. All equipment was off-loaded at the Site on Friday October 21, and barricades were erected. Palm's crew trailer was set up in Colville the same day, and the crew returned home for the weekend. Palm returned Monday October 24 with light support equipment to initiate work at the Site. Mr. Lambeth outlined the approach to field work and solicited recommendations from the construction crew for execution of the RA work plan

2.3 Site Access and Erosion Controls

Palm Construction cleared and widened approximately 900 linear feet of the existing access road from the mill site to the stope. All vegetation and trees removed were stockpiled for mulching. Approximately 20 loose cubic yards (lcy) of coarse road base borrowed from approved locations on-Site was placed in select areas of the access road, as needed. Some improvements of Spur Road 150 were also made by removing obstructions, widening the road, and placing road base material (total of ~10 lcy of 2-inch minus material) in selected areas to minimize hazards. To divert drainage a corrugated metal pipe culvert was installed in a small ravine crossing the access road to the south of the small pond PD-1) to provide heavy equipment access without erosion and sedimentation. Temporary ditching and water bar erosion controls were installed to the south of PD-1 to contain run-off, minimize erosion, and prevent sedimentation of the ephemeral tributary during the RA. Specific BMPs included: silt fencing, straw bales, check dams, temporary surface water diversions, sediment retention, and dust suppression.

During Site work barricades and warning signs limiting entry were placed. There were no visitors to the Site area except for one firewood crew. Following site reclamation large boulders were located to preclude motorized access. (**Appendix 4, Photo 52**). A locked gate was not installed.

2.4 Stockpiling Construction Materials

During construction of drainage ditches (Section 2.6), the Palm crew stockpiled excavated soils at locations near where site reclamation and revegetation were anticipated. The construction contractor also mobilized a wood chipper to the site to generate mulch for reclaimed areas. On October 30, brush was cut in the immediate vicinity of construction areas to generate wood chips. Brush was processed through the chipper and the wood chips were stockpiled in areas where revegetation was anticipated including the stope area, waste rock piles, tailings deposits, pond PD-1, mill area, drainage ditches, and access road.

2.5 Backfilling the Stope

On the morning of October 30, Palm began to backfill the stope with waste rock and unprocessed ore from WR3, and ore from the Ore Bin, and beneath the mill foundation. Large rock was used to safety-berm the stope to prevent trucks from backing too far. Smaller size clean rock and soil from the same source areas were also placed in the stope to bridge and cover the coarse waste rock material. From October 30 to October 31 the construction crew excavated and placed approximately 500 cubic yards of waste rock from WR3 and unprocessed ore from the Ore Bin into the stope. The stope was subsequently filled on October 31 with clean soils excavated from onsite drainage ditches, graded to blend in with the

surrounding topography, and then fertilized and seeded. Additional coarse rock was placed along the vertical rock face to create the appearance of a natural landscape. As is illustrated in the repository cross-section in **Figure 4**, there was inadequate contaminated material to fill the gloryhole. The plan initially preferred by the USFS was to place a soil cover over this rock (See **Figure 2**, Earthen Cover) then construct a cable net over the opening for safety and waste rock isolation. This preference was intended to reduce the excavation footprint and, therefore reclamation needs of the Site. In consultation with Rod Lentz, it was decided to completely fill the gloryhole to the surface for the following reasons.

1. A cable net will be a hazard for small animals and could also trap larger hooved animals;
2. A net will required perpetual maintenance and will be an attractive nuisance;
3. A net cannot be made to appear "natural;"
4. A net would be more hazardous to construct; and
5. There was adequate clean fill in approved borrow areas by excavating deeper without enlarging footprints.

Areas from which waste rock was removed are identified in blue highlight on **Figure 3** include:

- WR3;
- Ore Bin; and
- Additional waste rock below the mill foundation.

As is tabulated in **Table 2**, more waste rock was removed than indicated in the work plan.

2.6 Solid and Demolition Waste Removal

The partially collapsed mill structure was demolished during the Ore Bin hot spot removal. The wood and metal debris were transported to the Stevens County Landfill per USFS requirements. The concrete foundation located downhill from the mill structure was decontaminated and left in place for historical purposes. Miscellaneous debris and litter from the millsite and surrounding hillside was also removed and transported to the Stevens County Landfill for disposal. Metal debris and wood waste not associated with the mill structure were presumed clean and not sample and analyzed.

Prior to disposal of wood debris from mill demolition a composite sample was obtained for total metal analyses as well as TCLP testing. The sample was obtained with hammer and chisel to a depth of 1/8 inch from locations dispersed equally over the wood stock pile area. There is no EPA protocol for sampling wood. However, the Project Manager had performed similar sampling of wood at another CERCLA RA and had developed a protocol that was approved by EPA. This protocol was used here and the laboratory followed the same digestion and analytical methods.

The samples were analyzed for Total Metals and subjected to EPA Method 1311 Toxicity Characteristics Leaching Procedure (TCLP) to determine suitability for disposal in a municipal landfill. Results are provided in **Table 1**. No TCLP criteria were exceeded; therefore, disposal in a municipal landfill was approved. Additionally, the total Metals analyses were compared to MTCA Method A Industrial Soil Cleanup Criteria (RCW 173-340-900, Table 745-1) to determine if the wood was a potential hazard if exposed in a landfill surface. No criteria were exceeded, and the wood remained suitable for disposal in a municipal landfill.

2.7 Adit Closures

Upper Adit - On October 30, Palm Construction, Inc. received permission to install angled bars onto the back of the bat gates instead of flat-bars that were in the original design. The following day, Rodney Lentz from USFS and Bob Lambeth from MSE met on the site for inspection. Rodney Lentz concluded that additional bars were necessary to blockade human access into the portal. The additions were implemented on November 1. See **Appendix 3, Photos 47, 48**; as-builts are provided in **Figure 4**. A bate gate was proposed in the work plan.

Lower Adit – A bat gate was proposed at the Lower Adit in the work plan. However, the portal brow was unstable and a caving hazard. With Rod Lentz's approval a bat culvert provided by the USFS was installed in place of the gate as a safer, more secure alternative. See **Appendix 4, Photos 34, 53, 54, 68, and 69**; as-builts are provided in **Figure 4**. During final site inspection on November 7 it was noted that the Lower Adit bat-gate was damaged during installation and needed repair. On November 14 MSE and Palm met onsite to fix the lower adit bat-gate and to install a temporary lock for the gate (**Appendix 4, Photo 69**).

2.8 Drainage Features

On October 30 Palm breached the dam and excavated a ditch to drain the small pond (PD-1) (**Appendix 4, Photo 36**) to the northeast of the mill area and waste rock pile WR1. The pond was subsequently filled with soil excavated from the Lower Adit drainage ditch and later revegetated.

On the afternoon of October 30 Palm created an interception trench up-slope and along the vertical rock face above the gloryhole to prevent water from draining into the backfilled stope (See **Figure 3** and **Appendix 4, Photo 42**). The earthen, V-shaped channel was constructed with a slope of 1 to 2 percent, 1 to 2 feet deep, and 2H:1V side slopes and was approximately 150 feet in length. The drainage ditch was routed to discharge into a nearby natural infiltration pond.

2.9 Lower Adit Diversion Ditch

On October 30 and 31 a diversion ditch was made for drainage of the lower adit discharge. The previous drainage ditch which discharged to the small pond (PD-1) was filled with adjacent soil after PD-1 was drained. The new ditch bypassed the vicinity of the mill to provide additional prevention of infiltration through the mill area by directing flow to the drainage upgradient from and avoiding the millsite (Note location on **Figure 3**. See **Appendix 4, Photo 51**).

2.10 Site Reclamation

Site reclamation involved grading and covering the mill site and stope areas, covering tailings areas (TA1, TA2, TA3), covering waste rock areas (WR1, WR2, WR3, WR4, WR5 and WR6) with clean soil obtained from onsite sources and revegetation. Borrow areas are indicated by blue highlight on **Figure 3**. Areas reclaimed are indicated by yellow highlight. On October 31 soil from the diversion ditch was hauled to and placed to cover the stope. Waste rock adjacent to the vertical rock face was placed on top of the soil to create an appearance of a natural landscape. The site reclamation began near WR6 and stopped east of WR-1 in a downhill progression. Large rocks were placed at the end of the reclaimed areas to prevent any vehicles from accessing the reclaimed road. Reclaimed areas were reseeded by applying 6 to 18 inches of growth media, fertilizer, seeding with a USFS-approved seed mix and applying woodchips as mulch material. Cover soil was placed by excavator in hummocks with tree limb and trunks to discourage ATV and motorcycle access to upper workings. A parking and turn around was developed near the former ore bin location. Site reclamation was completed on November 1.

Reclamation can be observed in **Appendix 4, Photos 29, 40, 41, 43, 44, 46, 49, 50, 56, 58-67**.

2.11 Site Survey

At the completion of all Site reclamation activities and following approval by the USFS a final survey was completed by Dan Sampson, Survey Solutions, Spokane, Washington in late November 2011.

3.0 CONFIRMATION SAMPLING

Mine wastes were targeted for removal because they exceeded "applicable" or "relevant and appropriate" federal and state environmental requirements (ARARs). The streamlined risk assessment presented in the Site Inspection Report (MSE, 2005) indicated potential risk to human and ecological receptors from exposure to metals in the mine waste and sediment. Specifically, the maximum detected concentration (MDC) of lead in the unprocessed ore (30,000 mg/kg) exceeds Washington Department of Ecology's (WDOE's) Model Toxics Control Act (MTCA) Method A Industrial Soil cleanup level of 1,000 mg/kg by a factor of 30. The MDC of four metals in the mine waste exceeded WDOE's MTCA Method A Industrial Soil cleanup levels: arsenic, cadmium, chromium, and lead. The MDC of 13 metals in the mine waste exceed WDOE's MTCA Ecological Indicator Soil Concentrations for Protection of Terrestrial Plant and Animals: aluminum, antimony, arsenic, cadmium, chromium, cobalt, copper, lead, mercury, nickel, silver, vanadium and zinc.

A risk-based cleanup level was developed for arsenic in the mine waste at the Site as part of the SI. The risk-based arsenic cleanup level was calculated to be 52 mg/kg, which is above the highest detected arsenic concentration in mine waste at the Site (41 mg/kg). Cleanup risk-based criteria for lead in soil and sediment could not be calculated using standard risk assessment algorithms, because toxicological reference values (i.e. reference doses and slope factors) have not been established for lead. However, it was determined that removal of mine waste from the two hotspots (WR3 and the Ore Bin) would decrease the average lead concentration at the Site from 5,371 to 1,278 mg/kg, and significantly decrease the overall Site risk. Therefore, media-specific (waste rock from WR3 and unprocessed ore from the Ore Bin) cleanup was targeted rather than applying chemical-specific numerical cleanup levels to the site. The desired soil concentration cleanup level is the Method A Industrial Cleanup level of 1,000 mg/kg lead. XRF screening and confirmation sampling was conducted to document final cleanup levels.

All waste excavation areas were to be screened with an XRF meter prior to sample collection to verify that the arsenic- and lead-contaminated mine wastes with surface exposure above the cleanup levels had been adequately removed. On October 28, 2011 Bob Lambeth, P.E., Project Manager and Eric Hieb, Field Engineer, both of MSE, arrived at the Longshot Mine to assess removal conditions. Major Site features inspected during the site visit included the Upper and Lower Adits, tailings and waste rock piles, the gloryhole, and access road (**Figures 2 and 3**). Mr. Lambeth and Mr. Hieb were met onsite by representatives of Palm. On October 29, 2011, MSE representatives mobilized a portable X-Ray Fluorescence (XRF) instrument to the site, but were initially unable to calibrate it for use in the field**.** After several attempts to calibrate the instrument, both onsite and offsite, it was determined that the instrument would not calibrate above a certain elevation. This required that the instrument be calibrated at a lower elevation before each XRF sample location was measured at the site.

3.1 XRF Screening

Due to concerns about soil moisture content and other factors that can influence in-situ XRF measurements, final XRF confirmation measurements consisted of bench testing on-site. Discrete grab samples were first collected from the bottom and sides of excavated waste areas. The samples were prepared and tested in accordance with the manufacturer's instructions and specifications for bench testing. When screening results indicated metals concentrations were at or above the cleanup levels, additional material was excavated and the XRF screening process repeated. Once screening results indicated metals concentrations were below the cleanup levels, confirmation soil samples were collected.

A total of seven final XRF measurements were taken (**Figure 3**) to evaluate post-removal metals concentrations at selected locations onsite. XRF readings were collected: 1) between the stope and waste rock pile WR6; 2) in the center of waste rock pile WR3; 3) at the base of waste rock pile WR3, where waste rock came in contract with what appeared to be native soil; 4) across the access road and to the south of WR3; 5) from the ore bin, upslope (north of) the concrete mill foundation; 6) downslope (south of) the concrete mill foundation; and 7) on the access road, approximately 300 feet to the southeast of waste rock pile WR2. The post-removal XRF screening results are summarized in **Table 3**. All readings were less than the two key criteria in MTCA 173-340-742, Method A Industrial Soil, Table 745-1 wherein arsenic = 20 mg/kg and lead = 1,000 mg/kg. Given these readings, confirmation samples were taken nearly coeval with XRF readings and Palm was authorized to initiate soil covering and reclamation.

Three reading that were taken outside of the hot spots were used to determine usability of material as soil cover, if concentration were significantly lower than criteria.

3.2 Confirmation Samples

Composite confirmation samples were collected at three locations (WR-3, ORE BIN, and adjacent/downslope of concrete mill foundation). The confirmation samples consisted of three discrete grab samples collected from areas of the bottom and sides of the excavated waste areas. The samples were collected and the sample number, date and time of sample collection, sampler's initials and requested analysis were recorded on the label using an indelible ink ball-point pen. Chain-of-Custody forms were used to document and track sample possession. One copy of the Chain-of-Custody was retained, and the original was sealed in a plastic bag and placed in the cooler with the samples. The cooler was sealed with tape and custody seals placed across the cooler opening and initialed. The samples were delivered to City Parcel Service, Spokane, Washington for same-day shipment to SVL Analytical Laboratory in Kellogg, Idaho. The confirmation samples were analyzed for arsenic and lead by EPA 6000/7000 Methods. The analytical results are provided in **Appendix 3** and summarized in **Table 4**. Copies of field sample forma are presented in **Appendix 2**.

Discussion of data: Arsenic concentrations in the confirmation samples ranged from 6.6 mg/kg to 13.0 mg/kg illustrating no criteria exceedences. Lead concentrations in confirmation samples ranged from 305 mg/kg to 2,600 mg/kg. Arsenic concentrations were well below the ARARs. However, two lead concentrations exceeded the ARARs. The lead concentration of the sample collected downslope of the mill foundation was 1,590 mg/kg, and the lead concentration of the sample collected at WR-3 was 2,600 mg/kg. Both concentrations exceeded the WDOE's MTCA Method A Industrial Soil cleanup level of 1,000 mg/kg. All areas where confirmation samples were collected were covered with 18 inches of clean soil, thus eliminating surface exposure and direct contact potential. The soil cover will, therefore, comply with the requirement to protect human health.

Also, the location of the former millsite is on the trend of an apparently mineralized structure where elevated arsenic, lead, and other metal concentrations could be elevated naturally. This may be responsible for elevated lead concentrations rather than contamination left in place.

The analyses further indicate that the XRF instrument was malfunctioning and was not providing accurate field readings, but rather much lower reading than the analyses. This is supported by the difficulty in calibrating the instrument.

4.0 DEVIATIONS FROM THE REMOVAL ACTION WORK PLAN

Several deviations from the work plan occurred during the RA, as is common. Usually this is caused by unanticipated subsurface conditions requiring removal of additional material as occurred at Longshot.

The deviations are described as follows:

1. The following materials were identified as deviations from work plan estimates (See **Table 2**).
    a. Unprocessed hotspot ore was 150 lcy greater due to discovery of additional ore below the mill foundation.
    b. Volume of clean waste rock from WR1, 5, and 6 was 37 lcy less than workplan estimates.
    c. The WR3 hotspot was 17 lcy greater than estimates.
    d. Metal and wood debris was 100 lcy greater than work plan projections.
    e. 48 lcy of additional clean fill was used, mostly to complete filling of the gloryhole to surface.
    f. The total net amount of material excavated and transported in excess of the work plan estimates is, therefore, 278 lcy.
2. The preference for protective closure of the gloryhole was a cable net. This was changed to complete fill of the void to the surface for improve safety and better aesthetics.
3. On October 30, 2011 Les Palm of Palm Construction requested clarification regarding construction of the bat gate for the upper adit. The work plan drawing suggested that the bat gate crossbars should be constructed of rectangular steel filled with concrete or grout. The Palm crew came equipped with angle iron provided by the USFS for use as crossbars. After discussion with Bob Lambeth of MSE and Rodney Lentz, the USFS OSC, it was agreed that the angle iron was suitable for bat gate construction. This no-cost change did not affect the project schedule.
4. The Lower Adit portal was closed and secured with a bat culvert rather than the planned bat gate, because of the unstable portal brow and related construction safety issues. The modification was approved by the USFS who also provided the bat culvert.
5. The locations which lead exceeded criteria were covered with clean soils eliminating surface exposure, whereas the workplan called for complete removal to criterion. The soil capping reduces potential health risks at the Site by eliminating exposure pathways, ingestion and dermal contact. With capping of these areas at the Site meets ARARs.

5.0 REMOVAL ACTION COSTS

- The original contract amount was $203,689.00.
- No Change Order has been issued.
- The total projected cost for the RA including post-RA monitoring is $203,689.00.

6.0 POST-REMOVAL ACTION MONITORING

MSE will complete three years of annual post-RA monitoring at the Site. The proposed samples and analyses are summarized in **Table 4**; Details, protocols, and sample locations are provided in **Appendix 5**, "Post Removal Monitoring and O&M Plan, Longshot Mine and Mill Site, Stevens County, Washington" (MSE 2011). The first monitoring event will be conducted in spring or summer 2012, and

the final monitoring event will be conducted in spring or summer 2014. The monitoring will be limited to the aquatic environment and will be based on the modified set of sampling locations and analytical parameters that were used during the SI. Annual monitoring reports summarizing the analytical results and comparing to previous monitoring results will be prepared and submitted to the Forest Service by the end of each calendar year. Surface water, sediment, and benthic samples as follows:

- Sample Locations – The sample locations are selected to follow the flowpath of water from up-gradient (BG-1, background) through the site (AD-1 to ET-3) to the probable discharge point downstream near Mill Creek (ET-4).
    - ✓ No water flows through the Site from directly up-gradient, except perhaps for brief periods during spring runoff. BG-1 is the nearest source for potential background sample. Water flow is perennial, which at that elevation probably indicates spring discharge from bedrock fractures. Fracture discharge within the Lower Adit (AD-1) also has a fracture source, and given Site geometry and structure trends this discharge may be derived from the same fracture trend as BG-1.
    - ✓ AD-1 is the only and most up-gradient source of water at the Site and represents Site water source.
    - ✓ ET-3 is the sample point immediately downgradient of all working and waste rock and represents impacts to water from AD-1 through and under potential contaminant sources. The sample is deliberately located upstream from a culvert, a potential source of zinc and not related to the Site.
    - ✓ ET-4 is located immediately upstream of the County Road and a 24-inch culvert, a potential source of zinc. This location is the only possible location for a sample to measure potential impact to Mill Creek, but it contains water only during wet periods.
- Flowpath Discussion – There is no clear evidence that BG-1 is truly source water. There is no surface water upstream of the Site, and BG-1 is the only spring water near the Site that is potentially definable as "background" water. Water discharging at AD-1 is perennial, and the water does flow downgradient through and under waste rock and tailings. This water is probably diluted by groundwater base flow. As a side note the large pond PD-2 was supplemented during mine operation by a small ditch from BG-1, which at that time had its own small dam and reservoir (now breached). The ditch appears to have been dry for years. Approximately 100 yards downstream from ET-4 all surface flow infiltrates during most of the year. Location ET-4 also appears to be dry most of the year, but there is a small perennial pond approximately 100 yards upstream with no apparent outflow toward ET-4 at least during summer through winter. Although the authors of the SI and EECA recommended sampling during summer it is unlikely there will be flow at ET-4 during that time except perhaps during very wet years. Water from the general area of the Site appears to infiltrate and move as groundwater downhill to discharge at the surface in the vicinity of the pond. The ground water is probably highly diluted by infiltration of precipitate and runoff. Also, the groundwater connection between ET-3 and ET-4 is speculative; a groundwater investigation was far beyond the scope of the RA.

Small ephemeral streams are common on the slope between ET-3 and ET-4, indicating that surface flow does occur during flood periods such as spring runoff. MSE now recommends that sampling be completed during this period. It is not entirely clear from where water at ET-4 is derived, and the benthos will not represent a flowing stream. Analyses from ET-4 must be interpreted carefully.

7.0 REFERENCES

MSE, 2005. Site Inspection Report, Longshot Mine and Mill Site, Longshot Mine and Mill Site, Coleville National Forest, Stevens County, Washington. Prepared by Millennium Science and Engineering, Inc. for U.S. Forest Service, November 18, 2005.

MSE 2008. Engineering Evaluation/Cost Analysis, Longshot Mine and Mill Site, Coleville National Forest, Stevens County, Washington. Prepared by Millennium Science and Engineering, Inc. for U.S. Forest Service, November 2008.

MSE 2011. Post Removal Monitoring and O&M Plan, Longshot Mine and Mill Site, Stevens County, Washington. Prepared by Millennium Science and Engineering, Inc. for U.S. Forest Service, October 2011.

MSE 2012. Pre-Removal Action Inspection and Monitoring Report, Colville National Forest, Stevens County Washington. Draft prepared by Millennium Science and Engineering, Inc. for U.S. Forest Service. October 2011; final prepared September 12, 2012.

MSE 2012. Work Plan, Longshot Mine and Mill Site, Colville National Forest, Stevens County, Washington. Draft prepared by Millennium Science and Engineering, Inc. for U.S. Forest Service, October 2011; Final prepared August 6, 2012.

USFS, 2003. Abbreviated Preliminary Assessment, Longshot Mine and Mill Site Coleville National Forest, Stevens County, Washington. Prepared by the U.S. Forest Service, September 2003.

