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May 4, 2012

Earl Liverman, On-Scene Coordinator
United States Environmental Protection Agency
1910 Northwest Blvd, Suite 208
Coeur D'Alene, Idaho 83814

Re: Contract Number EP-S7-06-02, Technical Direction Document Number 11-05-0007
Removal Action Report, Grandview Mine and Mill Site, Pend Oreille County, Washington

Dear Mr. Liverman:

Enclosed please find the Removal Action Report for the Grandview Mine and Mill Site in Pend Oreille County, Washington. If you have any questions regarding this submittal, please call me at (206) 920-1739.

Sincerely,

ECOLOGY AND ENVIRONMENT, INC.

Steven G. Hall
START-3 Project Leader

cc: Vanessa Rayner, E & E, START-3 Project Engineer, Seattle, Washington

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REMOVAL ACTION REPORT

Grandview Mine and Mill Site
Pend Oreille County, Washington
TDD: 11-05-0007

Prepared for:

U.S. Environmental Protection Agency, Region 10
1910 Northwest Boulevard, Suite 208
Coeur d'Alene, Idaho 83814

Prepared by:

Ecology and Environment, Inc.
720 Third Avenue, Suite 1700
Seattle, Washington 98104

May 2012

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List of Abbreviations and Acronyms

Abbreviation	Definition
$\mu g/m^3$	micrograms per cubic meter
%	Percent
% R	percent recovery
ACM	asbestos-containing material
BA	Biological Assessment
AHS	Archaeological and Historical Services
BMP	best management practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
CY	cubic yard
DQOs	data quality objectives
Ecology	Washington State Department of Ecology
E & E	Ecology and Environment, Inc.
EPA	United States Environmental Protection Agency
Entact	Entact, LLC
EQM	Environmental Quality Management, Inc.
ERRS	Emergency and Rapid Response Services
EWU	Eastern Washington University
FPXRF	field portable x-ray fluorescence
ICS	interference check sample
LLDPE	Linear Low Density Polyethylene
mg/L	milligrams per liter
MS	matrix spike
MTCA	Model Toxics Control Act
MW	monitoring well
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
OSC	On-Scene Coordinator

List of Abbreviations and Acronyms (cont.)

Abbreviation	Definition
OSHA	Occupational Safety and Health Administration
PDR	Personal DataRam
PEL	permissible exposure limit
PPE	personal protective equipment
POLREP	Pollution Report
PVC	Polyvinyl chloride
QA	quality assurance
QC	quality control
RA	removal action
RCW	Revised Code of Washington
REL	recommended exposure limit
RPD	relative percent difference
SARA	Superfund Amendments and Reauthorization Act
Site	Grandview Mine and Mill Site
SOP	standard operating procedure
SSSP	Site-Specific Sampling Plan
START	Superfund Technical Assessment and Response Team
SVOCs	semivolatile organic compounds
TCLP	toxicity characteristic leaching procedure
TDD	Technical Direction Document
TechLaw	TechLaw, Inc.
TWA	time-weighted average
UECA	Uniform Environmental Covenants Act
URS	URS Corporation
USFWS	United States Fish and Wildlife Service
WAC	Washington Administrative Code
Washington Resources	Washington Resources, LLC

Executive Summary

In 2011, the United States Environmental Protection Agency (EPA) performed a removal action (RA) at the Grandview Mine and Mill Site (Site). The Site consisted of a former lead and zinc mine and mill located approximately 0.75 miles east of the Pend Oreille River and approximately 2 miles northeast of Metaline Falls in Pend Oreille County, Washington. The RA was performed to mitigate the release of hazardous substances, including arsenic, lead, cadmium, mercury, and zinc, from mine-waste-contaminated materials accumulations across the Site. Approximately 67,500 cubic yards (CY) of mine-waste-contaminated materials (waste rock and tailings) were addressed by the RA.

Previous investigations conducted at the Site and an Engineering Evaluation / Cost Analysis (EE/CA) prepared by the Responsible Parties (Blue Tee Corp., Seattle City Light, Teck American Incorporated, and Washington Resources, LLC) in December 2009 (Formation 2009) provided sufficient data to indicate a risk to human health and ecological receptors from exposure to mine-waste-contaminated materials. Concentrations of arsenic, lead, cadmium, mercury, and zinc in waste rock and tailings exceeded applicable cleanup levels, including Washington State Model Toxics Control Act (MTCA) Method A Soil Cleanup Levels for Unrestricted Land Use (Washington Administrative Code [WAC] 173-340-740).

In July 2011, E & E prepared a Work Plan and Conceptual Design (E & E 2011b) for EPA that provided a preliminary approach and conceptual design for guidance during implementation of the RA. The RA conceptual design was based on the selected removal action as described in the Action Memorandum for the Grandview Mine and Mill (Liverman 2011), involving the removal of mine-waste-contaminated materials (waste rock and tailings) for consolidation in an on-Site repository beneath an impermeable cover.