FIGURES



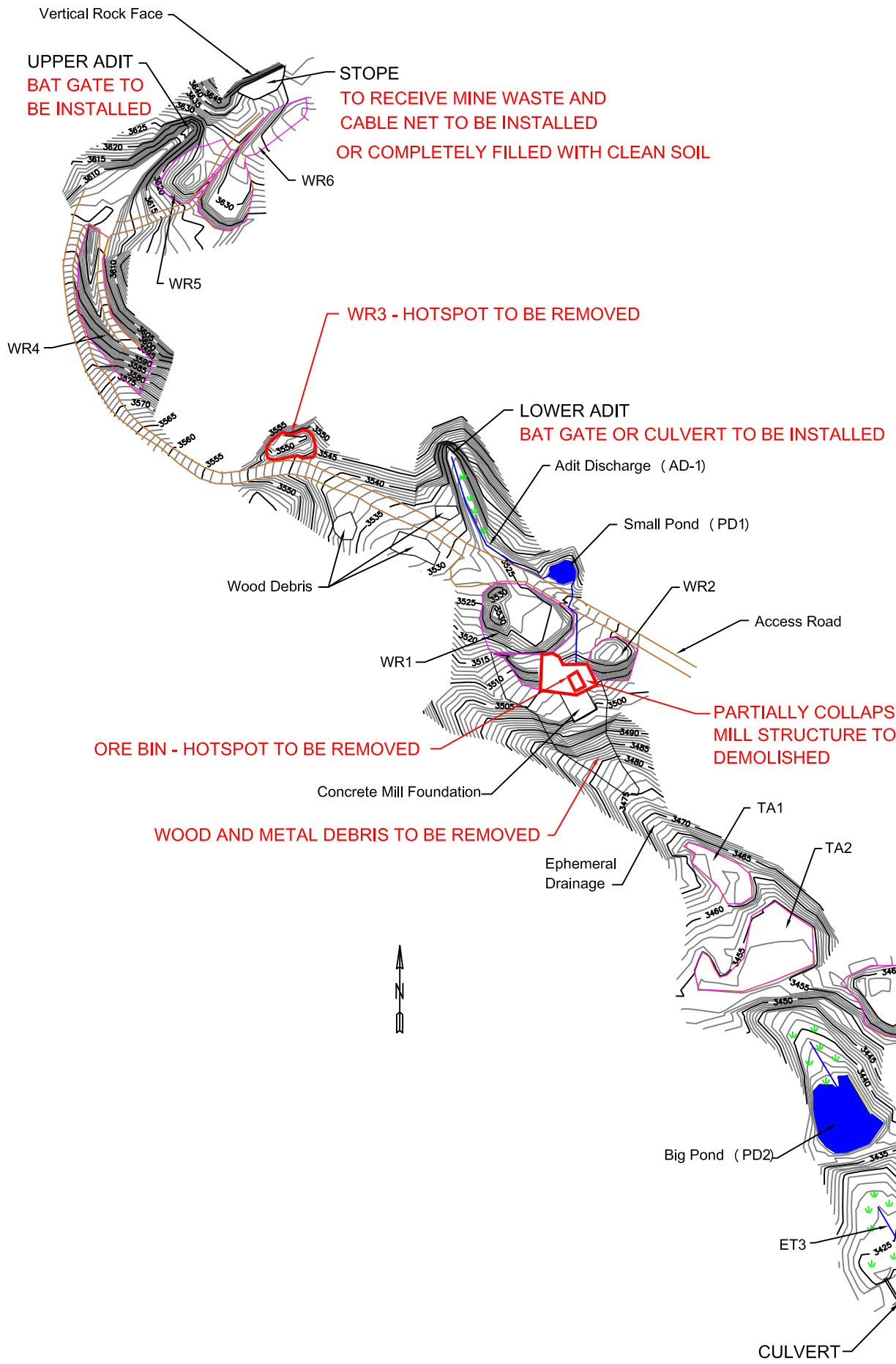
Figure 1. Project Vicinity

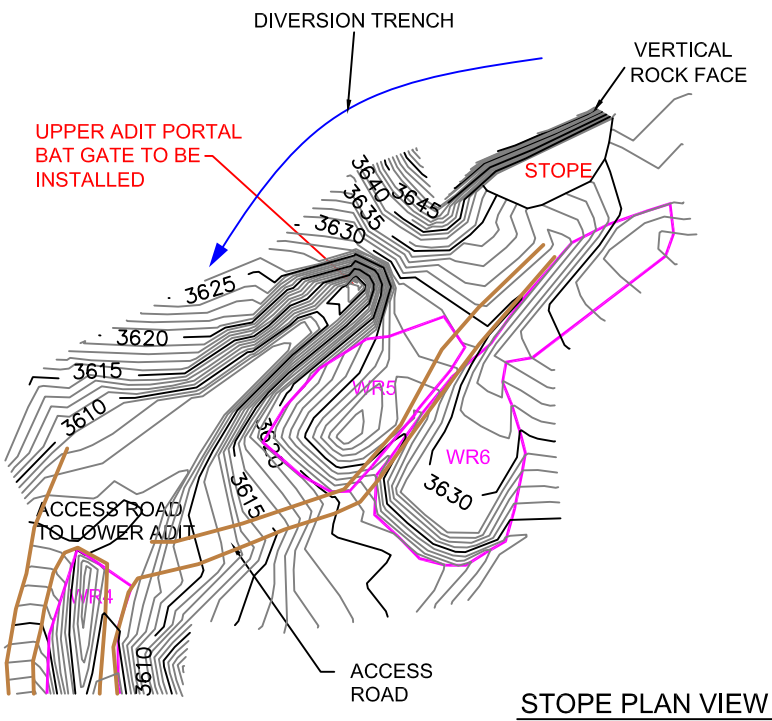
Longshot Mine Removal Action;
Stephens County, WA

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

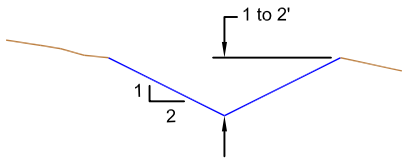
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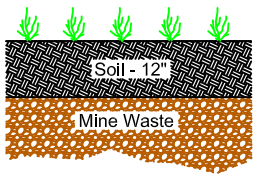


STOPE PLAN VIEW



DIVERSION CHANNEL CROSS SECTION
Not to Scale

STOPE DETAILS



EARTHEN COVER
Not to Scale

LEGEND

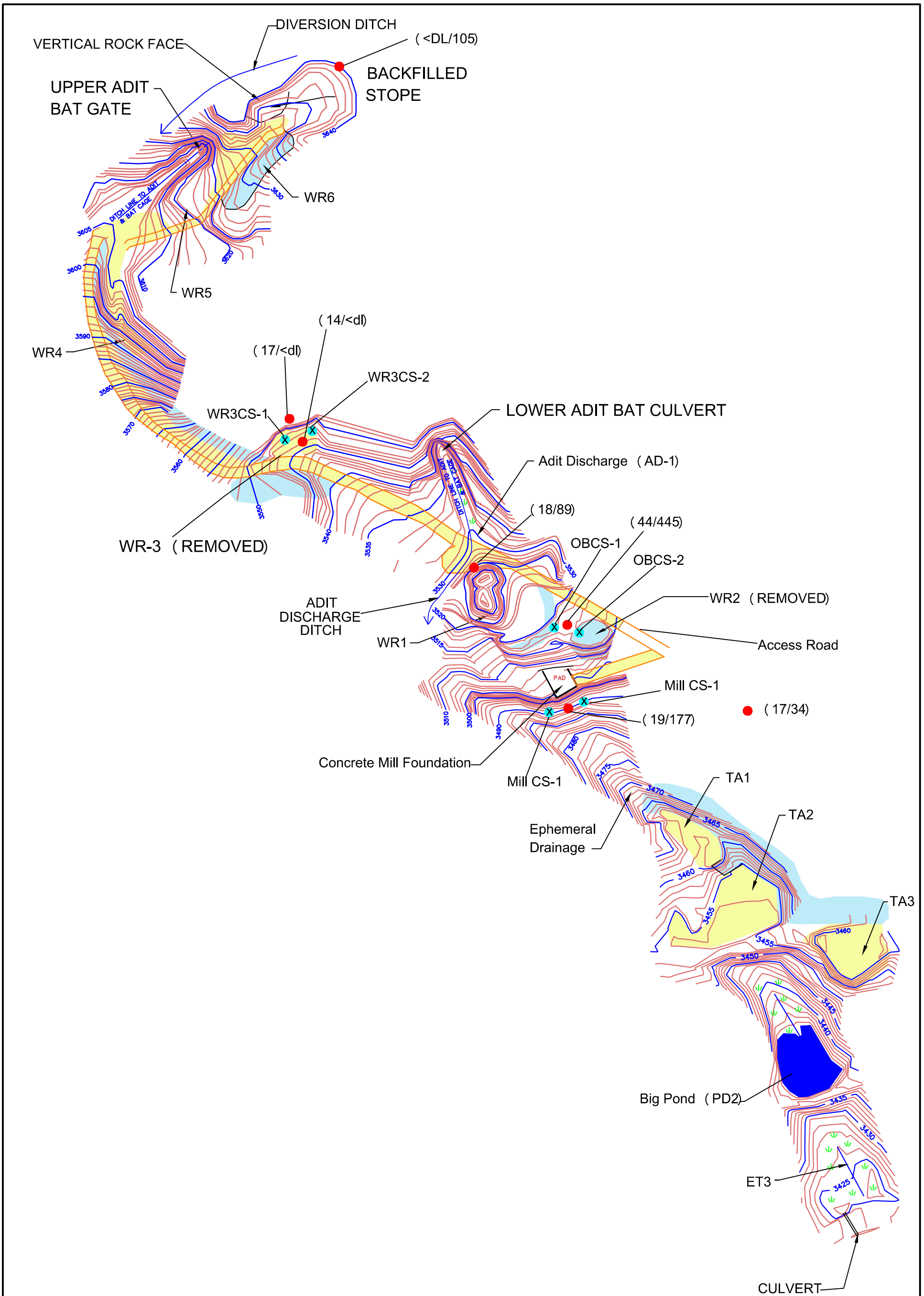
- Major Contour
- Intermediate Contour
- Riparian Habitat
- Road
- Water
- Mine Waste
- Hotspot

Map updated September 10, 2012

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Figure 2. Pre-Removal Action
Features and Workings
Longshot Mine Removal Action
Stevens County, Washington

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LEGEND

- Reclaimed Contours
- Road
- Water
- Borrow Area
- Reclaim Area
- Riparian Habitat
- Water Body
- X Confirmation Sample
- XRF Measurement (As/Pb, mg/kg)

Map updated October 03, 2012

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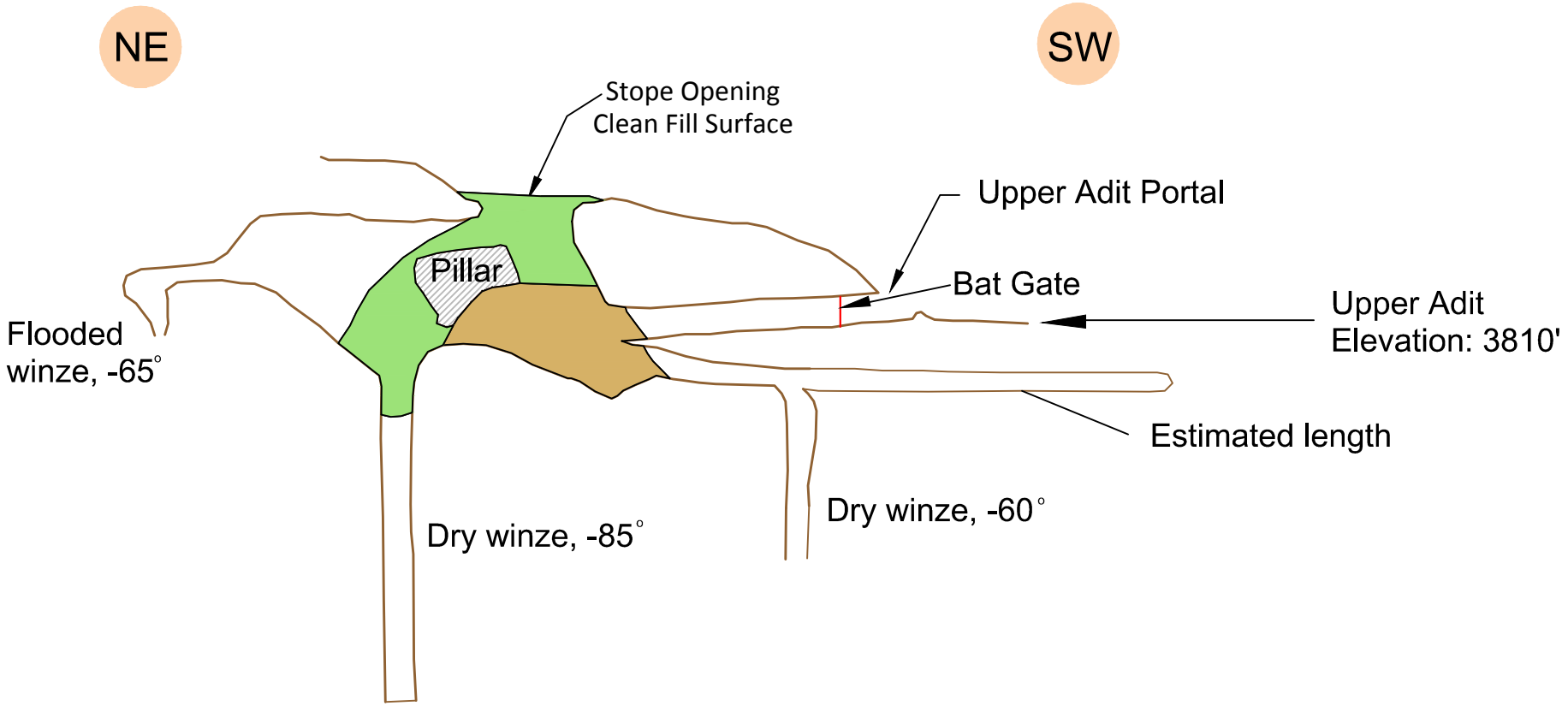
Figure 3. Final Reclamation Surface As-Built
Longshot Mine Removal Action
Stevens County, Washington

100 0 100

SCALE: 1 unit = 100 feet

N

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LEGEND

Clean Fill/ Additional Waste Rock

Waste Rock

Figure 4. Repository Cross-Section
Longshot Mine Removal Action
Stevens County, Washington

Not To Scale

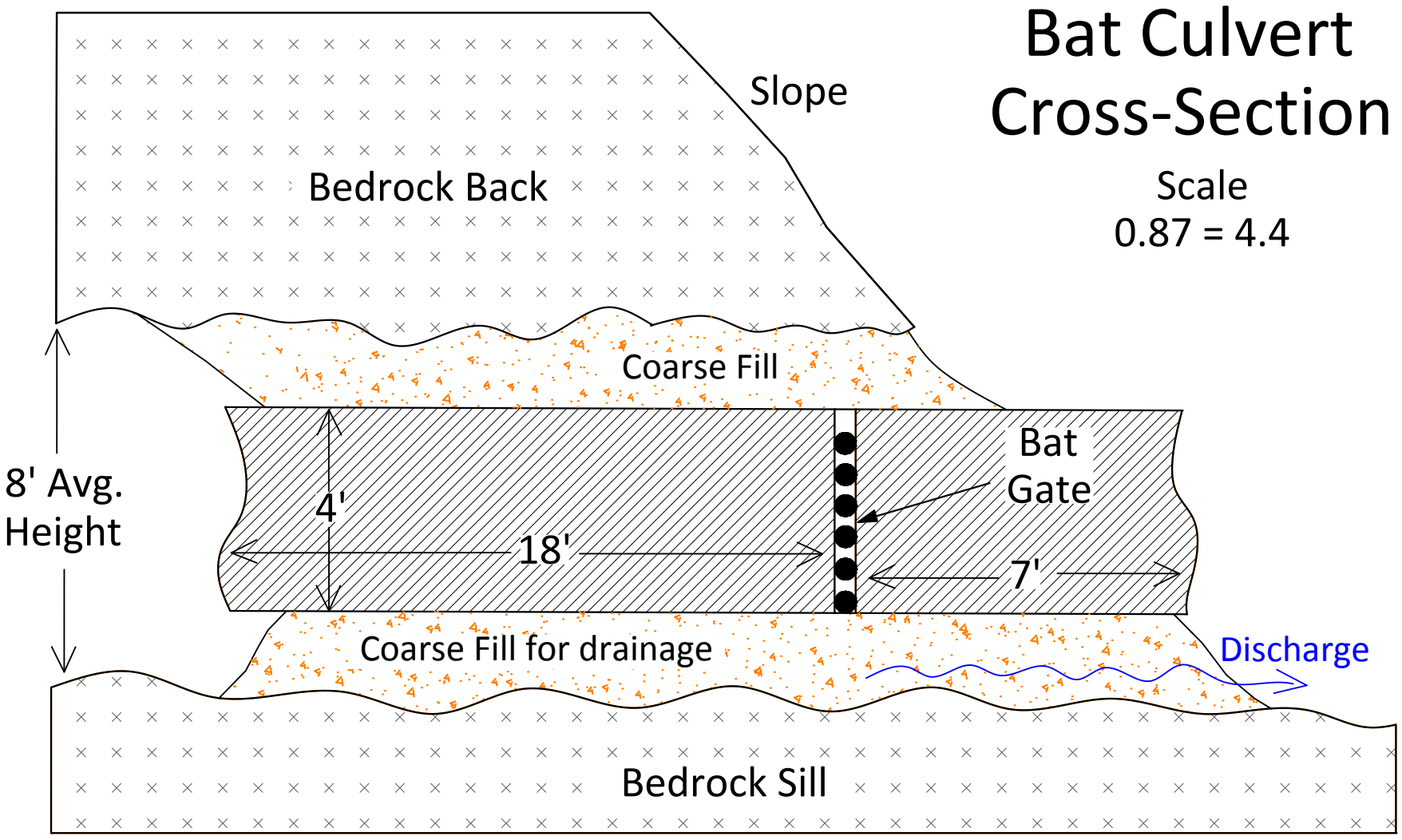
Map updated October 03, 2012

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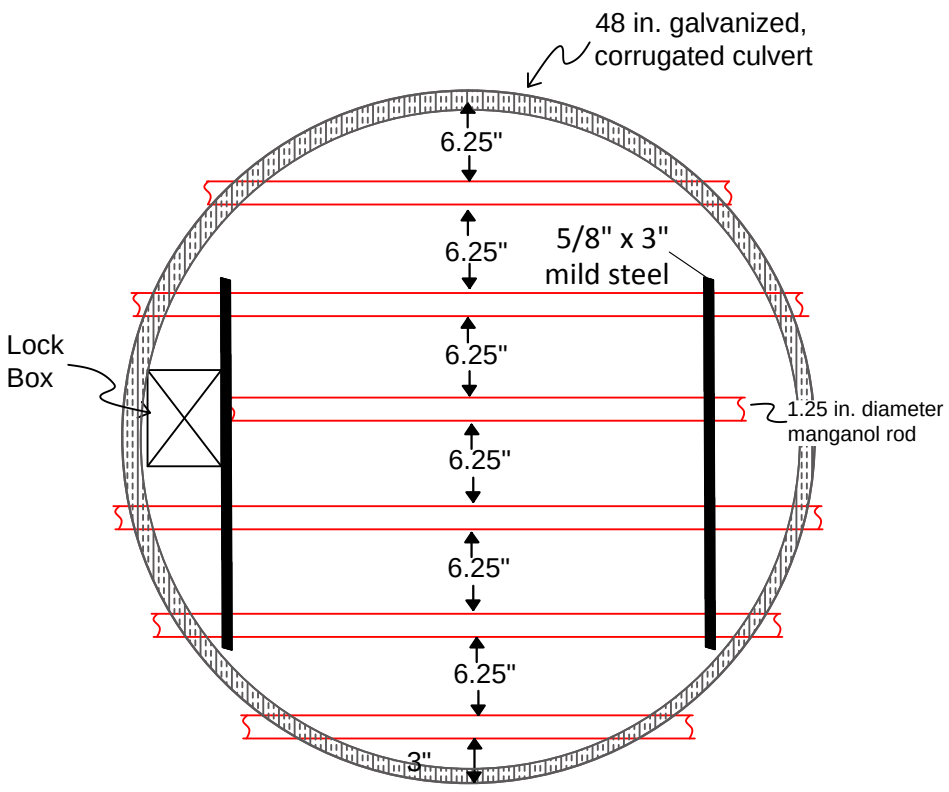
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Spokane WA, 99218
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Bat Culvert Cross-Section

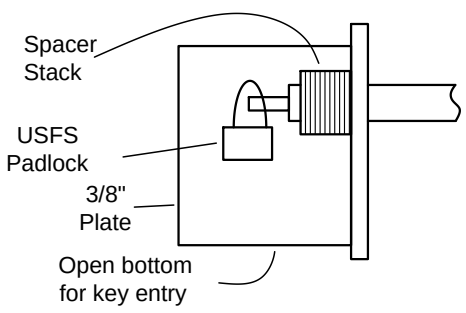
Scale
0.87 = 4.4



Bat Culvert Detail

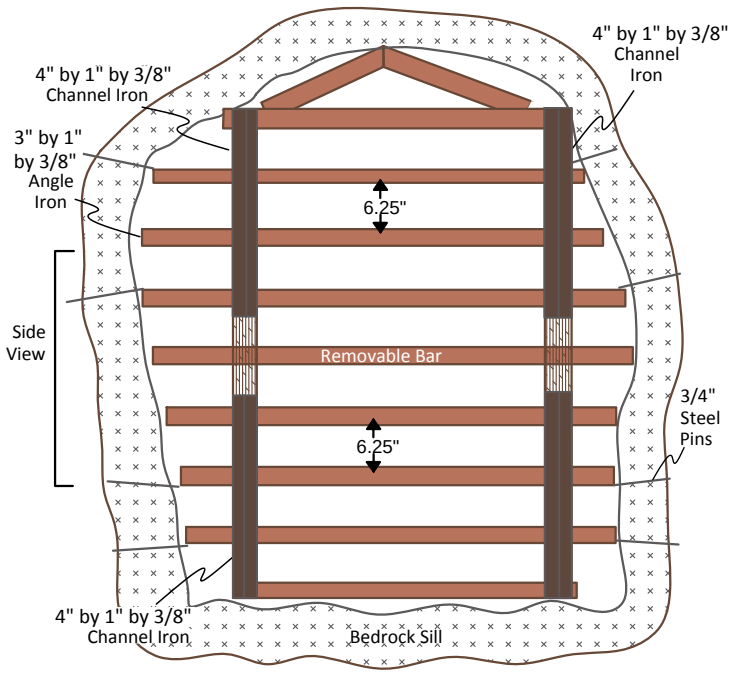


Lock Box Detail

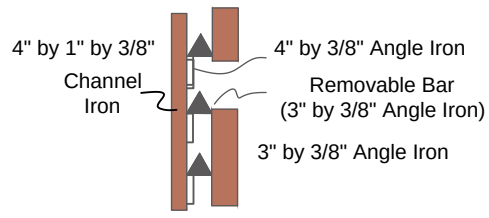


Upper Adit Bat Gate

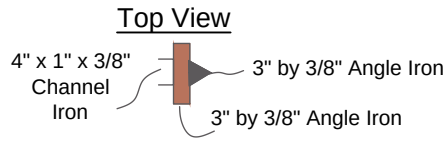
Frontal View



Side View



Top View




Photograph of Bat Culvert Installed (A)


Photograph of Bat Culvert Installed (B)


Photograph of Bat Gate Installed (side)

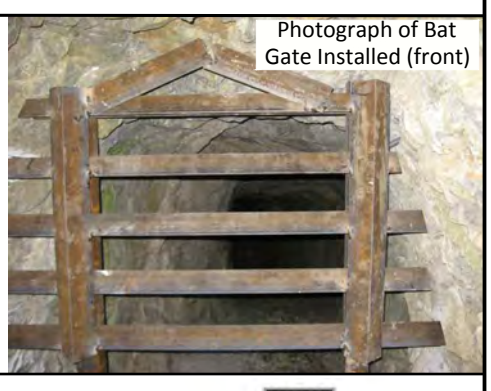

Photograph of Bat Gate Installed (front)

Figure 5. Bat Culvert and Gate As-Built
Longshot Mine Removal Action
Stevens County, Washington

Figure created October 03, 2012
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TABLES

Table 1. Wood Waste Analyses

This sample was a composite of wood shavings from the ore bin.

Total Metals mg/kg):

	As	Ba	Cd	Cr	Cu	Pb	Hg	Se	Ag	Zn
	<2.5	8.06	1.33	<0.60	7.8	303	0.39	<4.0	1.88	224
Criteria[1]	20	--	2	19	--	1000	2	--	--	--

TCLP Leachate (mg/L):

	As	Ba	Cd	Cr	Cu	Pb	Hg	Se	Ag	Zn
	<0.050	<1.00	0.0147	<0.0500	0.092	1.56	<0.00020	<0.0500	<0.0500	2.41
Criteria[2]	5	100	1	5	--	5	0.2	1	5	--

Notes:

Criteria[1] = MTCA Industrial Soil Cleanup Criteria (RCW 173-340-742, Table 745-1)

Criteria[2] = EPA Method 1311 Criteria (40 CFR 261.24)

-- = No Standard

Table 2. Summary of Volumes Moved.

Location	EECA Volume	RA Volume
Unprocessed Ore	150	300**
WR1, 5, 6*	287	250
WR3	63	80
General Debris	20	120
Cover Soil and Rip-Rap	230	378
Road Improvement	30	30
Totals	**780**	**1,158**

Notes:

* = Additional removals requested by Ecology

** = Includes additional volumes below mill foundation

Table 3. Post-Removal XRF Field Screening Results.

Location	Date	Time	As (mg/kg)	Pb (mg/kg)
Adjacent to WR6	10/29/2011	12:50:00 PM	<10	105
WR3 - on the bank	10/29/2011	12:35:00 PM	17.0	ND
WR3 - center of area	10/29/2011	11:31:00 AM	18.0	ND
Adjacent to WR3	10/29/2011	12:30:00 PM	18.0	89.0
ORE BIN	10/29/2011	10:01:00 AM	44.0	445
Downslope from mill foundation	10/29/2011	9:45:00 AM	19.0	177
Along access road just before WR2	10/29/2011	10:23:00 AM	17.0	34.0
Cleanup Criteria				
Site Specific			52.0	800
State of Washington Criteria				
(WAC 173-340-740) MTCA Method A Industrial Soil (Table 745-1)			20.0	1000
(WAC 173-340-7492) Method B Unrestricted Land Use (Table 749-2)			20.0	250
(WAC 173-340-7493) Method B Ecological Receptor[b] (Table 749-3)			10p (As^5)	50p
Federal Criteria				
EPA Region 9 PRGs - Industrial Soil			1.6	800

Notes:

= Screening criteria exceeded (State OR Federal)

= Screening criteria exceeded (State AND Federal)

ND = below the XRF instrument detection limit

XRF = X-ray Fluorescence

Table 4. Confirmation Sample Analytical Results Summary

Location	Sample ID	Date Collected	Solids (%)	Analytical Result (mg/kg)									
				As	Ba	Cd	Cr	Cu	Pb	Se	Ag	Zn	Hg
Waste Rock Pile WR-3	WR3CS-1	10/29/2011	85.8	6.6	57.3	6.52	26.0	23.8	305	<4.0	1.79	1060	0.043
Waste Rock Pile WR-3	WR3CS-2	10/29/2011	86.3	5.6	60.1		30.2	48.6	**2600**	<4.0	10.2	1080	0.04
Ore-Bin	OBCS-1	10/29/2011	92.0	10.1	59.0		38.7	86.9	706	<4.0	16.2	1130	0.038
Ore-Bin	OBCS-2	10/29/2011	90.2	13.0	29.2	4.71	34.6	59.7	476	<4.0	24.4	812	<0.033
Downslope of Mill	Mill CS-1	10/29/2011	87.2	8.3	74.7	4.32	31.0	323	**1590**	<4.0	20.5	881	0.062
Downslope of Mill	Mill CS-2	10/29/2011	87.2	9.1	85.4	3.13	41.6	51.6	789	<4.0	6.99	571	<0.033
Cleanup Criteria													
Site Specific Criteria				52.0	ND	ND	ND	ND	**800**	ND	ND	ND	ND
State of Washington Criteria													
(WAC 173-340-742) MTCA Method A Industrial Soil (Table 745-1)				20.0	NS	2.0	19.0	NS	1000	NS	NS	NS	2.0
(WAC 173-340-7492) Method B Unrestricted Land Use (Table 749-2)				20.0	NS	2.0	19.0	NS	250	NS	NS	NS	2.0
(WAC 173-340-7493) Method B Ecological Receptor[b] (Table 749-3)				10p (As^5)	NS	4p	42p,s	50s	50p	NS	2p	86p	0.1s
Federal Criteria													
EPA Region 9 PRGs - Industrial Soil				1.6	67000	450	450	41000	800	5100	5100	100000	310

Notes:

= Screening criteria exceeded (State OR Federal)

= Screening criteria exceeded (State AND Federal)

800 = **Bold, red font** indicates exceedence of Site Specific Cleanup criteria

mg/kg = Milligram per kilogram

PRG = Preliminary Remediation Goal

NS = No screening criteria

ND = Not Determined

Table 5. Post-Removal Monitoring Analysis Summary

Location	Medium	Number of Samples	Analyse
(1) Ephemeral (Background) Stream East of Site (BG-1)	Surface Water Sediment	1 Each Medium	Total & Dissolved Metals: Ag, As, Ba, Cd, Pb, Zn Water only add: Sulfate, TDS, TSS, Hardness Field Parameters: Ph, Temp, DO, EC, ORP/Eh
(2) Adit Discharge (AD-1)	Surface Water Sediment	1 Each Medium	Total & Dissolved Metals: Ag, As, Ba, Cd, Pb, Zn Water only add: Sulfate, TDS, TSS, Hardness Field Parameters: Ph, Temp, DO, EC, ORP/Eh
(3) Ephemeral Stream Below Lower Tailings & PD2	Surface Water Sediment	1 Each Medium	Total & Dissolved Metals: Ag, As, Ba, Cd, Pb, Zn Water only add: Sulfate, TDS, TSS, Hardness Field Parameters: Ph, Temp, DO, EC, ORP/Eh
(4) Ephemeral Stream Below Discharge to Mill Creek (ET-4)	Surface Water Sediment	1 Each Medium	Total & Dissolved Metals: Ag, As, Ba, Cd, Pb, Zn Water only add: Sulfate, TDS, TSS, Hardness Field Parameters: Ph, Temp, DO, EC, ORP/Eh
(5) Ephemeral Stream Below Discharge to Mill Creek (ET-4)	Surface Water Benthic Organisms	1	Taxonomy generaly to genus/species
(6) Site	Water QA/QC	1 Blank, 1 MS/MSD	Total & Dissolved Metals: Ag, As, Ba, Cd, Pb, Zn Sulfate, TDS, TSS, Hardness

Notes:
DO = Dissolved Oxygen
EC = Electrical Conductivity
MS/MSD = Matrix Spike/Matrix Spike Duplicate
ORP/EH = Oxidation-Reduction Potential
TDS = Total Dissolved Solids
Temp = Temperature
TSS = Total Suspended Solids

APPENDIX 1

Daily Field Log Forms

MSE Daily Field Summary

Project:	**Longshot Mine Removal Action**
Project Number:	3149
Location:	Colville National Forest
Field Personnel:	Bob Lambeth
USFS Personnel:	Rod Lentz
Date:	10/21/2011

FIELD CONDITIONS

Weather: Sunny **Partly cloudy** Cloudy Rain Snow Temp **45°F**

Precipitation: **Dry** Recent Current Wind: 0 **<5** 5-15 15-30 >30

VISITORS TO THE SITE

Name	Company:	Purpose of Visit:
Bob Lambeth	MSE	Reclamation Oversight
Lyle Palm	Palm Construction, Inc.	Reclamation Activities
Jerry Palm	Palm Construction, Inc.	Reclamation Activities
John McCombs	Palm Construction, Inc.	Reclamation Activities
Les Palm	Palm Construction, Inc.	Reclamation Activities

FIELD WORK SUMMARY

9:00 am Drove from home to Colville - Mobilization

10:30 am Arrived in Colville, WA to met Rod Lentz and inspect Palm Construction equipment. Les Palm did not arrive with his truck, lowboy, and excavator until later. We inspected two trucks, lowboys, and excavators.

12:30 pm Left for Longshot Mine with Lyle and John to move equipment in. Jerry took a crew trailer to an RV lot.

1:00 pm Arrived on site and offloaded equipment. Lyle, John, and I toured the site and discussed Scope of Work. Jerry arrived at 2:30 pm.

4:30 pm Bob returned to Spokane. The Palm crew returned to Winthrop for the weekend.

MSE Daily Field Summary

Project:	**Longshot Mine Removal Action**
Project Number:	3149
Location:	Colville National Forest
Field Personnel:	Bob Lambeth
USFS Personnel:	
Date:	10/24/2011

FIELD CONDITIONS

Weather: Sunny **Partly cloudy** Cloudy Rain Snow Temp **35°F**

Precipitation: **Dry** Recent Current Wind: 0 **<5** 5-15 15-30 >30

VISITORS TO THE SITE

Name	Company:	Purpose of Visit:
Bob Lambeth	MSE	Reclamation Oversight
Lyle Palm	Palm Construction, Inc.	Reclamation Activities
Les Palm	Palm Construction, Inc.	Reclamation Activities
John McCombs	Palm Construction, Inc.	Reclamation Activities

FIELD WORK SUMMARY

9:00 am Bob received foreign travel shots at Spokane County Health District before driving to the Longshot Mine.

10:00 am Drove to Longshot; arrived at 12 Noon.

12:00 pm Palm's crew arrived at 12:05 PM after spending the weekend in Twisp to bring light equipement back to the Longshot (welder, iron stock, smaller excavator bucket, etc.). Reviewed activites for the day with Palm crew.

The crew brushed all roads and trails as needed for access to the wood and metal scrap as well as the Upper Adit.

The spur road to the mill foundations was opened to access and grubbed. Stockpiles for all grubbed brush were located. The Spur Road was improved adequately for dump trucks, but new fill was not necessary.

The crew initiated stockpiling of scrap for later loading and transporting to the Stevens county Landfill.

5:00 pm Bob returned to Spokane, arriving at 6:30 pm.

MSE Daily Field Summary

Project:	**Longshot Mine Removal Action**
Project Number:	3149
Location:	Colville National Forest
Field Personnel:	Bob Lambeth
USFS Personnel:	
Date:	10/25/2011

FIELD CONDITIONS

Weather: Sunny Partly cloudy **Cloudy** Rain Snow Temp **45°F**

Precipitation: Dry **Recent** Current Wind: **0** <5 5-15 15-30 >30

VISITORS TO THE SITE

Name	Company:	Purpose of Visit:
Bob Lambeth	MSE	Reclamation Oversight
Lyle Palm	Palm Construction, Inc.	Reclamation Activities
Les Palm	Palm Construction, Inc.	Reclamation Activities
John McCombs	Palm Construction, Inc.	Reclamation Activities
Jerry Palm	Palm Construction, Inc.	Reclamation Activities

FIELD WORK SUMMARY

8:00 am Drove to Longshot; arrived at 9:30 am. Check on status of debris removal.

10:00 am Bob drove to Colville to obtain supplies and chisels to get wood samples from the mill debris for TCLP tests.

11:00 am Bob returned to the Longshot and obtained one composite sample of wood shaving from the old mill structure wood in contact with ore and partially processed ore. This sample analysis is to be completed overnight to determine if the wood passes TCLP and can be disposed of in the County Landfill or must be transported to Arlington, Oregon. Watched the Palm crew remove scrap and transport 5 loads to the landfill. The wood as was anticipated exceeded the EECA volume estimation, because of the high void percentage. The crew began to raze and stockpile collapsed mill structure wood. The access road to the Gloryhole was improved, and Palm excavated WR-3 and deposited it in the Gloryhole. Removal of ore and partially processed ore was initiated.

Bob and Jerry picked up the USFS bat culvert in Kettle Falls for transport to the site.

5:00 pm Bob returned to Spokane, arriving at 6:30 pm.

Debris Removed = 5 loads (50 lcy)

Waste Rock Removed = 8 loads (80 bcy, WR3)

MSE Daily Field Summary

Project:	**Longshot Mine Removal Action**
Project Number:	3149
Location:	Colville National Forest
Field Personnel:	Bob Lambeth
USFS Personnel:	
Date:	10/26/2011

FIELD CONDITIONS

Weather: Sunny Partly cloudy **Cloudy** Rain Snow Temp **50°F**

Precipitation: Dry **Recent** Current Wind: 0 **<5** 5-15 15-30 >30

VISITORS TO THE SITE

Name	Company:	Purpose of Visit:
Bob Lambeth	MSE	Reclamation Oversight
Lyle Palm	Palm Construction, Inc.	Reclamation Activities
Les Palm	Palm Construction, Inc.	Reclamation Activities
John McCombs	Palm Construction, Inc.	Reclamation Activities

FIELD WORK SUMMARY

8:00 am Drove wood waste sample to City Parcel for immediate delivery to SVL Analytical in Kellog, ID. The sample will be analyzed today to verify safe disposal in the Stevens County Landfill of wood in contact with ore and partially processed ore. This sample analysis is to be completed overnight to determine if the wood passes TCLP and can be disposed of in the County Landfill or must be transported to Arlington, Oregon.

9:00 am Bob returned to the Longshot, arriving at 11:00 am.

Watched the Palm crew remove scrap and transport 5 loads to the landfill. The wood as was anticipated exceeded the EECA volume estimation, because of the high void percentage. The crew began to raze and stockpile collapsed mill structure wood and continued and nearly completed removal of ore, partially processed ore, and additional sulfidic waste downhill from and around the mill foundation. The removal volume significantly exceeded that of the EECA.

5:00 pm Bob returned to Spokane, arriving at 6:30 pm.

Debris Removed = 5 loads (50 lcy)

Waste Rock Removed = 15 loads (10 bcy, Ore Bin & Foundation areas)

MSE Daily Field Summary

Project:	**Longshot Mine Removal Action**
Project Number:	3149
Location:	Colville National Forest
Field Personnel:	Bob Lambeth
USFS Personnel:	
Date:	10/27/2011

FIELD CONDITIONS

Weather: Sunny **Partly cloudy** Cloudy Rain Snow Temp **45°F**

Precipitation: Dry **Recent** Current Wind: 0 **<5** 5-15 15-30 >30

VISITORS TO THE SITE

Name	Company:	Purpose of Visit:
Bob Lambeth	MSE	Reclamation Oversight
Lyle Palm	Palm Construction, Inc.	Reclamation Activities
Les Palm	Palm Construction, Inc.	Reclamation Activities
John McCombs	Palm Construction, Inc.	Reclamation Activities

FIELD WORK SUMMARY

8:00 am Drove to the Longshot Mine, arriving at 9:45 am.

Palm was aggressively moving WR1 & WR2 Ecology material to the stope. This was completed by 3:00 pm.

Two loads of scrap from a garbage dump and the slope below the foundation was transported to the Stevens County Landfill. Additional scrap from below the mill was stockpiled.

3:00 pm Palm started fueling and mainrenance on trucks and equipment, including repairing a leaking hydraulic hose.

5:00 pm Palm treturned to Colville; Bob drove to Spokane, arriving at 7:00 pm.

Debris Removed = 2 loads (10 lcy)

Waste Rock Moved to repository = 10 loads (100 bcy Ecology material)

MSE Daily Field Summary

Project:	**Longshot Mine Removal Action**
Project Number:	3149
Location:	Colville National Forest
Field Personnel:	Eric Hieb, Bob Lambeth
USFS Personnel:	
Date:	10/28/2011

FIELD CONDITIONS

Weather: Sunny Partly cloudy **Cloudy** Rain Snow Temp **35°F**

Precipitation: Dry **Recent** Current Wind: 0 **<5** 5-15 15-30 >30

VISITORS TO THE SITE

Name	Company:	Purpose of Visit:
Eric Hieb	MSE	Reclamation Oversight
Bob Lambeth	MSE	Reclamation Oversight
Lyle Palm	Palm Construction, Inc.	Reclamation Activities
Les Palm	Palm Construction, Inc.	Reclamation Activities
John McCombs	Palm Construction, Inc.	Reclamation Activities

FIELD WORK SUMMARY

8:30 am Went to Boise's airport from home

10:30 am Landed in and left Spokane to head to Colville, WA

2:00 pm Arrived in Colville, WA and checked into local hotel

2:30 pm Left for Longshot Mine with Bob Lambeth to take some confirmation samples and XRF readings

3:00 pm Arrived on site. With the exception of the Gloryhole area, all wasterock has been deposited in the stope.

5:30 pm Tour of the site (upper/lower adit, wasterock piles (WR), stope, access road). The XRF instrument would not calibrate properly. We read all the manuals and instructions for troubleshooting, but nothing seemed to work. Daylight was almost gone; we took the XRF back to the hotel in Colville and see if we could get it to work. When we got back to the hotel, we tried calibrating the XRF instrument, and it worked on the first attempt

6:00 pm Arrive back in Colville

Waste Rock Removed = 15 loads (150 bcy, Ore Bin & Foundation area)

MSE Daily Field Summary

Project:	**Longshot Mine Removal Action**
Project Number:	3149
Location:	Colville National Forest
Field Personnel:	Eric Hieb, Bob Lambeth
USFS Personnel:	
Date:	10/29/2011

FIELD CONDITIONS

Weather: Sunny **Partly cloudy** Cloudy Rain Snow Temp **40°F**

Precipitation: Dry **Recent** Current Wind: 0 **<5** 5-15 15-30 >30

VISITORS TO THE SITE

Name	Company:	Purpose of Visit:
Eric Hieb	MSE	Reclamation Oversight
Bob Lambeth	MSE	Reclamation Oversight
Lyle Palm	Palm Construction, Inc.	Reclamation Activities
Les Palm	Palm Construction, Inc.	Reclamation Activities
John McCombs	Palm Construction, Inc.	Reclamation Activities

FIELD WORK SUMMARY

9:00 am Met with Bob at hotel in Colville and left for the Longshot Mine

9:30 am Arrive at site

9:30 am - 3:15 pm Once Bob and I arrived on site we tried to calibrate the XRF instrument but it reported errors. We brainstormed why the calibration was unsuccessful at the site but successful in town. We drove down the main access road stopping at various places until calibration was successful. The XRF instrument calibrated at a lower elevation. Once successfully calibrated we drove back up to the site to take readings. After one reading the instrument would have an error and require calibration. We tried calibrating on site but calibration errors forced us to drive down the main access road to a lower elevation for successful calibration. This process repeated for each XRF reading. Over a span of a few hours, we were able to take enough readings to feel comfortable that reclamation can ensue. XRF readings were taken at the stope, WR6, center of WR3, bank of WR3, rock/soil pile across the road from WR3, ORE BIN, adjacent/downslop of concrete mill foundation, and on side of access road ~300 ft south of WR2. Noted that photographs need to be taken the following day of all XRF reading locations. Composite confirmation samples were collected at WR3, ORE BIN,and adjacent/downslope of the foundation and shipped for lab analysis. Palm continued to remove waste required by Ecology at WR5 and WR6.

3:15 pm Leave site

3:45 pm Arrive at hotel in Colville

Waste Rock Removed = 15 loads (150 lcy, Ecology material)

MSE Daily Field Summary

Project:	**Longshot Mine Removal Action**
Project Number:	3149
Location:	Colville National Forest
Field Personnel:	Eric Hieb
USFS Personnel:	
Date:	10/30/2011

FIELD CONDITIONS

Weather: Sunny Partly cloudy **Cloudy** Rain Snow Temp **34°F**

Precipitation: Dry **Recent** Current Wind: **0** <5 5-15 15-30 >30

VISITORS TO THE SITE

Name	Company:	Purpose of Visit:
Eric Hieb	MSE	Reclamation Oversight
Lyle Palm	Palm Construction, Inc.	Reclamation Activities
Les Palm	Palm Construction, Inc.	Reclamation Activities
John McCombs	Palm Construction, Inc.	Reclamation Activities

FIELD WORK SUMMARY

7:30 am Leave hotel in Colville to Longshot Mine

8:00 am When I arrived on site, the crew had not arrived yet. While waiting for the crew, I looked through the EE/CA and started documenting the daily field summaries on my PC. At 9:00am the crew arrived as it started to rain. The crew filled the stope with soil and rock from adjacent to the vertical rock face. I took photographs of all the locations where XRF reading were taken, and documented the values that were written on the marked locations.

10:30 am Observed Les tear down trees to be chipped and took a photo of him doing so

11:00 am Les backfilled in the small pond (PD1). He also inquires about the design of the upper bat gate - the drawing showed a flat bar but the crew only had corner angle bars. I told them I would contact Bob to get the answer. In the meantime John and Lyle were cutting down more trees to be chipped.

11:30 am Les finished draining PD1 and filling it in with adjacent soil. Lyle and John were chipping wood until the chipper ran out of transmision fluid - have to go to town to get some more

12:00 pm Crew left to town (Colville) for lunch and to pick up needed supplies. I also traveled back to Colville for lunch

2:00 pm Arrive back on site from lunch in Colville

3:00 pm Les finishes up the welding on the bat gate - the "ok" was given to proceed with the angle bars. The wood chipper temporarily got jammed but was shortly after able to be unplugged

4:30 pm Most chipping piles have been completed (4 photos). Less finishes the drainage ditch which captures the runoff that would fall into the stope from atop the vertical rock face (3 photos)

5:00 pm Photograph of John and Lyle chipping wood by WR2

6:00 pm End of day (Arrive back in Colville) Soil Fill in PD1 = 3 loads (30 bcy)

MSE Daily Field Summary

Project:	**Longshot Mine Removal Action**
Project Number:	3149
Location:	Colville National Forest
Field Personnel:	Eric Hieb
USFS Personnel:	Rodney T. Lentz
Date:	10/31/2011

FIELD CONDITIONS

Weather: Sunny **Partly cloudy** Cloudy Rain Snow Temp **35°F**

Precipitation: Dry **Recent** Current Wind: 0 <5 **5-15** 15-30 >30

VISITORS TO THE SITE

Name	Company:	Purpose of Visit:
Eric Hieb	MSE	Reclamation Oversight
Bob Lambeth	MSE	Reclamation Oversight/Site Inspection
Lyle Palm, Les Palm	Palm Construction, Inc.	Reclamation Activities
Rodney T. Lentz	USFS	Site Inspection
John McCombs	Palm Construction, Inc.	Reclamation Activities

FIELD WORK SUMMARY

7:45 am Leave for Longshot Mine

8:15 am Arrive on site

8:45 am The crew shows up - Lyle takes back the wood chipper back to Spokane.

9:00 am John and Les are filling up the dump truck and moving the soil next to the ORE BIN. On confirmation from laboratory results that there was sufficient clean-up, the soil will be spread over the area.

9:30 am Continued work on placing soil by ORE BIN (2 photos taken). The soil is the trenched soil from the drainage ditch that will receive all the drainage from the lower adit (AD1).

10:00 am Leave site to get cell phone service to ask Bob when he and Rodney T. Lentz will arrive on site

11:00 am Arrive back on site from cell phone call to Bob. Les filed the stope with the excess soil from the drainage ditch. John got a flat tire in his truck - I drove him to cell service again so he could notify Lyle to pick up appropriate tools.

11:45 am Arrive back on site from the phone call to Lyle

12:00 pm Lunch

12:45 pm Les finishes up filling the stope (2 photos). Afterwards he went to the ORE BIN to spread the soil

1:30 pm Lyle arrives back on the site. Lyle and Les start loading up the wood from the destroyed mill.

2:00 pm Rodney and Bob arrive on site for inspection and to go over everything that needs to be done or altered. These were: seed and fertilize the tailings (TA1, TA2), place rocks at reclamations end to prevent vehicle access, retrieve the tag from the seed bag, and additions to upper bat gate, increase the slope for the drainage ditch, and place the wasterock adjacent to the stope at bottom of vertical cliff.

4:00 pm Rod and Bob leave and will return on the following Monday for final inspection

5:00 pm Les and John start reclamation by stope and WR6

5:15 pm I leave site for Colville

5:45 pm Arrive in Colville Soil & Ditch Muck Moved = 12 loads (120bcy); Topsoil Moved = 50 bcy

MSE Daily Field Summary

Project:	**Rainy Mine Removal Action**
Project Number:	3149
Location:	Colville National Forest
Field Personnel:	Eric Hieb
USFS Personnel:	
Date:	11/1/2011

FIELD CONDITIONS

Weather: **Sunny** Partly cloudy Cloudy Rain Snow Temp **35°F**

Precipitation: **Dry** Recent Current Wind: 0 **<5** 5-15 15-30 >30

VISITORS TO THE SITE

Name	Company:	Purpose of Visit:
Eric Hieb	MSE	Reclamation Oversight
Lyle Palm	Palm Construction, Inc.	Reclamation Activities
Les Palm	Palm Construction, Inc.	Reclamation Activities
John McCombs	Palm Construction, Inc.	Reclamation Activities

FIELD WORK SUMMARY

8:00 am Leave for Longshot Mine

9:00 am Les is finishing up reclaiming access road by stope and WR-6 while John is finishing getting the flat tire fixed

9:30 am Les is loading the dump truck with wood from the destroyed mill for Lyle to take away.

10:30 am Les finishes up welding the additions to the bat gate on the upper adit

11:30 am Lyle returns from dumping some of the wood and is being loaded again

12:00 pm Lunch

12:45 pm Les and John are reclaiming the access road along WR4

1:30 pm Lyle returns to load the last of the wood from the mill, and graciously brought lunch for John and Les who take a lunch break

2:30 pm Les and John continue reclamation of the access road and just passed WR-3

4:00 pm Les and John continue reclamation of the access road to the culvert

4:30 pm Lyle returns from dumping the wood. Les finishes digging the lower-adit drainage ditch deeper - as request from Rodney. Palm installs the bat culvert and fills the portal void.

5:15 pm Leave site for Colville

5:45 pm Arrive in Colville

Debris = 3 loads (30 lcy)

Soil & Muck Removed = 7 loads (70 bcy); Bat Culvert Fill = 8 bcy

MSE Daily Field Summary

Project:	**Rainy Mine Removal Action**
Project Number:	3149
Location:	Colville National Forest
Field Personnel:	Eric Hieb
USFS Personnel:	
Date:	11/2/2011

FIELD CONDITIONS

Weather: Sunny Partly cloudy **Cloudy** Rain Snow Temp **35°F**

Precipitation: **Dry** Recent Current Wind: 0 **<5** 5-15 15-30 >30

VISITORS TO THE SITE

Name	Company:	Purpose of Visit:
Eric Hieb	MSE	Reclamation Oversight
Lyle Palm	Palm Construction, Inc.	Reclamation Activities
Les Palm	Palm Construction, Inc.	Reclamation Activities
John McCombs	Palm Construction, Inc.	Reclamation Activities

FIELD WORK SUMMARY

8:00 am Leave for Longshot Mine

9:00 am Les reclaims the Lower to Upper Adit access road; Lyle starts reclamaition of the mill spur road.

12:00 pm Both roads are completed

12:45 pm Les and John continue reclamation of the tailings ponds, and Lyle places access restriction boulders.

12:00 pm Lunch

3:00 pm All reclamation short of seeding and fertilizing is complete

4:00 pm Les, John, and Lyle start seeding and fertilizing the site.

5:10 pm Leave site for Colville

5:45 pm Arrive in Colville

Soil Moved = 10 loads (100 bcy)

MSE Daily Field Summary

Project:	**Rainy Mine Removal Action**
Project Number:	3149
Location:	Colville National Forest
Field Personnel:	Eric Hieb
USFS Personnel:	
Date:	11/3/2011

FIELD CONDITIONS

Weather: Sunny Partly cloudy **Cloudy** Rain Snow Temp **40°F**

Precipitation: **Dry** Recent Current Wind: 0 **<5** 5-15 15-30 >30

VISITORS TO THE SITE

Name	Company:	Purpose of Visit:
Eric Hieb	MSE	Reclamation Oversight
Lyle Palm	Palm Construction, Inc.	Reclamation Activities
Les Palm	Palm Construction, Inc.	Reclamation Activities
John McCombs	Palm Construction, Inc.	Reclamation Activities

FIELD WORK SUMMARY

8:00 am Leave for Longshot Mine

8:45 am Arrive at Mine with Palm crew

12:00 pm Both roads are completed

1:00 pm Palm starts loading equipment for demobilization.

3:00 pm All equipment loaded.

4:00 pm Palm polices the site and cleans all miscellaneous trash and debris.

5:00 palm and MSE depart for Colville.

MSE Daily Field Summary

Project:	**Longshot Mine Removal Action**
Project Number:	3149
Location:	Colville National Forest
Field Personnel:	Eric Hieb
USFS Personnel:	Rodney T. Lentz
Date:	11/4/2011

FIELD CONDITIONS

Weather: Sunny Partly cloudy Cloudy Rain **Snow** Temp **35°F**

Precipitation: Dry Recent **Current** Wind: 0 **<5** 5-15 15-30 >30

VISITORS TO THE SITE

Name	Company:	Purpose of Visit:
Eric Hieb	MSE	Lower-adit bat gate fixing
Rodney T. Lentz	USFS	Lower-adit bat gate fixing
Gerald L. Palm, and coworker	Palm Construction, Inc.	Lower-adit bat gate fixing

FIELD WORK SUMMARY

8:30 am Leave for Longshot Mine

9:45 am Arrive at on site (the road conditions were bad - ice and snow)

10:15 am Start clearing the lower adit so Palm Construction, Inc. could fix the bat gate

10:45 am Finished fixing the bat gate and filled it back in. Once back to the trucks Jerry cut the steel bar that is going to be used temporarily.

11:20 am Rodney arrives on site. Gives the instructions on how to drill the hole in the steel bar for the temporary lock

11:40 am Rodney places the steel bar in the bat gate and locks it up

12:00 pm Leave site to Colville

1:00 pm Arrive in Colville

Eric will return to Spokane tomorrow and fly to Boise.

MSE Daily Field Summary

Project:	**Longshot Mine Removal Action**
Project Number:	3149
Location:	Colville National Forest
Field Personnel:	Bob Lambeth
USFS Personnel:	Rod Lentz
Date:	11/7/2011

FIELD CONDITIONS

Weather: Sunny **Partly cloudy** Cloudy Rain Snow Temp **35°F**

Precipitation: **Dry** Recent Current Wind: 0 **<5** 5-15 15-30 >30

VISITORS TO THE SITE

Name	Company:	Purpose of Visit:

FIELD WORK SUMMARY

8:00 am Bob leaves for Longshot Mine and to meet Rod for a final inspection, arriving at 9:30 am.

11:00 am Rod approves all reclamation action and bat culvert repair.

12:00 pm Bob returns to Spokane, arriving at 1:30 pm.

All reclamation work is complete; only O&M remains.

APPENDIX 2

Field Sample Forms

MSE Background Soil/Mine Waste Sample Collection Record

SAMPLE ID:	**WR3CS-1**		
Sample Location:	**Longshot Mine, Wa**	Photo:	Yes! Add number when tabulated.
Description:	Post removal confirmation sample, Waste Rock Pile 3		
Date:	11/29/2011		
Field Personnel:	E. Hieb and B. Lambeth		
Conditions:	**Dry**	Weather:	**Partly cloudy, 45°F**

METHOD

Grab: **Yes** Depth: **4-6 inches**

Composite: **Yes**

Boring ID	Depth	Comments

SAMPLE COLLECTION

Equipment: Trowel Hand Auger Other: **Manual with glove**

Sample Collection Time: **1:10PM**

	Size				Analysis								Other
# Sample Containers	1-gal. Ziplok bag	12-oz glass jar	8-oz glass jar	Brass Sleeve	TAL Metals+CN	Metals: As, Ba, Cd, Cr, Cu, Pb, Se, Ag, Zn, Hg	Paste pH	ABA	PCBs	Pesticides	VOCs	SVOCs	
1	**X**					**X**							

DESCRIPTION/COMMENTS

Removal compliance sample obtained within margins of removed WR-3. Waste rock had be removed to visually apparent natural rock. XRF measuremnts obtained indicated material was less than 90%UCL background criteria for As (7.29 mg/kg) and Pb (64 mg/kg). Cleanup Criteria is 52 mg/kg As, 800 mg/kg Pb.

48° 37' 18.46" N
117° 41' 26.45 W
El. = 3530' MSL

MSE Background Soil/Mine Waste Sample Collection Record

SAMPLE ID:	**WR3CS-2**		
Sample Location:	**Longshot Mine, Wa**	Photo:	Yes! Add number when tabulated.
Description:	Post removal confirmation sample, Waste Rock Pile 3		
Date:	11/29/2011		
Field Personnel:	E. Hieb and B. Lambeth		
Conditions:	**Dry**	Weather:	**Partly cloudy, 45°F**

METHOD

Grab: **Yes** Depth: **4-6 inches**

Composite: **Yes**

Boring ID	Depth	Comments

SAMPLE COLLECTION

Equipment: Trowel Hand Auger Other: **Manual with glove**

Sample Collection Time: **1:10PM**

# Sample Containers	Size				Analysis								Other
	1-gal. Ziplok bag	12-oz glass jar	8-oz glass jar	Brass Sleeve	TAL Metals+CN	Metals: As, Ba, Cd, Cr, Cu, Pb, Se, Ag, Zn, Hg	Paste pH	ABA	PCBs	Pesticides	VOCs	SVOCs	
1	**X**					**X**							

DESCRIPTION/COMMENTS

Removal compliance sample obtained within margins of removed WR-3. Waste rock had be removed to visually apparent natural rock. XRF measuremnts obtained indicated material was less than 90%UCL background criteria for As (7.29 mg/kg) and Pb (64 mg/kg). Cleanup Criteria is 52 mg/kg As, 800 mg/kg Pb.

48° 37' 18.46" N
117° 41' 26.45 W
El. = 3530' MSL

MSE Background Soil/Mine Waste Sample Collection Record

SAMPLE ID:	**OBCS-1**		
Sample Location:	**Longshot Mine, Wa**	Photo:	Yes! Add number when tabulated.
Description:	Post removal confirmation sample, Ore Bin Area		
Date:	11/29/2011		
Field Personnel:	E. Hieb and B. Lambeth		
Conditions:	**Dry**	Weather:	**Partly cloudy, 45°F**

METHOD

Grab: **Yes** Depth: **4-6 inches**

Composite: **Yes**

Boring ID	Depth	Comments

SAMPLE COLLECTION

Equipment: Trowel Hand Auger Other: **Manual with glove**

Sample Collection Time: **1:25PM**

# Sample Containers	Size				Analysis								Other
	1-gal. Ziplok bag	12-oz glass jar	8-oz glass jar	Brass Sleeve	TAL Metals+CN	Metals: As, Ba, Cd, Cr, Cu, Pb, Se, Ag, Zn, Hg	Paste pH	ABA	PCBs	Pesticides	VOCs	SVOCs	
1	**X**					**X**							

DESCRIPTION/COMMENTS

Removal compliance sample obtained form area of removed Ore Bin area. Waste rock had be removed to visually apparent natural rock. XRF measuremnts obtained indicated material was less than 90%UCL background criteria for As (7.29 mg/kg) and Pb (64 mg/kg). Cleanup Criteria is 52 mg/kg As, 800 mg/kg Pb.

48° 37' 18.43" N
117° 41' 26.45 W
El. = 3510' MSL

MSE Background Soil/Mine Waste Sample Collection Record

SAMPLE ID:	**OBCS-1**		
Sample Location:	**Longshot Mine, Wa**	Photo:	Yes! Add number when tabulated.
Description:	Post removal confirmation sample, Ore Bin Area		
Date:	11/29/2011		
Field Personnel:	E. Hieb and B. Lambeth		
Conditions:	**Dry**	Weather:	**Partly cloudy, 45°F**

METHOD

Grab: **Yes** Depth: **4-6 inches**

Composite: **Yes**

Boring ID	Depth	Comments

SAMPLE COLLECTION

Equipment: Trowel Hand Auger Other: **Manual with glove**

Sample Collection Time: **1:25PM**

	Size				Analysis								Other
# Sample Containers	1-gal. Ziplok bag	12-oz glass jar	8-oz glass jar	Brass Sleeve	TAL Metals+CN	Metals: As, Ba, Cd, Cr, Cu, Pb, Se, Ag, Zn, Hg	Paste pH	ABA	PCBs	Pesticides	VOCs	SVOCs	
1	**X**					**X**							

DESCRIPTION/COMMENTS

Removal compliance sample obtained removed Ore Bin area. Waste rock had be removed to visually apparent natural rock. XRF measuremnts obtained indicated material was less than 90%UCL background criteria for As (7.29 mg/kg) and Pb (64 mg/kg). Cleanup Criteria is 52 mg/kg As, 800 mg/kg Pb.

48° 37' 18.43" N
117° 41' 26.45 W
El. = 3510' MSL

MSE Background Soil/Mine Waste Sample Collection Record

SAMPLE ID:	**MILL CS-1**		
Sample Location:	**Longshot Mine, Wa**	Photo:	Yes! Add number when tabulated.
Description:	Post removal confirmation sample, Below Mill Area		
Date:	11/29/2011		
Field Personnel:	E. Hieb and B. Lambeth		
Conditions:	**Dry**	Weather:	**Partly cloudy, 45°F**

METHOD

Grab: **Yes** Depth: **4-6 inches**

Composite: **No**

Boring ID	Depth	Comments

SAMPLE COLLECTION

Equipment: Trowel Hand Auger Other: **Manual with glove**

Sample Collection Time: **1:45PM**

# Sample Containers	Size				Analysis								Other
	1-gal. Ziplok bag	12-oz glass jar	8-oz glass jar	Brass Sleeve	TAL Metals+CN	Metals: As, Ba, Cd, Cr, Cu, Pb, Se, Ag, Zn, Hg	Paste pH	ABA	PCBs	Pesticides	VOCs	SVOCs	
1	**X**					**X**							

DESCRIPTION/COMMENTS

Removal compliance sample obtained from removed waste rock below mill. Waste rock had be removed to visually apparent natural rock. XRF measuremnts obtained indicated material was less than 90%UCL background criteria for As (7.29 mg/kg) and Pb (64 mg/kg). Cleanup Criteria is 52 mg/kg As, 800 mg/kg Pb.

48° 37' 18.43" N
117° 41' 26.46 W
El. = 3500' MSL

MSE Background Soil/Mine Waste Sample Collection Record

SAMPLE ID:	**MILL CS-1**		
Sample Location:	**Longshot Mine, Wa**	Photo:	Yes! Add number when tabulated.
Description:	Post removal confirmation sample, Below Mill Area		
Date:	11/29/2011		
Field Personnel:	E. Hieb and B. Lambeth		
Conditions:	**Dry**	Weather:	**Partly cloudy, 45°F**

METHOD

Grab: **Yes** Depth: **4-6 inches**

Composite: **No**

Boring ID	Depth	Comments

SAMPLE COLLECTION

Equipment: Trowel Hand Auger Other: **Manual with glove**

Sample Collection Time: **1:45PM**

# Sample Containers	Size				Analysis								Other
	1-gal. Ziplok bag	12-oz glass jar	8-oz glass jar	Brass Sleeve	TAL Metals+CN	Metals: As, Ba, Cd, Cr, Cu, Pb, Se, Ag, Zn, Hg	Paste pH	ABA	PCBs	Pesticides	VOCs	SVOCs	
1	**X**					**X**							

DESCRIPTION/COMMENTS

Removal compliance sample obtained from removed waste rock below mill. Waste rock had be removed to visually apparent natural rock. XRF measuremnts obtained indicated material was less than 90%UCL background criteria for As (7.29 mg/kg) and Pb (64 mg/kg). Cleanup Criteria is 52 mg/kg As, 800 mg/kg Pb.

48° 37' 18.43" N
117° 41' 26.46 W
El. = 3500' MSL

MSE Background Soil/Mine Waste Sample Collection Record

SAMPLE ID:	**LMRAWW-1**		
Sample Location:	**Longshot Mine, Wa**	Photo:	Yes! Add number when tabulated.
Description:	Pre-disposal sample of mill structure Wood Waste		
Date:	10/26/2011		
Field Personnel:	E. Hieb and B. Lambeth		
Conditions:	**Dry**	Weather:	**Partly cloudy, 45°F**

METHOD

Grab: **Yes** Depth **0.25 inches**

Composite: **Yes**

Boring ID	Depth	Comments

SAMPLE COLLECTION

Equipment: Trowel Hand Auger Other: **Chisel & Hammer w/Glove**

Sample Collection Time: **4:45PM**

# Sample Containers	Size: 1-gal. Ziplok bag	Size: 12-oz glass jar	Size: 8-oz glass jar	Size: Brass Sleeve	Analysis: TCLP: As, Ba, Cd, Cr, Cu, Pb, Se, Ag, Zn, Hg	Analysis: Metals: As, Ba, Cd, Cr, Cu, Pb, Se, Ag, Zn, Hg	Analysis: Paste pH	Analysis: ABA	Analysis: PCBs	Analysis: Pesticides	Analysis: VOCs	Analysis: SVOCs	Other
1	**X**				**X**	**X**							

DESCRIPTION/COMMENTS

Composite pre-landfill disposal sample of wood waste from demolition of razed mill structure. Sample was obtained with hammer & chisel and wood saw. Purpose was to verify that it was legal to dispose of the material in a municipal landfill prior to disposal.

48° 37' 18.42" N
117° 41' 26.45 W
El. = 3505' MSL

MSE XRF Screening Record

Project:	Longshot Mine Removal Action
Date:	10/29/2011
XRF Instrument:	Innov-X
Settings:	Auto Calibration
Operator:	Lambeth & Hieb

XRF SCREENING RESULTS

Location	ID	Result	GPS Coordinates	Comments
Slope above WR3	None	17 mg/kg As; <dl Pb	None	Possible native soil for cover
WR3	WR3-CS	14 mg/kg As; <dl Pb	None	Verification of WR3 removal
WR1	None	18 mg/kg As; 89 mg/kg Pb	None	Possible soil cover
Ore Bin	OBCS-1	44 mg/kg As; 445 mg/kg Pb	None	Verification of ore removal
Ore Bin	OBCS-2	<dl As; <dl Pb	None	Verification of ore removal
Below mill foundation	MillCS-1	19 mg/kg As; 177 mg/kg Pb	None	Verification of waste removal
Roadside Berm	None	17 mg/kg As; 34 mg/kg Pb	None	Potential cover soil
Gloryhole	None	40 mg/kg As; 105 mg/kg Pb	None	Verication of Waste removal

DESCRIPTION/COMMENTS

The cleanup criteria is 52 mg/kg As and 800 mg/kg Pb. According to XRF data, hotspot removal is complete, and all material examined for soil cover is qualified for use as such. Samples as noted above were obtained for actual verification analysis.

APPENDIX 3

Laboratory Analysis Forms

WKJ0525

Page 1 of 1

FOR SVL USE ONLY
SVL JOB #

TEMP on Receipt: 4.1 °C

CHAIN OF CUSTODY RECORD

SVL Analytical, Inc. • One Government Gulch • Kellogg, ID 83837 • (208) 784-1258 • FAX: (208) 783-0891

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other_____

Report to Company: MSE
Contact: Bob Lambeth
Address: 1241 E. Division ST, #333
Spokane, WA 99218
Phone Number: (509) 747-0594
FAX Number:
E-mail: blambeth@mse-env.com

Invoice Sent To: Same
Contact:
Address:
Phone Number:
FAX Number:
PO#:

Project Name: Longshot Mine RA
Sampler's Signature: RS Lamb

Indicate State of sample origination: WA **USACE?** ☐ Yes ☒ No

	Sample ID Please take care to distinguish between: 1 and I 2 and Z 5 and S Ø and O Thanks!	Collection Date	Collection Time	Collected by: (Init.)	Misc. Matrix Type (From Table 1)	Misc. No. of Containers	Preservative(s) Unpreserved	HNO_3 Filtered	HNO_3 Unfiltered	HCl	H_2SO_4	NaOH	Other (Specify)	Analyses Required: TRM: As, Ba, Cd, Cu, Pb, Zn	TM: " "	TDS, TSS, Hardness	SO_4	pH, EL	Conductivity per BL 10-24-11	Rush Instructions (Days)	Comments
1	AD1	10-19	10:50	DW	1	4								✓	✓	✓	✓		x		10:35 AM 10-27-11 DW spoke w/ BL do As, Cd and Pb by MS
2	ET3	10-19	9:35	"	1	4								✓	✓	✓	✓		x		
3	BG1	10-19	12:00	"	1	4								✓	✓	✓	✓		y		10-21-11 DW phone call to Bob
4	B1 TR Metals 15 phs.	10-19	11:15	"	1	2								✓			X omit		NO		
5				DW																	
6																					
7	AD1	10-19	10:50	1	3	1	x							✓							
8	ET3 Soils	10-19	9:35	1	3	1	x														
9	BG1	10-19	10:00	1	3	1	x														
10																					

-we are to filter in lab on ~~ALL~~ all metals samples
-wants T + D metals

Relinquished by: RS Lamb Date: 10-21 Time: 7:30 Received by:
Relinquished by: Date: Time: Received by:

Date: 10/21/11 Time: 16:00
Date: Time:

SVL-COC 9/05

White: LAB COPY Yellow: CUSTOMER COPY

* Sample Reject: ☐ Return ☐ Dispose ☒ Store (30 Days)

SVL WILL FILTER & PRESERVE FOR DISSOLVED METALS ANALYSIS. CF 10/21/11

SAMPLE RECEIPT/CHAIN-OF -CUSTODY CHECKLIST

The following items were checked for completeness, correctness, and compliance to project specifications using the Chain-of-Custody (COC) and other supporting information.

Date of acceptance: 10/27/11 By: CR Seay

SVL Work No: WLJ0525

Item	Description	V	VC	NV	NA	Comments
1	Client or project name	✓				MSE
2	Date and time of receipt at lab	✓				10/27/11 16:00
3	Received by	✓				C Flores
4	Temperature blank or cooler temperature	✓				Temp. 4.1 °C.
5	Were the sample(s) received on ice	✓				YES
6	Custody tape/bottle seals				✓	
7	Condition of samples upon receipt (leaking; bubbles in VOA vials	✓				Good
8	Sample numbers/IDs agree with COC	✓				
9	Sample date & time agree with COC	✓				
10	Number of containers for each sample	✓				
11	The correct preservative for the analysis requested	✓				
12	Did an SVL employee preserve sample(s) upon receipt				✓	NO SVL WILL FILT & PRES FOR D. METALS
12	Type of container for each sample / volume received	✓				
13	Analysis requested for each sample	✓				
14	Sample matrix description	✓				
15	COC properly completed & legible	✓				
16	Corrections properly made (initials & date)				✓	
17	Additional comments or records of sample condition or treatment (unlisted or missing samples at laboratory, aliquot taken, sample hold, samples subcontracted, communications between client and laboratory)				✓	
18	Shipper's air bill				✓	CITY PARCEL

V- Verified VC- Verified Corrections Made NV-Not Verified NA- Not Applicable

Additional Comments: _____

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

MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0525**
Reported: 07-Nov-11 11:14

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
AD1	W1J0525-01	Surface Water	19-Oct-11 10:50	21-Oct-2011
ET3	W1J0525-02	Surface Water	19-Oct-11 09:35	21-Oct-2011
BG1	W1J0525-03	Surface Water	19-Oct-11 10:00	21-Oct-2011
B1	W1J0525-04	Surface Water	19-Oct-11 11:15	21-Oct-2011
AD1	W1J0525-05	Soil	19-Oct-11 10:50	21-Oct-2011
ET3	W1J0525-06	Soil	19-Oct-11 09:35	21-Oct-2011
BG1	W1J0525-07	Soil	19-Oct-11 10:00	21-Oct-2011

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

10/27/11 - 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 (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0525**
Reported: 07-Nov-11 11:14

Client Sample ID: **AD1**
SVL Sample ID: **W1J0525-01 (Surface Water)**

Sample Report Page 1 of 1

Sampled: 19-Oct-11 10:50
Received: 21-Oct-11
Sampled By:

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**	0.0029	mg/L	0.0020	0.0002		W144320	TJK	11/01/11 15:03	
EPA 200.7	**Calcium**	80.7	mg/L	0.040	0.006		W144320	TJK	11/01/11 15:01	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.002		W144320	TJK	11/01/11 15:02	
EPA 200.7	**Magnesium**	3.40	mg/L	0.060	0.010		W144320	TJK	11/01/11 15:01	
EPA 200.7	Silver	< 0.0050	mg/L	0.0050	0.0003		W144320	TJK	11/01/11 15:02	
EPA 200.7	**Zinc**	0.0427	mg/L	0.0100	0.0010		W144320	TJK	11/01/11 15:03	
EPA 200.8	Arsenic	< 0.0030	mg/L	0.0030	0.0006	2.5	W144321	KWH	10/31/11 16:48	
EPA 200.8	**Cadmium**	0.00058	mg/L	0.00020	0.00003	2.5	W144321	KWH	10/31/11 16:48	
EPA 200.8	**Lead**	0.00375	mg/L	0.00300	0.000052	2.5	W144321	KWH	10/31/11 16:48	
SM 2340B	**Hardness (as CaCO3)**	215	mg/L	0.347	0.058		N/A		11/01/11 15:01	
Metals (Dissolved)										
EPA 200.7	**Barium**	0.0027	mg/L	0.0020	0.0004		W145011	TJK	11/03/11 11:03	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.003		W145011	TJK	11/03/11 11:03	
EPA 200.7	Silver	< 0.0050	mg/L	0.0050	0.0005		W145011	TJK	11/03/11 11:03	
EPA 200.7	**Zinc**	0.0298	mg/L	0.0100	0.0021		W145011	TJK	11/03/11 11:03	
EPA 200.8	Arsenic	< 0.0030	mg/L	0.0030	0.0005		W145006	KWH	11/03/11 07:37	
EPA 200.8	**Cadmium**	0.00037	mg/L	0.00020	0.000026		W145006	KWH	11/03/11 07:37	
EPA 200.8	Lead	< 0.00300	mg/L	0.00300	0.000042		W145006	KWH	11/03/11 07:37	
Classical Chemistry Parameters										
EPA 120.1	**Specific conductance**	467	µmhos/cm	5.00			W145034	JMS	10/31/11 09:30	
SM 2540 C	**Total Diss. Solids**	230	mg/L	10			W144266	RS	10/28/11 13:20	H1
SM 2540 D	Total Susp. Solids	< 5.0	mg/L	5.0			W144265	RS	10/28/11 13:20	H1
SM 2580B	**Eh**	448	mV	2.50			W144299	DKS	10/28/11 13:57	
SM 4500 H B	**pH @21.0°C**	7.95	pH Units				W144257	DKS	10/28/11 09:23	H5
Anions by Ion Chromatography										
EPA 300.0	**Sulfate as SO4**	22.9	mg/L	1.50	0.37	5	W144333	AEW	11/04/11 13:07	D1

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 (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0525**
Reported: 07-Nov-11 11:14

Client Sample ID: **ET3**
SVL Sample ID: **W1J0525-02 (Surface Water)**

Sampled: 19-Oct-11 09:35
Received: 21-Oct-11
Sampled By:

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**	0.0480	mg/L	0.0020	0.0002		W144320	TJK	11/01/11 15:08	
EPA 200.7	**Calcium**	87.6	mg/L	0.040	0.006		W144320	TJK	11/01/11 15:06	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.002		W144320	TJK	11/01/11 15:08	
EPA 200.7	**Magnesium**	7.19	mg/L	0.060	0.010		W144320	TJK	11/01/11 15:07	
EPA 200.7	Silver	< 0.0050	mg/L	0.0050	0.0003		W144320	TJK	11/01/11 15:08	
EPA 200.7	**Zinc**	0.163	mg/L	0.0100	0.0010		W144320	TJK	11/01/11 15:08	
EPA 200.8	**Arsenic**	0.0046	mg/L	0.0030	0.0006	2.5	W144321	KWH	10/31/11 16:50	
EPA 200.8	**Cadmium**	0.00103	mg/L	0.00020	0.00003	2.5	W144321	KWH	10/31/11 16:50	
EPA 200.8	**Lead**	0.0657	mg/L	0.00300	0.000052	2.5	W144321	KWH	10/31/11 16:50	
SM 2340B	**Hardness (as CaCO3)**	248	mg/L	0.347	0.058		N/A		11/01/11 15:07	
Metals (Dissolved)										
EPA 200.7	**Barium**	0.0100	mg/L	0.0020	0.0004		W145011	TJK	11/03/11 11:22	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.003		W145011	TJK	11/03/11 11:21	
EPA 200.7	Silver	< 0.0050	mg/L	0.0050	0.0005		W145011	TJK	11/03/11 11:21	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0021		W145011	TJK	11/03/11 11:22	
EPA 200.8	Arsenic	< 0.0030	mg/L	0.0030	0.0005		W145006	KWH	11/03/11 07:42	
EPA 200.8	Cadmium	< 0.00020	mg/L	0.00020	0.000026		W145006	KWH	11/03/11 07:42	
EPA 200.8	Lead	< 0.00300	mg/L	0.00300	0.000042		W145006	KWH	11/03/11 07:42	
Classical Chemistry Parameters										
EPA 120.1	**Specific conductance**	518	µmhos/cm	5.00			W145034	JMS	10/31/11 09:30	
SM 2540 C	**Total Diss. Solids**	259	mg/L	10			W144266	RS	10/28/11 13:20	H1
SM 2540 D	**Total Susp. Solids**	89.0	mg/L	5.0			W144265	RS	10/28/11 13:20	H1
SM 2580B	**Eh**	462	mV	2.50			W144299	DKS	10/28/11 13:57	
SM 4500 H B	**pH @20.4°C**	7.65	pH Units				W144257	DKS	10/28/11 09:25	H5
Anions by Ion Chromatography										
EPA 300.0	**Sulfate as SO4**	10.3	mg/L	1.50	0.37	5	W144333	AEW	11/04/11 13:26	D1

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 (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0525**
Reported: 07-Nov-11 11:14

Client Sample ID: **BG1**
SVL Sample ID: **W1J0525-03 (Surface Water)**

Sampled: 19-Oct-11 10:00
Received: 21-Oct-11
Sampled By:

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**	0.0116	mg/L	0.0020	0.0002		W144320	TJK	11/01/11 15:14	
EPA 200.7	**Calcium**	65.0	mg/L	0.040	0.006		W144320	TJK	11/01/11 15:12	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.002		W144320	TJK	11/01/11 15:13	
EPA 200.7	**Magnesium**	3.43	mg/L	0.060	0.010		W144320	TJK	11/01/11 15:12	
EPA 200.7	Silver	< 0.0050	mg/L	0.0050	0.0003		W144320	TJK	11/01/11 15:13	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0010		W144320	TJK	11/01/11 15:14	
EPA 200.8	Arsenic	< 0.0030	mg/L	0.0030	0.0006	2.5	W144321	KWH	10/31/11 16:51	
EPA 200.8	Cadmium	< 0.00020	mg/L	0.00020	0.00003	2.5	W144321	KWH	10/31/11 16:51	
EPA 200.8	Lead	< 0.00300	mg/L	0.00300	0.000052	2.5	W144321	KWH	10/31/11 16:51	
SM 2340B	**Hardness (as CaCO3)**	176	mg/L	0.347	0.058		N/A		11/01/11 15:12	
Metals (Dissolved)										
EPA 200.7	**Barium**	0.0106	mg/L	0.0020	0.0004		W145011	TJK	11/03/11 11:28	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.003		W145011	TJK	11/03/11 11:27	
EPA 200.7	Silver	< 0.0050	mg/L	0.0050	0.0005		W145011	TJK	11/03/11 11:27	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0021		W145011	TJK	11/03/11 11:28	
EPA 200.8	Arsenic	< 0.0030	mg/L	0.0030	0.0005		W145006	KWH	11/03/11 07:43	
EPA 200.8	Cadmium	< 0.00020	mg/L	0.00020	0.000026		W145006	KWH	11/03/11 07:43	
EPA 200.8	Lead	< 0.00300	mg/L	0.00300	0.000042		W145006	KWH	11/03/11 07:43	
Classical Chemistry Parameters										
EPA 120.1	**Specific conductance**	392	µmhos/cm	5.00			W145034	JMS	10/31/11 09:30	
SM 2540 C	**Total Diss. Solids**	206	mg/L	10			W144266	RS	10/28/11 13:20	H1
SM 2540 D	Total Susp. Solids	< 5.0	mg/L	5.0			W144265	RS	10/28/11 13:20	H1
SM 2580B	**Eh**	457	mV	2.50			W144299	DKS	10/28/11 13:57	
SM 4500 H B	**pH @21.3°C**	7.85	pH Units				W144257	DKS	10/28/11 09:28	H5
Anions by Ion Chromatography										
EPA 300.0	**Sulfate as SO4**	7.18	mg/L	1.50	0.37	5	W144333	AEW	11/04/11 13:36	D1

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 (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0525**
Reported: 07-Nov-11 11:14

Client Sample ID: **B1**
SVL Sample ID: **W1J0525-04 (Surface Water)**

Sampled: 19-Oct-11 11:15
Received: 21-Oct-11
Sampled By:

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	< 0.0020	mg/L	0.0020	0.0002		W144320	TJK	11/01/11 15:19	
EPA 200.7	Calcium	< 0.040	mg/L	0.040	0.006		W144320	TJK	11/01/11 15:18	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.002		W144320	TJK	11/01/11 15:19	
EPA 200.7	Magnesium	< 0.060	mg/L	0.060	0.010		W144320	TJK	11/01/11 15:18	
EPA 200.7	Silver	< 0.0050	mg/L	0.0050	0.0003		W144320	TJK	11/01/11 15:19	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0010		W144320	TJK	11/01/11 15:19	
EPA 200.8	Arsenic	< 0.0030	mg/L	0.0030	0.0006	2.5	W144321	KWH	10/31/11 16:53	
EPA 200.8	Cadmium	< 0.00020	mg/L	0.00020	0.00003	2.5	W144321	KWH	10/31/11 16:53	
EPA 200.8	Lead	< 0.00300	mg/L	0.00300	0.000052	2.5	W144321	KWH	10/31/11 16:53	
SM 2340B	Hardness (as CaCO3)	< 0.347	mg/L	0.347	0.058		N/A		11/01/11 15:18	

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

John Kern
Laboratory Director

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MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0525**
Reported: 07-Nov-11 11:14

Client Sample ID: **AD1**
SVL Sample ID: **W1J0525-05 (Soil)**

Sampled: 19-Oct-11 10:50
Received: 21-Oct-11
Sampled By:

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	0.4		W144302	AS	10/31/11 16:19	
EPA 6010B	**Barium**	12.0	mg/kg	0.200	0.024		W144302	AS	10/31/11 16:19	
EPA 6010B	**Cadmium**	13.4	mg/kg	0.20	0.02		W144302	AS	10/31/11 16:19	
EPA 6010B	**Copper**	22.9	mg/kg	1.00	0.21		W144302	AS	10/31/11 16:19	
EPA 6010B	**Lead**	59.9	mg/kg	0.75	0.21		W144302	AS	10/31/11 16:19	
EPA 6010B	Silver	< 0.50	mg/kg	0.50	0.04		W144302	AS	10/31/11 16:19	
EPA 6010B	**Zinc**	577	mg/kg	1.00	0.09		W144302	AS	10/31/11 16:19	
Percent Solids										
Percent Solids	**% Solids**	29.0	%	0.1			W144304	DP	10/31/11 11:04	

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

John Kern
Laboratory Director

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MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0525**
Reported: 07-Nov-11 11:14

Client Sample ID: **ET3**
SVL Sample ID: **W1J0525-06 (Soil)**

Sampled: 19-Oct-11 09:35
Received: 21-Oct-11
Sampled By:

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	**Arsenic**	8.4	mg/kg	2.5	0.4		W144302	AS	10/31/11 16:43	
EPA 6010B	**Barium**	89.8	mg/kg	0.200	0.024		W144302	AS	10/31/11 16:43	
EPA 6010B	**Cadmium**	2.07	mg/kg	0.20	0.02		W144302	AS	10/31/11 16:43	
EPA 6010B	**Copper**	7.53	mg/kg	1.00	0.21		W144302	AS	10/31/11 16:43	
EPA 6010B	**Lead**	80.4	mg/kg	0.75	0.21		W144302	AS	10/31/11 16:43	
EPA 6010B	**Silver**	1.43	mg/kg	0.50	0.04		W144302	AS	10/31/11 16:43	
EPA 6010B	**Zinc**	287	mg/kg	1.00	0.09		W144302	AS	10/31/11 16:43	
Percent Solids										
Percent Solids	**% Solids**	22.4	%	0.1			W144304	DP	10/31/11 11:04	

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 (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0525**
Reported: 07-Nov-11 11:14

Client Sample ID: **BG1**
SVL Sample ID: **W1J0525-07 (Soil)**

Sampled: 19-Oct-11 10:00
Received: 21-Oct-11
Sampled By:

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	0.4		W144302	AS	10/31/11 16:49	
EPA 6010B	**Barium**	18.3	mg/kg	0.200	0.024		W144302	AS	10/31/11 16:48	
EPA 6010B	Cadmium	< 0.20	mg/kg	0.20	0.02		W144302	AS	10/31/11 16:49	
EPA 6010B	**Copper**	31.1	mg/kg	1.00	0.21		W144302	AS	10/31/11 16:48	
EPA 6010B	**Lead**	3.22	mg/kg	0.75	0.21		W144302	AS	10/31/11 16:49	
EPA 6010B	Silver	< 0.50	mg/kg	0.50	0.04		W144302	AS	10/31/11 16:48	
EPA 6010B	**Zinc**	12.7	mg/kg	1.00	0.09		W144302	AS	10/31/11 16:49	
Percent Solids										
Percent Solids	**% Solids**	24.7	%	0.1			W144304	DP	10/31/11 11:04	

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 (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0525**
Reported: 07-Nov-11 11:14

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	0.4	2.5	W144302	31-Oct-11	
EPA 6010B	Barium	mg/kg	<0.200	0.024	0.200	W144302	31-Oct-11	
EPA 6010B	Cadmium	mg/kg	<0.20	0.02	0.20	W144302	31-Oct-11	
EPA 6010B	Copper	mg/kg	<1.00	0.21	1.00	W144302	31-Oct-11	
EPA 6010B	Lead	mg/kg	<0.75	0.21	0.75	W144302	31-Oct-11	
EPA 6010B	Silver	mg/kg	<0.50	0.04	0.50	W144302	31-Oct-11	
EPA 6010B	Zinc	mg/kg	<1.00	0.09	1.00	W144302	31-Oct-11	
Metals (Total Recoverable--reportable as Total per 40 CFR 136)								
EPA 200.7	Barium	mg/L	<0.0020	0.0002	0.0020	W144320	01-Nov-11	
EPA 200.7	Calcium	mg/L	<0.040	0.006	0.040	W144320	01-Nov-11	
EPA 200.7	Copper	mg/L	<0.010	0.002	0.010	W144320	01-Nov-11	
EPA 200.7	Magnesium	mg/L	<0.060	0.010	0.060	W144320	01-Nov-11	
EPA 200.7	Silver	mg/L	<0.0050	0.0003	0.0050	W144320	01-Nov-11	
EPA 200.7	Zinc	mg/L	<0.0100	0.0010	0.0100	W144320	01-Nov-11	
EPA 200.8	Arsenic	mg/L	<0.0030	0.0006	0.0030	W144321	31-Oct-11	
EPA 200.8	Lead	mg/L	<0.00300	0.000052	0.00300	W144321	31-Oct-11	
EPA 200.8	Cadmium	mg/L	<0.00020	0.00003	0.00020	W144321	31-Oct-11	
Metals (Dissolved)								
EPA 200.7	Barium	mg/L	<0.0020	0.0004	0.0020	W145011	03-Nov-11	
EPA 200.7	Copper	mg/L	<0.010	0.003	0.010	W145011	03-Nov-11	
EPA 200.7	Silver	mg/L	<0.0050	0.0005	0.0050	W145011	03-Nov-11	
EPA 200.7	Zinc	mg/L	<0.0100	0.0021	0.0100	W145011	03-Nov-11	
EPA 200.8	Arsenic	mg/L	<0.0030	0.0005	0.0030	W145006	03-Nov-11	
EPA 200.8	Cadmium	mg/L	<0.00020	0.000026	0.00020	W145006	03-Nov-11	
EPA 200.8	Lead	mg/L	<0.00300	0.000042	0.00300	W145006	03-Nov-11	
Classical Chemistry Parameters								
EPA 120.1	Specific conductance	µmhos/cm	<5.00		5.00	W145034	31-Oct-11	
SM 2540 C	Total Diss. Solids	mg/L	<10		10	W144266	28-Oct-11	
SM 2540 D	Total Susp. Solids	mg/L	<5.0		5.0	W144265	28-Oct-11	
Anions by Ion Chromatography								
EPA 300.0	Sulfate as SO4	mg/L	<0.30	0.07	0.30	W144333	03-Nov-11	

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	93.3	100	93.3	80 - 120	W144302	31-Oct-11	
EPA 6010B	Barium	mg/kg	97.8	100	97.8	80 - 120	W144302	31-Oct-11	
EPA 6010B	Cadmium	mg/kg	94.3	100	94.3	80 - 120	W144302	31-Oct-11	
EPA 6010B	Copper	mg/kg	97.6	100	97.6	80 - 120	W144302	31-Oct-11	
EPA 6010B	Lead	mg/kg	94.5	100	94.5	80 - 120	W144302	31-Oct-11	
EPA 6010B	Silver	mg/kg	4.77	5.00	95.3	80 - 120	W144302	31-Oct-11	
EPA 6010B	Zinc	mg/kg	94.0	100	94.0	80 - 120	W144302	31-Oct-11	
Metals (Total Recoverable--reportable as Total per 40 CFR 136)									
EPA 200.7	Barium	mg/L	0.969	1.00	96.9	85 - 115	W144320	01-Nov-11	
EPA 200.7	Calcium	mg/L	18.4	20.0	92.0	85 - 115	W144320	01-Nov-11	
EPA 200.7	Copper	mg/L	0.962	1.00	96.2	85 - 115	W144320	01-Nov-11	
EPA 200.7	Magnesium	mg/L	18.3	20.0	91.5	85 - 115	W144320	01-Nov-11	
EPA 200.7	Silver	mg/L	0.0502	0.0500	100	85 - 115	W144320	01-Nov-11	

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MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0525**
Reported: 07-Nov-11 11:14

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 200.7	Zinc	mg/L	0.946	1.00	94.6	85 - 115	W144320	01-Nov-11	
EPA 200.8	Arsenic	mg/L	0.0247	0.0250	98.9	85 - 115	W144321	31-Oct-11	
EPA 200.8	Lead	mg/L	0.0254	0.0250	101	85 - 115	W144321	31-Oct-11	
EPA 200.8	Cadmium	mg/L	0.0255	0.0250	102	85 - 115	W144321	31-Oct-11	
Metals (Dissolved)									
EPA 200.7	Barium	mg/L	1.02	1.00	102	85 - 115	W145011	03-Nov-11	
EPA 200.7	Copper	mg/L	0.989	1.00	98.9	85 - 115	W145011	03-Nov-11	
EPA 200.7	Silver	mg/L	0.0508	0.0500	102	85 - 115	W145011	03-Nov-11	
EPA 200.7	Zinc	mg/L	0.993	1.00	99.3	85 - 115	W145011	03-Nov-11	
EPA 200.8	Arsenic	mg/L	0.0255	0.0250	102	85 - 115	W145006	03-Nov-11	
EPA 200.8	Cadmium	mg/L	0.0259	0.0250	103	85 - 115	W145006	03-Nov-11	
EPA 200.8	Lead	mg/L	0.0261	0.0250	105	85 - 115	W145006	03-Nov-11	
Classical Chemistry Parameters									
EPA 120.1	Specific conductance	µmhos/cm	504	492	102	90 - 110	W145034	31-Oct-11	
Anions by Ion Chromatography									
EPA 300.0	Sulfate as SO4	mg/L	10.7	10.0	107	90 - 110	W144333	03-Nov-11	

Quality Control - DUPLICATE Data

Method	Analyte	Units	Duplicate Result	Sample Result	RPD	RPD Limit	Batch ID	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)									
EPA 200.7	Barium	mg/L	<0.0020	<0.0020	UDL	20	W144320	01-Nov-11	
EPA 200.7	Calcium	mg/L	0.107	0.107	0.2	20	W144320	01-Nov-11	
EPA 200.7	Copper	mg/L	<0.010	<0.010	UDL	20	W144320	01-Nov-11	
EPA 200.7	Magnesium	mg/L	<0.060	<0.060	UDL	20	W144320	01-Nov-11	
EPA 200.7	Silver	mg/L	<0.0050	<0.0050	UDL	20	W144320	01-Nov-11	
EPA 200.7	Zinc	mg/L	<0.0100	<0.0100	UDL	20	W144320	01-Nov-11	
EPA 200.8	Arsenic	mg/L	<0.0030	<0.0030	UDL	20	W144321	31-Oct-11	
EPA 200.8	Lead	mg/L	<0.00300	<0.00300	UDL	20	W144321	31-Oct-11	
EPA 200.8	Cadmium	mg/L	<0.00020	<0.00020	UDL	20	W144321	31-Oct-11	
Metals (Dissolved)									
EPA 200.7	Barium	mg/L	0.0026	0.0027	4.0	20	W145011	03-Nov-11	
EPA 200.7	Copper	mg/L	<0.010	<0.010	UDL	20	W145011	03-Nov-11	
EPA 200.7	Silver	mg/L	<0.0050	<0.0050	UDL	20	W145011	03-Nov-11	
EPA 200.7	Zinc	mg/L	0.0295	0.0298	1.2	20	W145011	03-Nov-11	
EPA 200.8	Arsenic	mg/L	<0.0030	<0.0030	UDL	20	W145006	03-Nov-11	
EPA 200.8	Cadmium	mg/L	0.00034	0.00037	8.9	20	W145006	03-Nov-11	
EPA 200.8	Lead	mg/L	<0.00300	<0.00300	<RL	20	W145006	03-Nov-11	
Classical Chemistry Parameters									
EPA 120.1	Specific conductance	µmhos/cm	469	467	0.6	20	W145034	31-Oct-11	
SM 2540 C	Total Diss. Solids	mg/L	322	307	4.8	10	W144266	28-Oct-11	
SM 2540 D	Total Susp. Solids	mg/L	<5.0	<5.0	<RL	10	W144265	28-Oct-11	
SM 2540 D	Total Susp. Solids	mg/L	<5.0	<5.0	<RL	10	W144265	28-Oct-11	
SM 2580B	Eh	mV	440	448	1.8	20	W144299	28-Oct-11	
SM 4500 H B	pH	pH Units	7.32	7.37	0.7	20	W144257	28-Oct-11	
SM 4500 H B	pH	pH Units	8.08	8.10	0.2	20	W144257	28-Oct-11	
Anions by Ion Chromatography									
EPA 300.0	Sulfate as SO4	mg/L	1690	1680	0.3	20	W144333	03-Nov-11	D2

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MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0525**
Reported: 07-Nov-11 11:14

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	127	37.0	100	90.1	75 - 125	W144302	31-Oct-11	
EPA 6010B	Barium	mg/kg	140	38.7	100	101	75 - 125	W144302	31-Oct-11	
EPA 6010B	Cadmium	mg/kg	91.0	<0.20	100	90.9	75 - 125	W144302	31-Oct-11	
EPA 6010B	Copper	mg/kg	100	4.26	100	96.1	75 - 125	W144302	31-Oct-11	
EPA 6010B	Lead	mg/kg	96.8	5.21	100	91.6	75 - 125	W144302	31-Oct-11	
EPA 6010B	Silver	mg/kg	4.70	<0.50	5.00	93.9	75 - 125	W144302	31-Oct-11	
EPA 6010B	Zinc	mg/kg	116	23.9	100	92.3	75 - 125	W144302	31-Oct-11	
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	Barium	mg/L	0.974	<0.0020	1.00	97.4	70 - 130	W144320	01-Nov-11	
EPA 200.7	Calcium	mg/L	19.1	0.107	20.0	95.2	70 - 130	W144320	01-Nov-11	
EPA 200.7	Copper	mg/L	0.978	<0.010	1.00	97.8	70 - 130	W144320	01-Nov-11	
EPA 200.7	Magnesium	mg/L	18.9	<0.060	20.0	94.5	70 - 130	W144320	01-Nov-11	
EPA 200.7	Silver	mg/L	0.0508	<0.0050	0.0500	102	70 - 130	W144320	01-Nov-11	
EPA 200.7	Zinc	mg/L	0.956	<0.0100	1.00	95.6	70 - 130	W144320	01-Nov-11	
EPA 200.8	Arsenic	mg/L	0.0252	<0.0030	0.0250	101	70 - 130	W144321	31-Oct-11	
EPA 200.8	Lead	mg/L	0.0252	<0.00300	0.0250	101	70 - 130	W144321	31-Oct-11	
EPA 200.8	Cadmium	mg/L	0.0258	<0.00020	0.0250	103	70 - 130	W144321	31-Oct-11	
Metals (Dissolved)										
EPA 200.7	Barium	mg/L	1.02	0.0027	1.00	102	70 - 130	W145011	03-Nov-11	
EPA 200.7	Copper	mg/L	0.977	<0.010	1.00	97.7	70 - 130	W145011	03-Nov-11	
EPA 200.7	Silver	mg/L	0.0529	<0.0050	0.0500	106	70 - 130	W145011	03-Nov-11	
EPA 200.7	Zinc	mg/L	1.05	0.0298	1.00	102	70 - 130	W145011	03-Nov-11	
EPA 200.8	Arsenic	mg/L	0.0296	<0.0030	0.0250	118	70 - 130	W145006	03-Nov-11	
EPA 200.8	Cadmium	mg/L	0.0264	0.00037	0.0250	104	70 - 130	W145006	03-Nov-11	
EPA 200.8	Lead	mg/L	0.0258	<0.00300	0.0250	98.0	70 - 130	W145006	03-Nov-11	
Anions by Ion Chromatography										
EPA 300.0	Sulfate as SO4	mg/L	1700	1680	10.0	R > 4S	90 - 110	W144333	03-Nov-11	D2,M3
EPA 300.0	Sulfate as SO4	mg/L	33.7	22.9	10.0	108	90 - 110	W144333	04-Nov-11	D1

Quality Control - MATRIX SPIKE DUPLICATE Data

Method	Analyte	Units	MSD Result	Spike Result	Spike Level	RPD	RPD Limit	Batch ID	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Arsenic	mg/kg	135	127	100	6.1	20	W144302	31-Oct-11	
EPA 6010B	Barium	mg/kg	145	140	100	3.7	20	W144302	31-Oct-11	
EPA 6010B	Cadmium	mg/kg	91.8	91.0	100	0.9	20	W144302	31-Oct-11	
EPA 6010B	Copper	mg/kg	101	100	100	1.0	20	W144302	31-Oct-11	
EPA 6010B	Lead	mg/kg	97.5	96.8	100	0.7	20	W144302	31-Oct-11	
EPA 6010B	Silver	mg/kg	4.74	4.70	5.00	0.9	20	W144302	31-Oct-11	
EPA 6010B	Zinc	mg/kg	116	116	100	0.5	20	W144302	31-Oct-11	

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MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0525**
Reported: 07-Nov-11 11:14

Notes and Definitions

D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of target analyte.
H1	Sample analysis performed past holding time.
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to spike level. The LCS 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

CHAIN OF CUSTODY RECORD

SVL Analytical, Inc. • One Government Gulch • Kellogg, ID 83837 • (208) 784-1258 • FAX: (208) 783-0891

WIJ0635
FOR SVL USE ONLY
SVL JOB #

TEMP on Receipt:

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other Wood Chips

Report to Company: MSE
Contact: Bob Lamb etal
Address: 12402 N. Div. ST #333
Spokane, WA 99218
Phone Number: (509) 742-0294
FAX Number:
E-mail: blamb@etal@msz-env.com

Invoice Sent To: Same
Contact:
Address:
Phone Number:
FAX Number:
PO#:

Project Name: Long Shot Mine
Sampler's Signature: RB Zamb

Indicate State of sample origination: WA **USACE?** ☐ Yes ☒ No

	Sample ID (Please take care to distinguish between: 1 and I, 2 and Z, 5 and S, Ø and O. Thanks!)	Collection Date	Collection Time	Collected by: (Init.)	Misc. Matrix Type (From Table 1)	Misc. No. of Containers	Preservative(s) Unpreserved	HNO_3 Filtered	HNO_3 Unfiltered	HCl	H_2SO_4	NaOH	Other (Specify)	Analyses Required: TCLP (RCRA 8 + Cu, Zn)	Analyses Required: Total (RCRA 8 + Cu, Zn)	Rush Instructions (Days)	Comments
1	LMRAW 1	10-26	4:45	RB	7	1	X							X	X		1	
2	~~LMRAW 1~~																	
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Relinquished by: RB Zamb Date: 10-27 Time: 8:00 Received by:
Relinquished by: Date: Time: Received by:
Date: 10/27/11 Time: 13:50

* Sample Reject: ☐ Return ☐ Dispose ☑ Store (30 Days)

White: LAB COPY Yellow: CUSTOMER COPY

SAMPLE RECEIPT/CHAIN-OF -CUSTODY CHECKLIST

The following items were checked for completeness, correctness, and compliance to project specifications using the Chain-of-Custody (COC) and other supporting information.

Date of acceptance: 10/27/11 **By:** CR Seevy

SVL Work No: WIJ0635

Item	Description	V	VC	NV	NA	Comments
1	Client or project name	✓				MSE
2	Date and time of receipt at lab	✓				10/27/11 13:50
3	Received by	✓				C Flores
4	Temperature blank or cooler temperature				✓	Temp. N/A °C.
5	Were the sample(s) received on ice				✓	NO
6	Custody tape/bottle seals				✓	
7	Condition of samples upon receipt (leaking; bubbles in VOA vials	✓				Good
8	Sample numbers/IDs agree with COC	✓				
9	Sample date & time agree with COC	✓				
10	Number of containers for each sample	✓				
11	The correct preservative for the analysis requested				✓	WOOT
12	Did an SVL employee preserve sample(s) upon receipt				✓	
12	Type of container for each sample / volume received	✓				
13	Analysis requested for each sample	✓				
14	Sample matrix description	✓				
15	COC properly completed & legible	✓				
16	Corrections properly made (initials & date)				✓	
17	Additional comments or records of sample condition or treatment (unlisted or missing samples at laboratory, aliquot taken, sample hold, samples subcontracted, communications between client and laboratory)				✓	
18	Shipper's air bill				✓	CITY PARCEL

V- Verified **VC- Verified Corrections Made** **NV-Not Verified** **NA- Not Applicable**

Additional Comments: _____

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MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0635**
Reported: 01-Nov-11 15:47

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Sampled By	Date Received
LMRAWW1	W1J0635-01	Other	16-Oct-11 16:45	BL	27-Oct-2011

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.

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MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0635**
Reported: 01-Nov-11 15:47

Client Sample ID: **LMRAWW1**
SVL Sample ID: **W1J0635-01 (Other)**

Sampled: 16-Oct-11 16:45
Received: 27-Oct-11
Sampled By: BL

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	0.4		W144302	AS	10/31/11 17:55	
EPA 6010B	**Barium**	8.06	mg/kg	0.200	0.024		W144302	AS	10/31/11 17:55	
EPA 6010B	**Cadmium**	1.33	mg/kg	0.20	0.02		W144302	AS	10/31/11 17:55	
EPA 6010B	Chromium	< 0.60	mg/kg	0.60	0.05		W144302	AS	10/31/11 17:55	
EPA 6010B	**Copper**	7.80	mg/kg	1.00	0.21		W144302	AS	10/31/11 17:55	
EPA 6010B	**Lead**	303	mg/kg	0.75	0.21		W144302	AS	10/31/11 17:55	
EPA 6010B	Selenium	< 4.0	mg/kg	4.0	1.2		W144302	AS	10/31/11 17:55	
EPA 6010B	**Silver**	1.88	mg/kg	0.50	0.04		W144302	AS	10/31/11 17:55	
EPA 6010B	**Zinc**	224	mg/kg	1.00	0.09		W144302	AS	10/31/11 17:55	
EPA 7471A	**Mercury**	0.390	mg/kg	0.033	0.007		W145016	JAA	10/31/11 13:26	
Percent Solids										
Percent Solids	**% Solids**	75.7	%	0.1			W144304	DP	10/31/11 11:04	
TCLP Extraction Parameters										
EPA 1311	**% Dry Solids**	63.8	%				W144271	ESB	10/31/11 10:55	
EPA 1311	**Final pH**	4.93	pH Units				W144271	ESB	10/31/11 10:55	
TCLP Leachates (Metals)										
EPA 6010B	Arsenic	< 0.050	mg/L Extract	0.050	0.007		W145044	TJK	11/01/11 12:25	
EPA 6010B	Barium	< 1.00	mg/L Extract	1.00	0.0004		W145044	TJK	11/01/11 12:25	
EPA 6010B	**Cadmium**	0.0147	mg/L Extract	0.0100	0.0005		W145044	TJK	11/01/11 12:25	
EPA 6010B	Chromium	< 0.0500	mg/L Extract	0.0500	0.0006		W145044	TJK	11/01/11 12:25	
EPA 6010B	**Copper**	0.092	mg/L Extract	0.050	0.003		W145044	TJK	11/01/11 12:25	
EPA 6010B	**Lead**	1.56	mg/L Extract	0.0500	0.0034		W145044	TJK	11/01/11 12:25	
EPA 6010B	Selenium	< 0.050	mg/L Extract	0.050	0.009		W145044	TJK	11/01/11 12:25	
EPA 6010B	Silver	< 0.0500	mg/L Extract	0.0500	0.0005		W145044	TJK	11/01/11 12:25	
EPA 6010B	**Zinc**	2.41	mg/L Extract	0.0500	0.0021		W145044	TJK	11/01/11 12:25	
EPA 7470A	Mercury	< 0.00020	mg/L Extract	0.00020	0.000072		W145100	JAA	11/01/11 11:50	

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 (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0635**
Reported: 01-Nov-11 15:47

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	0.4	2.5	W144302	31-Oct-11	
EPA 6010B	Barium	mg/kg	<0.200	0.024	0.200	W144302	31-Oct-11	
EPA 6010B	Cadmium	mg/kg	<0.20	0.02	0.20	W144302	31-Oct-11	
EPA 6010B	Chromium	mg/kg	<0.60	0.05	0.60	W144302	31-Oct-11	
EPA 6010B	Copper	mg/kg	<1.00	0.21	1.00	W144302	31-Oct-11	
EPA 6010B	Lead	mg/kg	<0.75	0.21	0.75	W144302	31-Oct-11	
EPA 6010B	Selenium	mg/kg	<4.0	1.2	4.0	W144302	31-Oct-11	
EPA 6010B	Silver	mg/kg	<0.50	0.04	0.50	W144302	31-Oct-11	
EPA 6010B	Zinc	mg/kg	<1.00	0.09	1.00	W144302	31-Oct-11	
EPA 7471A	Mercury	mg/kg	<0.033	0.007	0.033	W145016	31-Oct-11	
TCLP Extraction Parameters								
EPA 1311	Final pH	pH Units	4.93			W144271	31-Oct-11	
EPA 1311	% Dry Solids	%	0.00			W144271	31-Oct-11	
TCLP Leachates (Metals)								
EPA 6010B	Arsenic	mg/L Extract	<0.050	0.007	0.050	W145044	01-Nov-11	
EPA 6010B	Barium	mg/L Extract	<1.00	0.0004	1.00	W145044	01-Nov-11	
EPA 6010B	Cadmium	mg/L Extract	<0.0100	0.0005	0.0100	W145044	01-Nov-11	
EPA 6010B	Chromium	mg/L Extract	<0.0500	0.0006	0.0500	W145044	01-Nov-11	
EPA 6010B	Copper	mg/L Extract	<0.050	0.003	0.050	W145044	01-Nov-11	
EPA 6010B	Lead	mg/L Extract	<0.0500	0.0034	0.0500	W145044	01-Nov-11	
EPA 6010B	Selenium	mg/L Extract	<0.050	0.009	0.050	W145044	01-Nov-11	
EPA 6010B	Silver	mg/L Extract	<0.0500	0.0005	0.0500	W145044	01-Nov-11	
EPA 6010B	Zinc	mg/L Extract	<0.0500	0.0021	0.0500	W145044	01-Nov-11	
EPA 7470A	Mercury	mg/L Extract	<0.00020	0.000072	0.00020	W145100	01-Nov-11	

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	93.3	100	93.3	80 - 120	W144302	31-Oct-11	
EPA 6010B	Barium	mg/kg	97.8	100	97.8	80 - 120	W144302	31-Oct-11	
EPA 6010B	Cadmium	mg/kg	94.3	100	94.3	80 - 120	W144302	31-Oct-11	
EPA 6010B	Chromium	mg/kg	97.9	100	97.9	80 - 120	W144302	31-Oct-11	
EPA 6010B	Copper	mg/kg	97.6	100	97.6	80 - 120	W144302	31-Oct-11	
EPA 6010B	Lead	mg/kg	94.5	100	94.5	80 - 120	W144302	31-Oct-11	
EPA 6010B	Selenium	mg/kg	89.7	100	89.7	80 - 120	W144302	31-Oct-11	
EPA 6010B	Silver	mg/kg	4.77	5.00	95.3	80 - 120	W144302	31-Oct-11	
EPA 6010B	Zinc	mg/kg	94.0	100	94.0	80 - 120	W144302	31-Oct-11	
EPA 7471A	Mercury	mg/kg	0.878	0.833	105	80 - 120	W145016	31-Oct-11	
TCLP Leachates (Metals)									
EPA 6010B	Arsenic	mg/L Extract	1.03	1.00	103	80 - 120	W145044	01-Nov-11	
EPA 6010B	Barium	mg/L Extract	18.5	20.0	92.5	80 - 120	W145044	01-Nov-11	
EPA 6010B	Cadmium	mg/L Extract	0.187	0.200	93.7	80 - 120	W145044	01-Nov-11	
EPA 6010B	Chromium	mg/L Extract	0.986	1.00	98.6	80 - 120	W145044	01-Nov-11	
EPA 6010B	Copper	mg/L Extract	1.07	1.00	107	80 - 120	W145044	01-Nov-11	
EPA 6010B	Lead	mg/L Extract	0.894	1.00	89.4	80 - 120	W145044	01-Nov-11	
EPA 6010B	Selenium	mg/L Extract	0.215	0.200	108	80 - 120	W145044	01-Nov-11	
EPA 6010B	Silver	mg/L Extract	1.11	1.00	111	80 - 120	W145044	01-Nov-11	
EPA 6010B	Zinc	mg/L Extract	0.967	1.00	96.7	80 - 120	W145044	01-Nov-11	
EPA 7470A	Mercury	mg/L Extract	0.00538	0.00500	108	80 - 120	W145100	01-Nov-11	

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MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0635**
Reported: 01-Nov-11 15:47

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	127	37.0	100	90.1	75 - 125	W144302	31-Oct-11	
EPA 6010B	Barium	mg/kg	140	38.7	100	101	75 - 125	W144302	31-Oct-11	
EPA 6010B	Cadmium	mg/kg	91.0	<0.20	100	90.9	75 - 125	W144302	31-Oct-11	
EPA 6010B	Chromium	mg/kg	101	14.0	100	87.2	75 - 125	W144302	31-Oct-11	
EPA 6010B	Copper	mg/kg	100	4.26	100	96.1	75 - 125	W144302	31-Oct-11	
EPA 6010B	Lead	mg/kg	96.8	5.21	100	91.6	75 - 125	W144302	31-Oct-11	
EPA 6010B	Selenium	mg/kg	88.7	<4.0	100	86.5	75 - 125	W144302	31-Oct-11	
EPA 6010B	Silver	mg/kg	4.70	<0.50	5.00	93.9	75 - 125	W144302	31-Oct-11	
EPA 6010B	Zinc	mg/kg	116	23.9	100	92.3	75 - 125	W144302	31-Oct-11	
EPA 7471A	Mercury	mg/kg	0.827	0.668	0.167	95.0	75 - 125	W145016	31-Oct-11	
TCLP Leachates (Metals)										
EPA 6010B	Arsenic	mg/L Extract	1.07	<0.050	1.00	107	75 - 125	W145044	01-Nov-11	
EPA 6010B	Barium	mg/L Extract	19.1	<1.00	20.0	94.2	75 - 125	W145044	01-Nov-11	
EPA 6010B	Cadmium	mg/L Extract	0.205	0.0147	0.200	95.2	75 - 125	W145044	01-Nov-11	
EPA 6010B	Chromium	mg/L Extract	1.02	<0.0500	1.00	102	75 - 125	W145044	01-Nov-11	
EPA 6010B	Copper	mg/L Extract	1.20	0.092	1.00	110	75 - 125	W145044	01-Nov-11	
EPA 6010B	Lead	mg/L Extract	2.45	1.56	1.00	89.4	75 - 125	W145044	01-Nov-11	
EPA 6010B	Selenium	mg/L Extract	0.236	<0.050	0.200	110	75 - 125	W145044	01-Nov-11	
EPA 6010B	Silver	mg/L Extract	1.14	<0.0500	1.00	114	75 - 125	W145044	01-Nov-11	
EPA 6010B	Zinc	mg/L Extract	3.27	2.41	1.00	86.0	75 - 125	W145044	01-Nov-11	
EPA 7470A	Mercury	mg/L Extract	0.00115	<0.00020	0.00100	105	70 - 130	W145100	01-Nov-11	

Quality Control - MATRIX SPIKE DUPLICATE Data

Method	Analyte	Units	MSD Result	Spike Result	Spike Level	RPD	RPD Limit	Batch ID	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Arsenic	mg/kg	135	127	100	6.1	20	W144302	31-Oct-11	
EPA 6010B	Barium	mg/kg	145	140	100	3.7	20	W144302	31-Oct-11	
EPA 6010B	Cadmium	mg/kg	91.8	91.0	100	0.9	20	W144302	31-Oct-11	
EPA 6010B	Chromium	mg/kg	103	101	100	1.6	20	W144302	31-Oct-11	
EPA 6010B	Copper	mg/kg	101	100	100	1.0	20	W144302	31-Oct-11	
EPA 6010B	Lead	mg/kg	97.5	96.8	100	0.7	20	W144302	31-Oct-11	
EPA 6010B	Selenium	mg/kg	89.5	88.7	100	0.8	20	W144302	31-Oct-11	
EPA 6010B	Silver	mg/kg	4.74	4.70	5.00	0.9	20	W144302	31-Oct-11	
EPA 6010B	Zinc	mg/kg	116	116	100	0.5	20	W144302	31-Oct-11	
EPA 7471A	Mercury	mg/kg	0.730	0.827	0.167	12.4	20	W145016	31-Oct-11	M2
TCLP Leachates (Metals)										
EPA 6010B	Arsenic	mg/L Extract	1.06	1.07	1.00	1.1	20	W145044	01-Nov-11	
EPA 6010B	Barium	mg/L Extract	18.8	19.1	20.0	1.2	20	W145044	01-Nov-11	
EPA 6010B	Cadmium	mg/L Extract	0.202	0.205	0.200	1.6	20	W145044	01-Nov-11	
EPA 6010B	Chromium	mg/L Extract	1.01	1.02	1.00	1.1	20	W145044	01-Nov-11	
EPA 6010B	Copper	mg/L Extract	1.19	1.20	1.00	0.1	20	W145044	01-Nov-11	
EPA 6010B	Lead	mg/L Extract	2.45	2.45	1.00	0.0	20	W145044	01-Nov-11	
EPA 6010B	Selenium	mg/L Extract	0.221	0.236	0.200	6.6	20	W145044	01-Nov-11	
EPA 6010B	Silver	mg/L Extract	1.15	1.14	1.00	0.4	20	W145044	01-Nov-11	
EPA 6010B	Zinc	mg/L Extract	3.32	3.27	1.00	1.6	20	W145044	01-Nov-11	
EPA 7470A	Mercury	mg/L Extract	0.00112	0.00115	0.00100	2.6	20	W145100	01-Nov-11	

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MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0635**
Reported: 01-Nov-11 15:47

Notes and Definitions

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

WIJ0680

Page 1 of 1

CHAIN OF CUSTODY RECORD

SVL Analytical, Inc. • One Government Gulch • Kellogg, ID 83837 • (208) 784-1258 • FAX: (208) 783-0891

FOR SVL USE ONLY
SVL JOB #

TEMP on Receipt: N/A

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other _____

Report to Company: MSE
Contact: Bob LambeTL
Address: 12402 N. Div. ST. #333
Spokane, WA 99218
Phone Number: (509) 467-4081
FAX Number: "
E-mail: blambetl@mse-env.com

Invoice Sent To: Same
Contact:
Address:
Phone Number:
FAX Number:
PO#:

Project Name: Longshot Mine RA 2
Sampler's Signature: RA 2

Indicate State of sample origination: WA **USACE?** ☐ Yes ☒ No

	Sample ID (Please take care to distinguish between: 1 and I, 2 and Z, 5 and S, Ø and O. Thanks!)	Collection: Date	Collection: Time	Collected by: (Init.)	Misc.: Matrix Type (From Table 1)	Misc.: No. of Containers	Preservative(s): Unpreserved	HNO_3 Filtered	HNO_3 Unfiltered	HCl	H_2SO_4	NaOH	Other (Specify)	Analyses Required: RCRA 8 Total Metals	Analyses Required: Cu, Zn	Rush Instructions (Days)	Comments
1	WR1CS-1	10-29-11	1:10	RLA	3	1	X							✓	✓	1	All are soil samples!
2	WR1CS-2	10-29-11	1:10	RLA	3	1	X							✓	✓	1	ditto
3	OBCS-1	10-29-11	1:25	RLA	3	1	X							✓	✓	1	
4	OBCS-2	10-29-11	1:25	RLA	3	1	X							✓	✓	1	
5	MillCS-1	10-29-11		RLA	3	1	X							✓	✓	1	
* 6	MillCS-2	10-29-11		RLA	3	1	X							✓	✓	1	
7																	
8																	
9																	
10																	

Relinquished by: RA 2 Date: 10-31-11 Time: 8:00 Received by: [signature]
Relinquished by: Date: Time: Received by:

10/31/11 Date: Time: 10:20

SVL-COC 9/0

White: LAB COPY Yellow: CUSTOMER COPY

* Sample Reject: ☐ Return ☐ Dispose ☒ Store (30 Days)

* SAMPLE ID ON BAG READS MILL CS-2, SAMPLE ID ON SVL LABEL ON BAG READS MILL CS-1. SVL WILL GO BY ID WRITTEN ON BAG. CF 10/31/11

SAMPLE RECEIPT/CHAIN-OF -CUSTODY CHECKLIST

The following items were checked for completeness, correctness, and compliance to project specifications using the Chain-of-Custody (COC) and other supporting information.

Date of acceptance: 10/31/11 **By:** CRSeay

SVL Work No: WIJ0680

Item	Description	V	VC	NV	NA	Comments
1	Client or project name	✓				MSE-SPOKANE
2	Date and time of receipt at lab	✓				10/31/11 10:20
3	Received by	✓				AGlopez
4	Temperature blank or cooler temperature				✓	Temp. N/A °C.
5	Were the sample(s) received on ice				✓	
6	Custody tape/bottle seals				✓	
7	Condition of samples upon receipt (leaking; bubbles in VOA vials	✓				Good
8	Sample numbers/IDs agree with COC	✓				
9	Sample date & time agree with COC	✓				
10	Number of containers for each sample	✓				
11	The correct preservative for the analysis requested				✓	Solids
12	Did an SVL employee preserve sample(s) upon receipt				✓	
12	Type of container for each sample / volume received	✓				
13	Analysis requested for each sample	✓				
14	Sample matrix description	✓				
15	COC properly completed & legible	✓				
16	Corrections properly made (initials & date)				✓	
17	Additional comments or records of sample condition or treatment (unlisted or missing samples at laboratory, aliquot taken, sample hold, samples subcontracted, communications between client and laboratory)				✓	
18	Shipper's air bill				✓	WALK-IN

V- Verified **VC- Verified Corrections Made** **NV-Not Verified** **NA- Not Applicable**

Additional Comments: _____

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MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0680**
Reported: 01-Nov-11 15:10

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WR3CS-1	W1J0680-01	Soil	29-Oct-11 13:10	31-Oct-2011
WR3CS-2	W1J0680-02	Soil	29-Oct-11 13:10	31-Oct-2011
OBCS-1	W1J0680-03	Soil	29-Oct-11 13:25	31-Oct-2011
OBCS-2	W1J0680-04	Soil	29-Oct-11 13:25	31-Oct-2011
MILL CS-1	W1J0680-05	Soil	29-Oct-11 00:00	31-Oct-2011
MILL CS-2	W1J0680-06	Soil	29-Oct-11 00:00	31-Oct-2011

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.

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MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0680**
Reported: 01-Nov-11 15:10

Client Sample ID: **WR3CS-1**
SVL Sample ID: **W1J0680-01 (Soil)**

Sampled: 29-Oct-11 13:10
Received: 31-Oct-11
Sampled By:

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	0.4		W145051	TJK	11/01/11 13:51	
EPA 6010B	**Barium**	57.3	mg/kg	0.200	0.024		W145051	TJK	11/01/11 13:51	
EPA 6010B	**Cadmium**	6.52	mg/kg	0.20	0.02		W145051	TJK	11/01/11 13:51	
EPA 6010B	**Chromium**	26.0	mg/kg	0.60	0.05		W145051	TJK	11/01/11 13:51	
EPA 6010B	**Copper**	23.8	mg/kg	1.00	0.21		W145051	TJK	11/01/11 13:51	
EPA 6010B	**Lead**	305	mg/kg	0.75	0.21		W145051	TJK	11/01/11 13:51	
EPA 6010B	Selenium	< 4.0	mg/kg	4.0	1.2		W145051	TJK	11/01/11 13:51	
EPA 6010B	**Silver**	1.79	mg/kg	0.50	0.04		W145051	TJK	11/01/11 13:51	
EPA 6010B	**Zinc**	1060	mg/kg	1.00	0.09		W145051	TJK	11/01/11 13:51	
EPA 7471A	**Mercury**	0.043	mg/kg	0.033	0.007		W145098	JAA	11/01/11 10:54	
Percent Solids										
Percent Solids	**% Solids**	85.8	%	0.1			W145052	DP	11/01/11 11:31	

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

John Kern
Laboratory Director

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MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0680**
Reported: 01-Nov-11 15:10

Client Sample ID: **WR3CS-2**
SVL Sample ID: **W1J0680-02 (Soil)**

Sampled: 29-Oct-11 13:10
Received: 31-Oct-11
Sampled By:

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	**Arsenic**	5.6	mg/kg	2.5	0.4		W145051	TJK	11/01/11 14:08	
EPA 6010B	**Barium**	60.1	mg/kg	0.200	0.024		W145051	TJK	11/01/11 14:08	
EPA 6010B	**Cadmium**	7.12	mg/kg	0.20	0.02		W145051	TJK	11/01/11 14:08	
EPA 6010B	**Chromium**	30.2	mg/kg	0.60	0.05		W145051	TJK	11/01/11 14:08	
EPA 6010B	**Copper**	48.6	mg/kg	1.00	0.21		W145051	TJK	11/01/11 14:08	
EPA 6010B	**Lead**	2600	mg/kg	0.75	0.21		W145051	TJK	11/01/11 14:08	
EPA 6010B	Selenium	< 4.0	mg/kg	4.0	1.2		W145051	TJK	11/01/11 14:08	
EPA 6010B	**Silver**	10.2	mg/kg	0.50	0.04		W145051	TJK	11/01/11 14:08	
EPA 6010B	**Zinc**	1080	mg/kg	1.00	0.09		W145051	TJK	11/01/11 14:08	
EPA 7471A	**Mercury**	0.040	mg/kg	0.033	0.007		W145098	JAA	11/01/11 10:59	
Percent Solids										
Percent Solids	**% Solids**	86.3	%	0.1			W145052	DP	11/01/11 11:31	

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

John Kern
Laboratory Director

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MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0680**
Reported: 01-Nov-11 15:10

Client Sample ID: **OBCS-1**
SVL Sample ID: **W1J0680-03 (Soil)**

Sampled: 29-Oct-11 13:25
Received: 31-Oct-11
Sampled By:

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	**Arsenic**	10.1	mg/kg	2.5	0.4		W145051	TJK	11/01/11 14:14	
EPA 6010B	**Barium**	59.0	mg/kg	0.200	0.024		W145051	TJK	11/01/11 14:13	
EPA 6010B	**Cadmium**	5.90	mg/kg	0.20	0.02		W145051	TJK	11/01/11 14:14	
EPA 6010B	**Chromium**	38.7	mg/kg	0.60	0.05		W145051	TJK	11/01/11 14:13	
EPA 6010B	**Copper**	86.9	mg/kg	1.00	0.21		W145051	TJK	11/01/11 14:13	
EPA 6010B	**Lead**	706	mg/kg	0.75	0.21		W145051	TJK	11/01/11 14:13	
EPA 6010B	Selenium	< 4.0	mg/kg	4.0	1.2		W145051	TJK	11/01/11 14:14	
EPA 6010B	**Silver**	16.2	mg/kg	0.50	0.04		W145051	TJK	11/01/11 14:13	
EPA 6010B	**Zinc**	1130	mg/kg	1.00	0.09		W145051	TJK	11/01/11 14:13	
EPA 7471A	**Mercury**	0.038	mg/kg	0.033	0.007		W145098	JAA	11/01/11 11:00	
Percent Solids										
Percent Solids	**% Solids**	92.0	%	0.1			W145052	DP	11/01/11 11:31	

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**:1268

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MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0680**
Reported: 01-Nov-11 15:10

Client Sample ID: **OBCS-2**
SVL Sample ID: **W1J0680-04 (Soil)**

Sampled: 29-Oct-11 13:25
Received: 31-Oct-11
Sampled By:

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	**Arsenic**	13.0	mg/kg	2.5	0.4		W145051	TJK	11/01/11 14:19	
EPA 6010B	**Barium**	29.2	mg/kg	0.200	0.024		W145051	TJK	11/01/11 14:19	
EPA 6010B	**Cadmium**	4.71	mg/kg	0.20	0.02		W145051	TJK	11/01/11 14:19	
EPA 6010B	**Chromium**	34.6	mg/kg	0.60	0.05		W145051	TJK	11/01/11 14:19	
EPA 6010B	**Copper**	59.7	mg/kg	1.00	0.21		W145051	TJK	11/01/11 14:19	
EPA 6010B	**Lead**	476	mg/kg	0.75	0.21		W145051	TJK	11/01/11 14:19	
EPA 6010B	Selenium	< 4.0	mg/kg	4.0	1.2		W145051	TJK	11/01/11 14:19	
EPA 6010B	**Silver**	24.4	mg/kg	0.50	0.04		W145051	TJK	11/01/11 14:19	
EPA 6010B	**Zinc**	812	mg/kg	1.00	0.09		W145051	TJK	11/01/11 14:19	
EPA 7471A	Mercury	< 0.033	mg/kg	0.033	0.007		W145098	JAA	11/01/11 11:02	
Percent Solids										
Percent Solids	**% Solids**	90.2	%	0.1			W145052	DP	11/01/11 11:31	

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John Kern
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MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0680**
Reported: 01-Nov-11 15:10

Client Sample ID: **MILL CS-1**
SVL Sample ID: **W1J0680-05 (Soil)**

Sampled: 29-Oct-11 00:00
Received: 31-Oct-11
Sampled By:

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	**Arsenic**	8.3	mg/kg	2.5	0.4		W145051	TJK	11/01/11 14:24	
EPA 6010B	**Barium**	74.7	mg/kg	0.200	0.024		W145051	TJK	11/01/11 14:24	
EPA 6010B	**Cadmium**	4.32	mg/kg	0.20	0.02		W145051	TJK	11/01/11 14:24	
EPA 6010B	**Chromium**	31.0	mg/kg	0.60	0.05		W145051	TJK	11/01/11 14:24	
EPA 6010B	**Copper**	323	mg/kg	1.00	0.21		W145051	TJK	11/01/11 14:24	
EPA 6010B	**Lead**	1590	mg/kg	0.75	0.21		W145051	TJK	11/01/11 14:24	
EPA 6010B	Selenium	< 4.0	mg/kg	4.0	1.2		W145051	TJK	11/01/11 14:24	
EPA 6010B	**Silver**	20.5	mg/kg	0.50	0.04		W145051	TJK	11/01/11 14:24	
EPA 6010B	**Zinc**	881	mg/kg	1.00	0.09		W145051	TJK	11/01/11 14:24	
EPA 7471A	**Mercury**	0.062	mg/kg	0.033	0.007		W145098	JAA	11/01/11 11:03	
Percent Solids										
Percent Solids	**% Solids**	87.2	%	0.1			W145052	DP	11/01/11 11:31	

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

John Kern
Laboratory Director

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MSE (Spokane)
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Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0680**
Reported: 01-Nov-11 15:10

Client Sample ID: **MILL CS-2**
SVL Sample ID: **W1J0680-06 (Soil)**

Sampled: 29-Oct-11 00:00
Received: 31-Oct-11
Sampled By:

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	**Arsenic**	9.1	mg/kg	2.5	0.4		W145051	TJK	11/01/11 14:30	
EPA 6010B	**Barium**	85.4	mg/kg	0.200	0.024		W145051	TJK	11/01/11 14:29	
EPA 6010B	**Cadmium**	3.13	mg/kg	0.20	0.02		W145051	TJK	11/01/11 14:30	
EPA 6010B	**Chromium**	41.6	mg/kg	0.60	0.05		W145051	TJK	11/01/11 14:29	
EPA 6010B	**Copper**	51.6	mg/kg	1.00	0.21		W145051	TJK	11/01/11 14:29	
EPA 6010B	**Lead**	789	mg/kg	0.75	0.21		W145051	TJK	11/01/11 14:29	
EPA 6010B	Selenium	< 4.0	mg/kg	4.0	1.2		W145051	TJK	11/01/11 14:30	
EPA 6010B	**Silver**	6.99	mg/kg	0.50	0.04		W145051	TJK	11/01/11 14:29	
EPA 6010B	**Zinc**	571	mg/kg	1.00	0.09		W145051	TJK	11/01/11 14:29	
EPA 7471A	Mercury	< 0.033	mg/kg	0.033	0.007		W145098	JAA	11/01/11 11:05	
Percent Solids										
Percent Solids	**% Solids**	87.2	%	0.1			W145052	DP	11/01/11 11:31	

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

John Kern
Laboratory Director

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MSE (Spokane)
12720 N. Division St. #333
Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0680**
Reported: 01-Nov-11 15:10

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	0.4	2.5	W145051	01-Nov-11	
EPA 6010B	Barium	mg/kg	<0.200	0.024	0.200	W145051	01-Nov-11	
EPA 6010B	Cadmium	mg/kg	<0.20	0.02	0.20	W145051	01-Nov-11	
EPA 6010B	Chromium	mg/kg	<0.60	0.05	0.60	W145051	01-Nov-11	
EPA 6010B	Copper	mg/kg	<1.00	0.21	1.00	W145051	01-Nov-11	
EPA 6010B	Lead	mg/kg	<0.75	0.21	0.75	W145051	01-Nov-11	
EPA 6010B	Selenium	mg/kg	<4.0	1.2	4.0	W145051	01-Nov-11	
EPA 6010B	Silver	mg/kg	<0.50	0.04	0.50	W145051	01-Nov-11	
EPA 6010B	Zinc	mg/kg	<1.00	0.09	1.00	W145051	01-Nov-11	
EPA 7471A	Mercury	mg/kg	<0.033	0.007	0.033	W145098	01-Nov-11	

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	94.5	100	94.5	80 - 120	W145051	01-Nov-11	
EPA 6010B	Barium	mg/kg	95.1	100	95.1	80 - 120	W145051	01-Nov-11	
EPA 6010B	Cadmium	mg/kg	92.4	100	92.4	80 - 120	W145051	01-Nov-11	
EPA 6010B	Chromium	mg/kg	95.2	100	95.2	80 - 120	W145051	01-Nov-11	
EPA 6010B	Copper	mg/kg	95.9	100	95.9	80 - 120	W145051	01-Nov-11	
EPA 6010B	Lead	mg/kg	92.9	100	92.9	80 - 120	W145051	01-Nov-11	
EPA 6010B	Selenium	mg/kg	89.7	100	89.7	80 - 120	W145051	01-Nov-11	
EPA 6010B	Silver	mg/kg	4.79	5.00	95.8	80 - 120	W145051	01-Nov-11	
EPA 6010B	Zinc	mg/kg	89.9	100	89.9	80 - 120	W145051	01-Nov-11	
EPA 7471A	Mercury	mg/kg	0.782	0.833	93.8	80 - 120	W145098	01-Nov-11	

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	174	75.8	100	98.1	75 - 125	W145051	01-Nov-11	
EPA 6010B	Barium	mg/kg	112	7.63	100	104	75 - 125	W145051	01-Nov-11	
EPA 6010B	Cadmium	mg/kg	95.2	<0.20	100	95.2	75 - 125	W145051	01-Nov-11	
EPA 6010B	Chromium	mg/kg	102	3.22	100	98.9	75 - 125	W145051	01-Nov-11	
EPA 6010B	Copper	mg/kg	524	418	100	106	75 - 125	W145051	01-Nov-11	M3
EPA 6010B	Lead	mg/kg	99.7	2.21	100	97.5	75 - 125	W145051	01-Nov-11	
EPA 6010B	Selenium	mg/kg	96.5	<4.0	100	95.2	75 - 125	W145051	01-Nov-11	
EPA 6010B	Silver	mg/kg	5.39	<0.50	5.00	102	75 - 125	W145051	01-Nov-11	
EPA 6010B	Zinc	mg/kg	111	12.8	100	97.9	75 - 125	W145051	01-Nov-11	
EPA 7471A	Mercury	mg/kg	0.210	0.053	0.167	94.0	75 - 125	W145098	01-Nov-11	

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MSE (Spokane)
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Spokane, WA 99218

Project Name: Longshot Mine
Work Order: **W1J0680**
Reported: 01-Nov-11 15:10

Quality Control - MATRIX SPIKE DUPLICATE Data

Method	Analyte	Units	MSD Result	Spike Result	Spike Level	RPD	RPD Limit	Batch ID	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Arsenic	mg/kg	162	174	100	7.0	20	W145051	01-Nov-11	
EPA 6010B	Barium	mg/kg	112	112	100	0.3	20	W145051	01-Nov-11	
EPA 6010B	Cadmium	mg/kg	95.9	95.2	100	0.6	20	W145051	01-Nov-11	
EPA 6010B	Chromium	mg/kg	102	102	100	0.3	20	W145051	01-Nov-11	
EPA 6010B	Copper	mg/kg	407	524	100	25.2	20	W145051	01-Nov-11	
EPA 6010B	Lead	mg/kg	99.4	99.7	100	0.4	20	W145051	01-Nov-11	
EPA 6010B	Selenium	mg/kg	97.1	96.5	100	0.6	20	W145051	01-Nov-11	
EPA 6010B	Silver	mg/kg	5.35	5.39	5.00	0.6	20	W145051	01-Nov-11	
EPA 6010B	Zinc	mg/kg	111	111	100	0.0	20	W145051	01-Nov-11	
EPA 7471A	Mercury	mg/kg	0.198	0.210	0.167	5.7	20	W145098	01-Nov-11	

Notes and Definitions

M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to spike level. The LCS 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 4

Pre-Removal Action, Removal Action and Post-Removal Action Photographs



Photograph 1. Lower adit (Pre-removal)



Photograph 2. Discharge from lower adit (Pre-removal)



Photograph 3. Partially collapsed mill structure (Pre-removal)



Photograph 4. Mill foundation and ore bin in background (Pre-removal)



Photograph 5. Mine waste hotspot - unprocessed ore in and around ore bin (Pre-removal)



Photograph 6. Mine waste hotspot - waste rock pile WR3 (Pre-removal)



Photograph 7. Upper adit (Pre-removal)



Photograph 8. Stope and vertical rock face (Pre-removal)



Photograph 9. Tailings impoundment TA1 (Pre-removal)



Photograph 10. Tailings impoundment TA2 (Pre-removal)



Photograph 11. Tailings impoundment TA3 (Pre-removal)



Photograph 12. Large pond (PD2) below TA3 (Pre-removal)



Photograph 13. Surface water sample location (ET3) in the ephemeral tributary (Pre-removal)



Photograph 14. Lower Adit Ditch and small pond (PD1, Pre-removal)



Photograph 15. Collected debris above mill



Photograph 16. Collected debris above mill



Photograph 17. Collected debris above mill



Photograph 18. Collected slash for chipping



Photograph 19. Collecting mill debris



Photograph 20. Collecting mill scrap



Photograph 21. Improved access road above mill



Photograph 22. Improved access road above mill



Photograph 23. Improved access road below mill



Photograph 24. Improved access road to gloryhole



Photograph 25. Razing the mill



Photograph 26. Razing the mill



Photograph 27. Razing the mill



Photograph 28. Cleaned mill area



Photograph 29. Mill debris and chips



Photograph 30. Collected verification sample



Photograph 31. (10/30/2011) XRF sample location near WR-6



Photograph 32. (10/30/2011) XRF sample location at WR-3



Photograph 33. (10/30/2011) XRF sample location at WR-3



Photograph 34. (10/30/2011) Discharge from lower adit



Photograph 35. (10/30/2011) XRF Reading for possible soil cover adjacent to WR-3



Photograph 36. (10/30/2011) Draining the pond (PD1) which captures discharge from lower adit



Photograph 37. (10/30/2011) XRF Reading directly up-slope from the concrete mill foundation (Ore Bin Area)



Photograph 38. (10/30/2011) XRF Reading directly down-slope from the concrete mill foundation (upper left-hand corner)



Photograph 39. (10/30/2011) XRF Reading along access road just before WR-2 to confirm the rocks are not waste-rocks



Photograph 40. (10/30/2011) Collection of timber for wood chips near small pond (PD1)



Photograph 41. (10/30/2011) Wood chip pile adjacent to WR-3



Photograph 42. (10/30/2011) Drainage ditch above vertical rock face and stope



Photograph 43. (10/30/2011) Making wood chips near WR-2



Photograph 44. (10/31/2011) Soil cover pile for ORE BIN that was removed



Photograph 45. (10/31/2011) Fill-in of stope to base of vertical rock face



Photograph 46. (10/31/2011) View from atop the vertical rock face showing the reclamation of the access road



Photograph 47. (10/31/2011) Side-view of bat gate of upper adit



Photograph 48. (10/31/2011) Top/Front view of bat gate of upper adit



Photograph 49. (10/31/2011) Reclamation of access road along WR-4



Photograph 50. (10/31/2011) Reclamation of the access road standing near lower adit discharge looking uphill towards WR-3



Photograph 51. (10/31/2011) Newly trenched drainage ditch for the lower adit discharge



Photograph 52. Access barrier rocks at mill



Photograph 53. Lower adit bat culvert



Photograph 54. Lower adit bat culvert



Photograph 55. Wood chip cover at mill



Photograph 56. Intact upper access road



Photograph 57. New adit drainage ditch



Photograph 58. Reclaimed glory hole



Photograph 59. Reclaimed lower adit area



Photograph 60. Reclaimed mill access area road



Photograph 61. Reclaimed mill foundations



Photograph 62. Reclaimed TP-3



Photograph 63. Reclaimed upper access road



Photograph 64. Reclaimed upper access road



Photograph 65. Reclamation above new adit drainage ditch



Photograph 66. Reclamation below new adit drainage ditch



Photograph 67. TP-3 Cover borrow area



Photograph 68. (11/4/2011) Filing in of the bat gate of lower adit



Photograph 69. (11/4/2011) Locking the temporary lock of the lower adit bat gate

APPENDIX 5

Post Removal Monitoring and O&M Plan

E W WELLS-MSE

ENVIRONMENTAL | CONSTRUCTION | MEC SERVICES

POST-REMOVAL MONITORING AND O&M PLAN

Longshot Mine and Mill Site

October 2011

COLVILLE NATIONAL FOREST, WASHINGTON





Submitted to:
USDA Forest Service
Region 6
10600 NE 51st Circle
Vancouver, WA 98682

Submitted by:
E W Wells Group - MSE
12402 N. Division Street #333
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POST-REMOVAL MONITORING AND O&M PLAN
Longshot Mine and Mill Site
Colville National Forest, Washington

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Tables

Table 1 - Cleanup Confirmation Sample Summary
Table 2 - Pre- and Post-Removal Action Monitoring Sample Summary
Table 3 - Sample Volume, Preservative, and Holding Time Summary
Table 4 -Data Quality Objectives

ATTACHMENTS

ATTACHMENT A – Field Forms

1.0 INTRODUCTION

- Millennium Science and Engineering, Inc. (MSE) has been contracted by the United States Department of Agriculture, Forest Service (Forest Service) to complete a Removal Action at the Longshot Mine and Mill Site in the Colville National Forest, Stevens County, Washington, the location of which is illustrated in Figure 1. The Removal Action is scheduled for 2011.
- This Operations & Maintenance (O&M) Plan describes the Cleanup Verification Sampling and Post-Removal Monitoring activities to be conducted at the Longshot Mine and Mill Site beginning in Fall 2011.
  - The plan combines elements of a Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP).
  - The plan discusses the laboratory analytical procedures and quality assurance/quality control (QA/QC) methods to be employed both in the field and the lab to ensure data quality.
  - The plan also discusses general O&M activities that may be required.
- Field forms are provided in Attachment A.

1.1 Purpose and Objectives

The purpose of a removal action is to abate, prevent, minimize, stabilize, mitigate or eliminate the release or the threat of a release. The overall objectives of the Longshot Mine Removal Action are 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 the post-removal sampling and monitoring are to compare post-removal mine waste area and aquatic habitat conditions to pre-removal conditions. This will be accomplished by:
  - Collecting cleanup verification samples from areas that contained mine waste: the Ore Bin, the area beneath Wood and Metal Debris around the mill foundation, and waste rock piles WR-1, WR-2 and WR-3 as illustrated in Figure 2;
  - Assessing surface water samples, Figure 3, collected from four locations: AD1 (Adit discharge), ET3 (Immediately below the lower tailings), BG1 (Ephemeral [background] stream east of from the Site), and ET4 (The end of the ephemeral stream prior to discharge to Mill Creek) for comparison with data collected during the SI and pre-removal data gap investigation;
  - Assessing sediment samples collected from each of the four surface water sampling locations for comparison with data collected during the SI; and
  - Assessing one coeval benthic sample collected at ET4 to evaluate potential impacts to the stream habitat, benthic macroinvertebrate community, and fish species. Benthic samples were not obtained from this location during the SI.
- A bulk sample of wood debris will be collected from the demolition of the mill building to confirm that it is acceptable for solid waste landfill disposal.
- The Site will also be inspected for revegetation success, evidence of erosion, slumps, or other damage.

1.2 Schedule

- Removal action activities, including mill debris and mine waste sampling and analysis are scheduled for the Fall of 2011.

- The first post-removal monitoring event is scheduled for Summer 2012. The second post-removal monitoring event is scheduled for 2013, and the third post-removal monitoring event is scheduled for 2014.
- Specific dates will be depend on weather conditions and Site access. If possible, the second and third monitoring events will be scheduled during the same time of year as the first event.

1.3 Site Description

- The Longshot Mine is an inactive lead-zinc mine and mill, located about 11 miles northeast of Colville, Washington in Stevens County. (See Figure 1.)
- The site is located in the eastern half of Section 18, Township 36 North, Range 41 East of the Willamette Meridian at an elevation of about 3,600 feet.
- Site features include:
  - Remnants of a mill and other wooden structures
  - Two open adits and one open stope
  - Two ponds
  - An unprocessed ore bin
  - Six waste rock piles
  - Three tailings impoundments
- Access to the site is via USFS Spur Road 150 from County Road 4954. (See Figure 3.)
- The site is on a hillside adjacent to an unnamed ephemeral tributary to South Fork Mill Creek.
- Ore from two adits was processed at the mill and tailings were deposited in a series of three impoundments in the ephemeral drainage. (See Figure 3.)
- Unprocessed ore is piled in an ore bin at the mill.
- Water discharges from the lower adit and flows through a small settling pond before disappearing beneath debris surrounding the mill structure.
- There is a second, larger pond in the ephemeral drainage below the last tailings impoundment.
- There are six waste rock piles: three near the upper adit, and three near the lower adit and mill.
- There is a vertical stope near the upper adit that extends into the underground workings.
- There are several collapsed wooden buildings and piles of debris near the lower adit and along the road to the upper adit.

2.0 POST-REMOVAL MONITORING AND O&M ACTIVITIES

- Post-removal monitoring activities will consist of:
  - A general visual inspection of areas disturbed during removal activities at the Site;
  - Collecting cleanup verification soil samples;
  - Collecting surface water, sediment and benthic macroinvertebrate samples;
  - Taking representative photos of the Site with an effort to replicate the photos taken at completion of the Removal Action; and
  - Preparing Annual Monitoring Reports.

2.1 General Site Inspection

A general site inspection will be conducted to assess revegetation success, evidence of erosion, slumps, or other damage. The site inspection will focus on:

- Revegetation success, noxious weeds and evidence of erosion or other damage in the areas from which waste rock is excavated (approximately 0.6 acre):
  - the ore bin at the mill site;

  - the area of additional unprocessed ore beneath the wood and metal debris around the mill foundation;
  - the waste rock piles (WR1, WR2, and WR3) near the lower adit.
- Revegetation success, noxious weeds, settling, sloughing, collapse or other evidence of instability in the backfilled stope feature.
- Signs of vandalism, collapse or other damage of bat gates or backfilled adits.
- Revegetation success and erosion in other reclaimed areas (e.g., road shoulders, staging areas).
- Any evidence of significant erosion or other damage will be photographed and reported to the Forest Service OSC.

2.2 Sample Collection

- Bulk debris, soil, surface water, sediment, and benthic samples will be collected for comparison with site characterization (i.e. samples collected during the SI) and pre-removal monitoring sample results. The list of metals to be analyzed, samples to be collected and sampling methodology are described in Section 3 and summarized in Tables 1 and 2.

2.3 Operations and Maintenance

- The Site will be inspected annually for three consecutive years beginning in 2012.
  - The post-removal inspections will assess revegetation success, evidence of erosion, slumps, or any failures from improperly placed materials during the Removal Action.
  - The post-removal inspections will be conducted concurrently with the post-removal sampling events and the results will be included in the annual monitoring reports.
  - The Forest Service OSC will be notified of any site conditions or damages that require immediate attention.
  - MSE will warranty work conducted during the Removal Action for 1 year during which any site damages or failures resulting from improper construction methods or materials will be repaired by MSE. Failures or damages resulting from natural causes or other means outside of MSE's control, such as vandalism, will not be covered.

3.0 SAMPLING AND ANALYSIS PLAN

- This section describes the sampling methods and procedures for each media; sample management activities such as sample identification, preservation, and shipping; laboratory analysis; decontamination procedures; and investigation derived waste.

3.1 Sampling Methods and Procedures

- The sampling approach and methods are described in the following subsections by media type.
  - Where possible, disposable single-use sampling equipment will be used for sample collection.
  - Field quality control samples will consist of one matrix spike/matrix spike duplicate pair (MS/MSD), and a field blank.
  - All observations, conversations, measurements and photograph descriptions will be recorded promptly in a bound waterproof logbook. The logbook will also record when, where, and how all samples were collected, along with pertinent observations.
  - During the sampling, all disturbances to the environment will be minimized.
  - Upon completion of the sampling, any trash or investigation derived waste generated during the sampling will be removed from the site and properly disposed of.

3.1.1 Bulk Wood Debris

- **Wood Debris:**
  - Wood debris from the demolition of the mill structure will be sampled and analyzed to confirm that this material would not be classified as hazardous waste and is suitable for solid waste landfill disposal.
  - One bulk sample will be collected from representative wood debris and packaged for laboratory analysis.
  - The bulk wood sample will be analyzed for 8 RCRA metals (As, Ba, Cd, Cr, Pb, Hg, Se, Ag) according to EPA analytical methods for both total metals and TCLP metals analysis, as summarized in Table 1.

3.1.2 Soil

- **Soil:**
  - Cleanup verification samples will be collected from several locations, including:
    - The ore bin at the mill site
    - Beneath wood and metal debris around the mill foundation
    - Waste rock pile WR-1
    - Waste rock pile WR-2
    - Waste rock pile WR-3
  - Up to 8 samples will be submitted for laboratory analysis to confirm the effectiveness of removal actions in these areas.
  - Gravel and organic media will be removed and the sample will be placed in a laboratory supplied, 4-ounce jar.
  - The soil samples will each be a composite sample consisting of two 2-ounce subsamples Subsamples will be thoroughly homogenized in a 1-quart plastic bag.
  - Samples will be collected using disposable, single-use hand trowels or shovels.
  - Samples will be placed in 4-ounce sample jars provided by the laboratory and will be properly sealed, labeled, and cooled for transport to the laboratory.
  - Soil samples will be submitted for analysis of 8 RCRA metals (As, Ba, Cd, Cr, Hg, Pb, Se, Ag), as summarized in Table 1.
  - Sample containers will be labeled and packaged as described in Section 4.2. The samples will be documented on a Sediment Sample Collection Record (Attachment A).

3.1.3 Surface Water

- **Surface Water:**
  - Surface water samples will be collected from four locations (Figures 1 and 2):
    - AD1 (Adit discharge),
    - ET3 (Immediately below the lower tailings),
    - BG1 (Ephemeral [background] stream east of the Site), and
    - ET4 (The end of the ephemeral stream prior to discharge to Mill Creek).
  - Stream samples will be collected from a flowing portion of the stream/discharge directly into 250 mL polyethylene bottles provided by the laboratory selected to perform the required analyses. Depending on stream depth, the bottle will be placed upside down into the center of stream and then slowly inverted while under the surface to allow the bottle to fill or the bottle can be placed with the opening pointed slightly upward toward and into the current allowing the container to fill. Sufficient headspace will be left to allow for sample preservative. Care will be taken to prevent disturbing the sediment and organic material during sample collection.
  - If the source is too shallow to collect a sample using either of these methods, disposal Tygon tubing and a portable pump will be used to extract a sample. New tubing will be used for each sample.

- Total Recoverable and Dissolved samples will be obtained. Dissolved samples will be filtered using a 0.45 micron filter and preserved in the field as appropriate for laboratory analysis.
- All stream sampling will proceed from downstream to upstream locations to avoid cross contamination.
- The appropriate preservative (Table 3) will be added to the sample and the container will be tightly capped.
- Based on results of the SI sample analyses and anticipated elevated metals, the samples will be analyzed for Ag, As, Ba, Cd, Cu, Pb, and Zn (Table 2).
- Water samples will also be analyzed for TDS, TSS, Hardness and Sulfate by the laboratory.
- Field parameters to be measured during sample collection include pH, temperature, conductivity, TDS, DO, and ORP or Eh.
- A multi-parameter water quality meter will be used to measure the field parameters by collecting a water sample in a decontaminated 500-mL beaker and submerging the sensor in the sample.
- The instrument will be calibrated and operated per the manufacturer's specifications.
- Field calibrations, measurements, and notations will be recorded in the Field Logbook.
- The flow at each sampling location will be estimated and recorded.
- The sample ID, flow, and field parameters will be documented on a Water Sample Collection Record (Attachment A).

3.1.4 Sediment

- **Sediment:**
  - One sediment sample will be collected from each of the four surface water sample locations.
  - The sediment samples will each be a composite sample consisting of two 2-ounce subsamples. Where appropriate subsamples will consist of one pool and one riffle habitat sample.
  - The sediment samples will be collected from 0 to 18 inches below the streambed using disposable, single-use hand trowels, or disposable push samplers.
  - The composite samples will be homogenized by combining the subsamples in a 1-quart plastic bag and thoroughly mixing.
  - Gravel and organic media will be removed and the sample will be placed in a laboratory supplied, 4-ounce, wide-mouth jar.
  - Any water in the sample will be decanted so that the bottle is filled with as much sediment as possible.
  - The bottles will be labeled and packaged as described in Section 4.2. The samples will be submitted for the analyses summarized in Table 2**.** The lab will be instructed to screen the sediment sample and discard material greater than 2 millimeters in diameter to focus the analysis on the finer material.
  - The samples will be documented on a Sediment Sample Collection Record (Attachment A).

3.1.5 Aquatic Survey and Benthic Macroinvertebrates

- **Benthic Macroinvertebrates:**
  - An aquatic survey will be conducted at ET4 only to evaluate potential impacts to the stream habitat, benthic macroinvertebrate community, and fish species. Benthic samples were not obtained at this location during the SI. However, because this is the best location for observing metal impact, and Mill Creek flow significantly dilutes impact, the survey will be conducted at this location.

- A sample will be obtained prior to initiating Site activity.
- The aquatic habitat survey will be conducted for a 100-meter reach, if possible, following the protocols outlined in the U.S. EPA Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers (Barbour et.al, 1999) and Benthic Macroinvertebrate Biological Monitoring Protocols for Rivers and Streams (Plotnikoff and Wiseman, 2001).
- The aquatic habitat surveys will consist of collecting quantitative as well as qualitative data on water chemistry and physical habitat.
- One macroinvertebrate sample will be collected as a composite sample from pool habitats and riffle habitats. The composite sample will consist of three subsamples from different pool or riffle habitats within the stream reach, if such can be identified in the ephemeral stream.
- Collection of macroinvertebrate samples from specific pool habitats is necessitated by the potential of tails or metals mobilizing into the ephemeral stream and settling or sorbing.
- Samples will be labeled (both inside and outside the container) with information such as identification number, stream name, date, site location, and collector's name.
- Samples will be preserved in ethanol (preservative added in the field) and shipped to Aquatic Biology Associates, Inc. for processing for taxonomy, generally to genus/species (Table 2).

3.1.6 Other Sampling Considerations

- Pore water sampling is not deemed necessary in an ephemeral stream.
- The first monitoring event will be conducted between August 15 and September 15, 2011.
- The monitoring will be limited to the aquatic environment and will be based on the SI using a refined set of sampling locations and analytical parameters as defined in preceding text.
- Annual Monitoring Reports summarizing the analytical results and comparing to previous monitoring results will be prepared and submitted to the Forest Service by the end of November for each calendar year.

3.2 Sample Management

- The following sections describe sample management activities, including sample designation, preservation, and shipping.

3.2.1 Sample Preservation

- Samples will be preserved as appropriate for the required analysis. The method of preservation and sample holding times are summarized in Table 3.
  - Solid media samples will be preserved by chilling and maintaining them at 4 °C.
  - Aqueous samples requiring inorganics analysis will be preserved by adding nitric acid (HNO_3).

3.2.2 Sample Designation

- Sample containers will be sealed at the time of collection and an adhesive label placed over the lid and threads to ensure that the sample container has not been tampered with prior to delivery to the laboratory.
  - A unique, descriptive sample number, date and time of sample collection, sampler's initials, and requested analysis shall be recorded on the label using an indelible ink ball-point pen or permanent marker.

3.2.3 Shipping

- The sample containers will be placed in a cooler suitable for transportation or shipping to the analytical laboratory.

  - Plastic bags filled with ice and sealed shall be placed in the cooler to maintain the samples at 4 °C until delivery to the laboratory.
  - Care shall be exercised to prevent direct contact between the samples and ice.
- Chain-of-Custody forms shall be used to document and track sample possession. The samples in each cooler and the required analysis will be recorded on a Chain-of-Custody.
  - Care will be taken to ensure the required analysis is consistent with the sample labels.
  - The sampler will retain one copy of the Chain-of-Custody and the original will be sealed in a plastic bag and placed in the cooler with the samples.
  - When transferring possession of the samples, the Chain-of-Custody will be signed and dated by the sample custodian.
  - The cooler will be sealed with tape and custody seals placed across the cooler opening and initialed.
  - The surface water and sediment samples will be shipped via Federal Express to SVL Analytical (SVL) Laboratory in Kellogg, Idaho. The benthic macroinvertebrate samples will be shipped via Federal Express to Aquatic Biology Associates, Inc. in Corvallis, Oregon. The Federal Express airbills will be retained as part of the permanent Chain-of-Custody documentation.

3.3 Laboratory Analysis

- Tables 1 and 2 summarize the samples to be collected during the post-removal monitoring and the corresponding laboratory analyses. Table 3 summarizes the analytical methods, required sample volumes, preservatives, and holding times.
  - The metals to be analyzed are based on the results of samples collected during the SI (MSE 2005).
  - The labs will be instructed to hold and maintain all remaining sample volumes for additional analysis, if determined necessary.
- The macroinvertebrate samples will be sorted and subsampled using a Caton type sample splitter.
  - Large debris and inorganic sediment will be inspected for attached invertebrates and removed from the sample and placed back into the original container.
  - A 300-count subsample will be utilized for this project.
  - Macroinvertebrates will be identified to the lowest practical level, usually genus or species.
  - Macroinvertebrates will be identified using published taxonomic keys.

3.4 Decontamination Procedures

- Disposable single-use sampling equipment will be used for sample collection.
  - The need for equipment decontamination is not anticipated.
  - Disposable sampling equipment and any personal protective equipment will be removed from the Site and properly disposed of.

3.5 Investigation-derived Waste

- All decontamination fluids will be allowed to drain onto the ground surface at the Site and infiltrate.
  - Disturbances to the Sites and environment during the monitoring event will be minimized.
  - Upon completion of the monitoring event, any trash or investigation derived waste generated during sampling will be removed and properly disposed of.

4.0 QUALITY ASSURANCE PROJECT PLAN

- This section describes the data quality objectives, field QA/QC procedures, and the analytical laboratory QA/QC methods and procedures.

4.1 Data Quality Objectives

- Data quality objectives (DQO) are qualitative and quantitative statements that describe the study objectives, data to be collected and study boundary, decision rules, tolerable limits on decision errors, and sampling design. DQOs were developed using EPA's seven-step process (EPA 2000), and are presented in Table 4.

4.2 Field QA/QC

- Field QA/QC will consist of:
  - Following standard sampling procedures,
  - Maintaining proper sample handling and documentation,
  - Calibrating and maintaining field instruments, and
  - Collecting field QA/QC samples.
- All sampling methods and procedures will follow standard MSE protocols, unless otherwise noted, and all field equipment will be operated, maintained, calibrated, and standardized in accordance with the manufacturer's recommended procedures.
- Field QA/QC samples will be collected to evaluate the precision, accuracy, and representativeness of the field sampling effort. Field QA/QC samples will consist of one matrix spike/matrix spike duplicate pair (MS/MSD), one equipment blank and one field blank.
- The MS/MSD duplicate pair samples combine the QA/QC objectives of a normal field duplicate and a laboratory MS/MSD sample.
  - The MS/MSD duplicates are collected at the same time and in the same manner as the other samples. However, unlike typical field duplicates, the samples are clearly labeled as MS/MSD samples.
  - The laboratory prepares the MS/MSD samples by adding a known concentration of a specific analyte. The corresponding analytical results measure: (1) the accuracy of the analytical method for the known analyte, and (2) the precision or reproducibility of the overall sampling and analytical procedures for the remaining analytes.
- The samples will be submitted for the analyses listed in Tables 1 and 2.
- The field QA/QC samples will be collected, handled, transported, and analyzed in the same manner as the monitoring samples.

4.3 Laboratory QA/QC

- The analytical laboratory selected for analysis of the monitoring samples is certified by the State of Washington Department of Ecology to perform the required analyses.
- The laboratory will follow EPA Level II protocol for analysis and reporting, including laboratory blanks, laboratory duplicates, and MS/MSDs.
- All samples will be analyzed within the required holding time for each analytical procedure.
- Detected concentrations between the method detection limit (MDL) and practical quantification limit (PQL) will be noted in the analytical summaries.
- All analytical results will be reviewed to ensure that the laboratory QA/QC sample results are within the acceptable limits.

5.0 ANNUAL MONITORING REPORT

- MSE will prepare and submit Annual Post-Removal Monitoring Reports that summarize field observations and analytical results of the samples collected. The reports will include the following:
  - Analytical results of site characterization and pre-removal samples collected from the four monitoring locations: AD1 (Adit discharge), ET3 (Immediately below the lower tailings), ET2 (Ephemeral [background] stream downgradient from the Site), and ET4 (The end of the ephemeral stream prior to discharge to Mill Creek) for comparison with data collected during the SI and pre-removal data gap investigation;
  - Descriptive text and photographs that document the changing Site conditions over time;
  - An interpretation of the analytical results and discussion regarding any observed trends; and
  - Completed field forms, photographs, laboratory analytical results, tables, graphs, and any other supporting documentation.

6.0 REFERENCES

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. *Rapid Bioassessment Protocols for Use in Creeks 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.

Millennium Science & Engineering, Inc. (MSE) 2005. Site Inspection Report. Longshot Mine and Mill, Colvillle National Forest, Stevens County, Washington. Novembe 18, 2005.

Millennium Science and Engineering, Inc. 2008. Engineering Evaluation/Cost Analysis. Rainy Mine and Mill Site, Mt. Baker-Snoqualmie National Forest, Snohomish County, Washington. June.

Plotinkoff, R.W., and Wiseman, C. 2001. *Benthic Macroinvertebrate Biological Monitoring Protocols for Rivers and Streams.* Washington Department of Ecology Publication No. 01-03-0286. August.

U.S. Environmental Protection Agency (EPA). 2000. *Data Quality Objectives Process for Hazardous Waste Site Investigations*. Final. EPA QA/G-4HW. January.

FIGURES

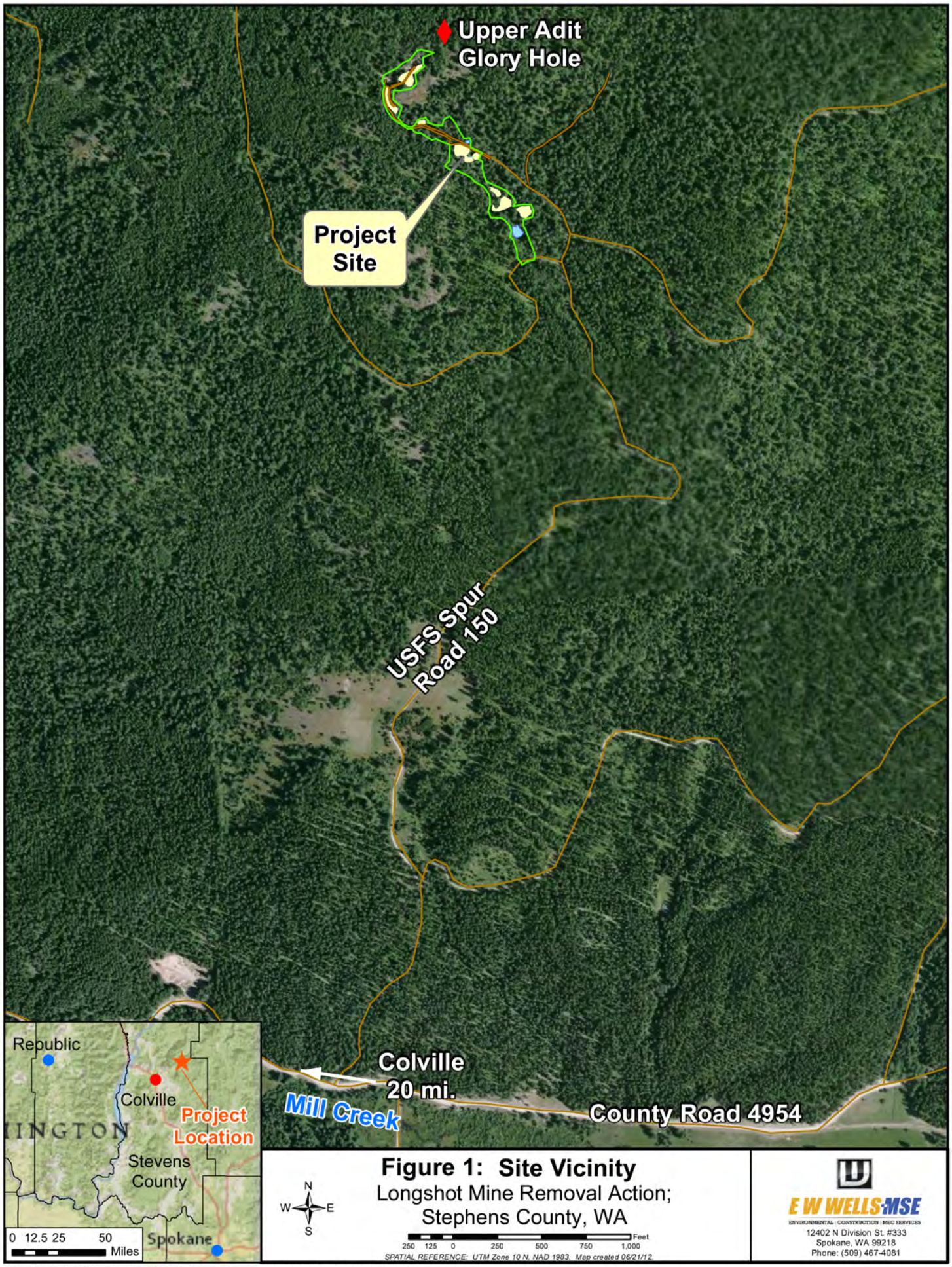


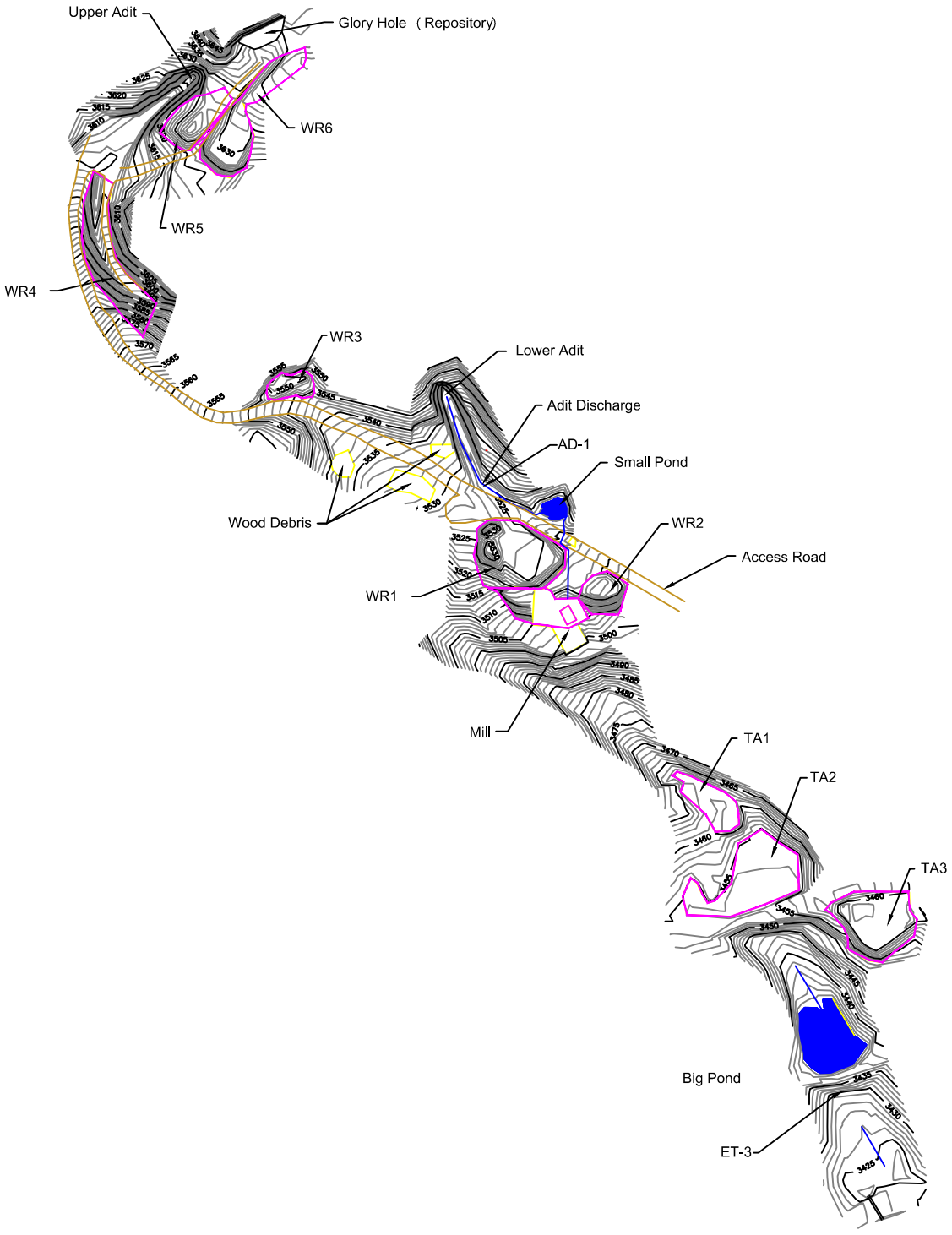
Figure 1: Site Vicinity

Longshot Mine Removal Action;
Stephens County, WA

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

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Spokane, WA 99218
Phone: (509) 467-4081

O:\Boise\Project Files\US Forest Service\USFS Region 6\Longshot Mine Removal Action-3149\GIS_Maps\Fig1_Overview Area.mxd



LEGEND

- 5280 Major Contour
- Intermediate Contour
- Road
- Water
- Mine Waste Areas

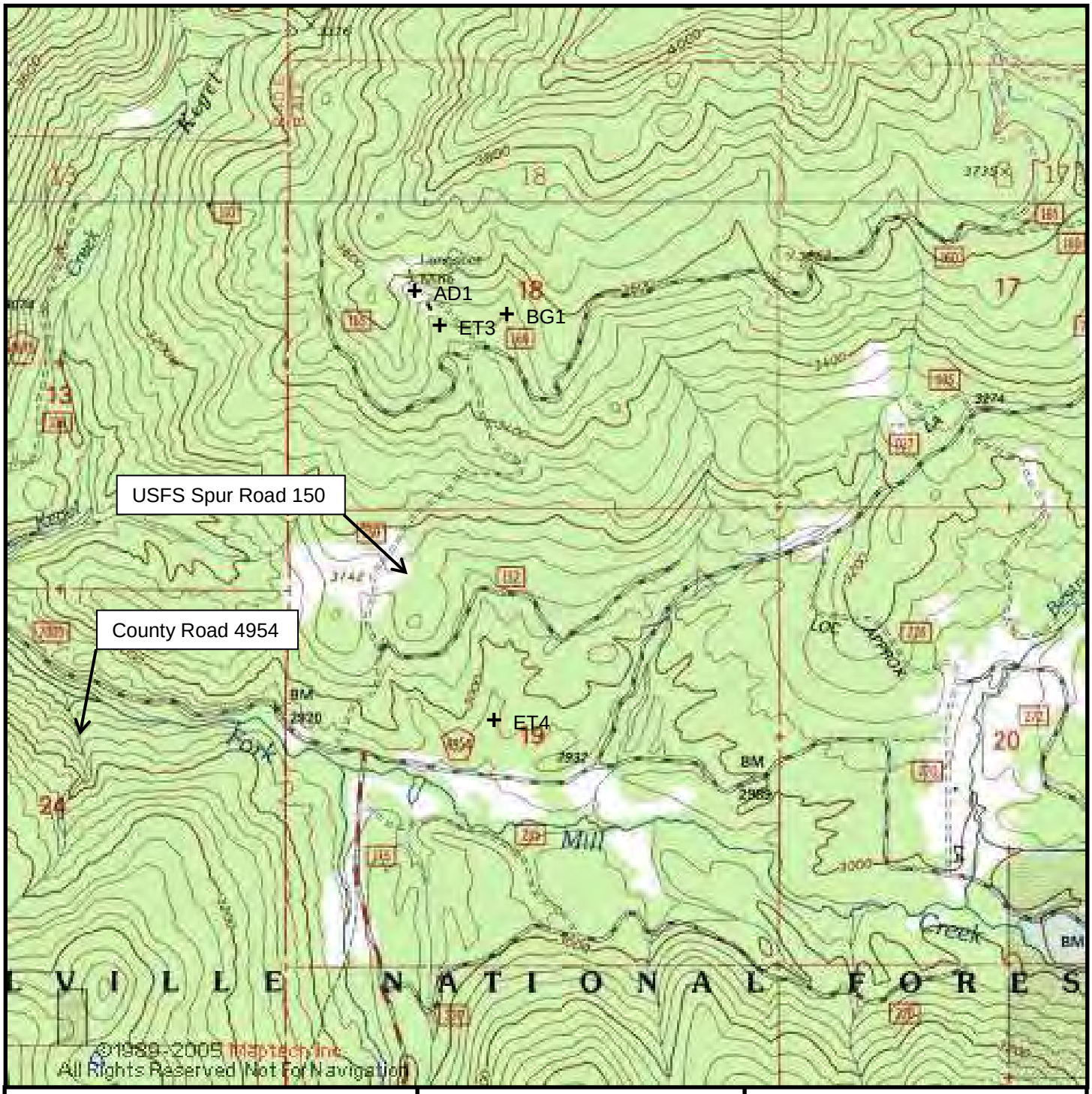
Figure 2: Site Features, Workings, and Sample Locations

Longshot Mine Removal Action;
Stephens County, WA

100 0 100

SCALE: 1 unit = 100 feet

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LEGEND

+ Sample Location & No.

Approximate Scale:

0 Ft. — 3000 Ft.

Figure 3: Surface Water Sample Locations

Longshot Mine Removal Action;
Stephens County, WA

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TABLES

Table 1. Disposal and Cleanup Verification Samples and Analyses

Location	Medium	Number of Samples	Analyses
(1) Bulk Debris from Mill Demolition	Wood	1	Total Metals: As, Ba, Cd, Cr, Pb, Hg, Se, Ag TCLP Metals: As, Ba, Cd, Cr, Pb, Hg, Se, Ag
(2) Ore bin at Mill Site	Soil	1	Total Metals: Ag, As, Ba, Cd, Pb, Zn
(3) Beneath wood and metal debris around the mill foundation	Soil	1	Total Metals: Ag, As, Ba, Cd, Pb, Zn
(4) Waste Rock Pile WR-1	Soil	1	Total Metals: Ag, As, Ba, Cd, Pb, Zn
(5) Waste Rock Pile WR-2	Soil	1	Total Metals: Ag, As, Ba, Cd, Pb, Zn
(6) Waste Rock Pile WR-3	Soil	1	Total Metals: Ag, As, Ba, Cd, Pb, Zn
(7) Site	Soil QA/QC	1 Blank, 1 MS/MSD	Total Metals: Ag, As, Ba, Cd, Pb, Zn

Table 2. Pre- and Post-Removal Monitoring Samples and Analyses

Location	Medium	Number of Samples	Analyses
(1) Adit Discharge (AD-1)	Surface Water Sediment	1 each medium	Total & Dissolved Metals: Ag, As, Ba, Cd, Pb, Zn Water only add: Sulfate, TDS, TSS, Hardness Field Parameters: pH, Temp, DO, EC, ORP/Eh
(2) Ephemeral Stream East of site (ET-2)	Surface Water Sediment	1 each medium	Total & Dissolved Metals: Ag, As, Ba, Cd, Pb, Zn Water only add: Sulfate, TDS, TSS, Hardness Field Parameters: pH, Temp, DO, EC, ORP/Eh
(3) Ephemeral Stream Below Lower Tailings (ET-3)	Surface Water Sediment	1 each medium	Total & Dissolved Metals: Ag, As, Ba, Cd, Pb, Zn Water only add: Sulfate, TDS, TSS, Hardness Field Parameters: pH, Temp, DO, EC, ORP/Eh
(4) Ephemeral Stream Before Discharge to Mill Creek (ET-4)	Surface Water Sediment	1 each medium	Total & Dissolved Metals: Ag, As, Ba, Cd, Pb, Zn Water only add: Sulfate, TDS, TSS, Hardness Field Parameters: pH, Temp, DO, EC, ORP/Eh
(5) Ephemeral Stream Before Discharge to Mill Creek (ET-4)	Surface Water Benthic Organisms	1	Taxonomy, generally to genus/species
(6) Site	Water QA/QC	1 Blank, 1 MS/MSD	Total & Dissolved Metals: Ag, As, Ba, Cd, Pb, Zn Sulfate TDS, TSS, Hardness,

Notes:
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 3. Sample Volume, Preservative, and Holding Time Summary

Medium	Laboratory Analysis	EPA Method	Container/Volume	Preservative[(a)]	Holding Time
Bulk Wood	Total Metals: As, Ba, Cd, Cr, Pb, Hg, Se, Ag	6010, 6020, 7471	1-gallon, zip-sealed plastic bag (double bag samples)	none	6 months
	TCLP Metals: As, Ba, Cd, Cr, Pb, Hg, Se, Ag	6010, 6020, 7471 Extraction by 1311	1-gallon, zip-sealed plastic bag (double bag samples)		
Soil	Total Metals: As, Ba, Cd, Cr, Pb, Hg, Se, Ag	6010, 6020, 7471	4-oz soil jar	none	6 months
Sediment	Metals: Ag, As, Ba, Cd, Pb, Zn	6010, 6020	One 4-oz soil jar	None	6 months
Waters	Dissolved Metals: Ag, As, Ba, Cd, Pb, Zn	200.7, 200.8	One 500-mL plastic bottle	HNO_3 to pH<2	6 months
	Total Recoverable Metals: Ag, As, Ba, Cd, Pb, Zn	200.7, 200.8	One 500-mL plastic bottle	HNO_3 to pH<2	6 months
	TDS TSS Hardness as $CaCO_3$ Sulfate	160.1 160.2 130.2/2340C 300.0	One 500-mL plastic bottle	None	7 days 7 days 28 days 28 days
	Benthic Macroinvertebrates Taxonomy to Genus or Species	Barbour, et. al, 1999	Unbreakable, 4-oz, (125 ml) wide mouth, water-tight container	Ethanol	indefinite

Notes:
[a] All samples will be cooled to 4°C.
mL = Milliliter
oz = ounce
HNO_3 = Nitric acid
TDS = Total dissolved solids
TSS = Total suspended solids

Table 4. Data Quality Objectives

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7
State the Problem	**Identify the Decision**	**Identify Inputs to the Decision**	**Define Study Boundaries**	**Develop Decision Rule**	**Specify Tolerable Limits on Decision Errors**	**Optimize Sampling Design**
• The effectiveness of the Removal Action is unknown.	1. Do metals concentrations exceed pre-removal levels? 2. Do metals concentrations exceed state and federal regulatory criteria? 3. Has the aquatic habitat improved post-removal? 4. Did the Removal Action achieve the desired objectives?	• Analytical results of surface water, pore water, sediment, and benthic samples • Results of aquatic habitat survey • State and federal regulatory criteria for surface water and sediment quality	• East and west seeps, and aquatic habitat on Quartz immediately downstream of the Site	• If metals concentrations exceed pre-removal levels and regulatory criteria, evaluate the need for further Removal Action at the Site. Otherwise, continue monitoring.	• Decision errors will be minimized through consistency in sampling locations and methodology. • Field and laboratory QA/QC samples will be used to ensure that data are of known precision and accuracy.	• Sampling locations will be selected based on locations used in the SI. • The analytical suite will be based on analytes that exceeded risk-screening criteria in pre-removal samples collected during the SI.

Notes:
QA/QC = Quality assurance/Quality Control
SI = Site Inspection

ATTACHMENT A

FIELD FORMS

MSE Daily Field Summary

Project:	Longshot Mine and Mill
Project Number:	3149
Location:	Colville National Forest, Washington
Field Personnel:	
USFS Personnel:	
Date:	

FIELD CONDITIONS

Weather:	Temp:
Precipitation:	Wind:

VISITORS TO THE SITE

Name	Company:	Purpose of Visit:

FIELD WORK SUMMARY

MSE Water Sample Collection Record

SAMPLE ID:

Sample Location: Photo:

Description:

Date:

Field Personnel:

Conditions: Weather:

FIELD PARAMETER MEASUREMENT

Field Meter:	Field Parameters:	Observation 1	Observation 2	Observation 3
	Temperature (Celcius)			
	pH (pH units)			
	SpCond (microS/cm)			
	Dissolved O_2 (mg/L)			
	Turbidity			
	ORP (mV)			

Method:

Measurement START Time: Measurement END Time:

FLOW MEASUREMENT

Method: Velocity Meter: Flume: Timed Volumetric:

Description:

Flow:

SAMPLE COLLECTION

Sample Method: Bottle Pump Other:

Sample Collection Time:

	Size			Filtration		Analysis							Preservative			
# Sample Containers	500-mL plastic bottle	250-mL plastic bottle	1000-mL glass bottle	Filtered	Unfiltered	Dissolved metals	Total As, Cr, Hg, Se	Total & WAD CN	Sulfate	As & Cr Speciation	Methyl Mercury	pH & Hardness	HCl	HNO_3	NaOH	NONE

STREAM CROSS-SECTION/COMMENTS

MSE Soil Sample Collection Record

SAMPLE ID:

Sample Location: Photo:

Description:

Date:

Field Personnel:

Conditions: Weather:

METHOD

Grab: Depth:

Composite:

Location/Boring ID	Depth	Comments

SAMPLE COLLECTION

Equipment: Trowel Hand Auger Other:

Sample Collection Time:

# Sample Containers	Size				Analysis								Other
	1-gal Plastic Ziploc Bag	8-oz glass jar	4-oz glass jar	Brass Sleeve	Total Lead	Total Arsenic	TCLP - Lead	TRPH	TPH	MBTEXN	VOCs		

DESCRIPTION/COMMENTS

MSE Sediment Sample Collection Record

SAMPLE ID:

Sample Location: Photo:

Description:

Date:

Field Personnel:

Conditions: Weather:

METHOD

Grab: Depth:

Composite:

Habitat	Depth	Comments

SAMPLE COLLECTION

Equipment: Trowel Push Sampler Other:

Sample Collection Time:

# Sample Containers	Size				Analysis								Other
	500-mL Bottle	12-oz glass jar	8-oz glass jar	Brass Sleeve	Metals	As Speciation	Methyl Mercury	Total & WAD CN	TOC				

DESCRIPTION/COMMENTS

MSE Sample Collection Record

SAMPLE ID:

Sample Location: Photo:

Description:

Date:

Field Personnel:

Conditions: Weather:

METHOD

Grab: Depth:

Composite:

Container	Depth	Comments

SAMPLE COLLECTION

Equipment: Trowel Siphon Other:

Sample Collection Time:

# Sample Containers	Size				Analysis								Other
	1000-mL glass bottle	8-oz glass jar	4-oz glass jar	40-ml VOA vial	8 RCRA metals	TPH	VOCs	SVOCs	TRPH	Oil and Grease	TCLP		

DESCRIPTION/COMMENTS

MSE Sample Collection Inventory

Sample ID	Medium								Location	Sample Type				Analysis											Date	By
	Mine Waste	Background Soil	Surface Water	Pore Water	Sediment	Benthics	Drums/Other	Quality Control		Grab	Composite	Filtered	Unfiltered	Metals	ABA	Paste pH	TAL Metals+CN, Hard	Total Se, Cr, Hg	Sulfate							

MSE XRF Screening Record

Project/Site:

Date:

XRF Instrument:

Settings:

Operator:

XRF SCREENING RESULTS

Location	ID	Result	GPS Coordinates	Comments

DESCRIPTION/COMMENTS