From August 15 through October 4, 2011, EPA performed the RA at the Site to mitigate the threat to human health and ecological receptors from exposure to mine-waste-contaminated materials and to reduce the potential for mine waste contaminated material to impact surface water and groundwater.

Structures were demolished only to the extent necessary to implement the RA, which included structures within the repository footprint, the core sample shed and explosive powder storage house at the Upper Level Mine Area, and the wash building at the southern end of the Lower Level Mill Area. Prior to demolition, an asbestos-containing material (ACM) survey of Site structures was conducted. ACM was discovered in the compressor building at the Upper Level Mine Area, thus this building was not demolished.

Approximately 67,500 CY of mine-waste-contaminated materials were excavated from several Site areas (including the Tailings Accumulation Area, Lower Level Mill Area, Upper Level Mine Area, access roads, upper Drainage Ditch, Historic Homesite Area, Distressed/Unvegetated Area, and Former Drum Storage Area) and consolidated in a repository constructed at the north end of the Lower Level Mill Area against an existing bluff. The repository was approximately 40 feet high and the footprint covered approximately 1.8 acres. The repository included an impermeable cover consisting of a textured 40-mil Linear Low Density Polyethylene (LLDPE)

liner, overlain by a geocomposite drainage layer, overlain by at least a 30-inch minimum layer of cover material from the on-Site borrow area. Erosion control slash material was placed over the repository and the cover was seeded. A French drain and v-ditch were installed around the periphery of the repository to control stormwater run-on and run-off and groundwater.

Removal areas were graded and/or backfilled with clean material obtained from the on-Site borrow area, and all areas disturbed during the removal activities were restored by placing erosion control slash material and seeding.

Mine-waste-contaminated materials were left in place at several locations due to several reasons, including the potential disproportionate adverse impact associated with cleanup activities, and the extensive quantity of waste rock present and the resulting impact on the project schedule, budget, and repository size constraints. Waste materials remain beneath a protective barrier in the northeast corner of the Lower Level Mill Area where it connects with the Upper Level Mine Area, the southeastern portion of the Lower Level Mill Area, the cul-de-sac at the end of Grandview Flat Road in front of the log cabin, the northwest portion of the Upper Level Mine Area, and the middle and southern areas of the Historic Homesite Area. Additionally, tailings were left in place in the lower portion of the Drainage Ditch, and along the length of the Downgradient Ditch and Man-Made Ditch.

Throughout the RA, a field portable x-ray fluorescence (FPXRF) unit was used to monitor for the Site contaminants of concern and to provide data to support removal decisions. Confirmation samples were also collected and analyzed by FPXRF and at an off-Site laboratory to characterize the materials left in place. During removal activities, dust control techniques and other best management practices (BMPs) were employed, and dust monitoring and air sampling of Site workers and the perimeter of work zones confirmed that the dust suppression and BMPs were effective.

1 Introduction

The United States Environmental Protection Agency (EPA) performed the Grandview Mine and Mill Site (Site) Removal Action (RA) in 2011, under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA). The RA was performed by Environmental Quality Management, Inc. (EQM) under an Emergency and Rapid Response Services (ERRS) contract with EPA. EPA tasked Ecology and Environment, Inc. (E & E), under Superfund Technical Assessment and Response Team (START-3) contract number EP-S7-06-02, Technical Direction Document (TDD) number 11-05-0007, to provide engineering, sampling, and documentation support for the RA.

This report documents the 2011 Grandview Mine and Mill Site RA and is organized into the following sections: Introduction (Section 1); Site Description and Background (Section 2); Removal Action Description (Section 3); Project Organization, Cost, and Timeline (Section 4); Removal Activities (Section 5); Post-Removal Site Controls (Section 6); Monitoring and Sampling Activities (Section 7); Quality Assurance / Quality Control (QA/QC) (Section 8); Community Relations (Section 9); Health and Safety (Section 10); Difficulties Encountered / Recommendations (Section 11); Summary and Conclusions (Section 12); and References (Section 13).

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2 Site Description and Background

2.1 Site Location and Layout

Site Name	Grandview Mine and Mill Site
Owners / Responsible Parties	Washington Resources, LLC, Teck American Incorporated, Seattle City Light, and Blue Tee Corp.
SSID #	10CY
CERCLIS #	WASFN 1002165
Location	Approximately 2 miles northeast of Metaline Falls, Washington
Latitude	48º52’22.04" North
Longitude	117º21’26.16" West

The Site is located in the Colville National Forest in the Metaline Mining District, Pend Oreille County, Washington (Figure 2-1). The Site is located within the lower Pend Oreille River Valley, approximately 0.75 miles east of the Pend Oreille River and 2 miles northeast of Metaline Falls. The Site is approximately 17.1 acres and is located in Sections 14, 15, 22, and 30, Township 39 North, Range 43 East. Main access to the Site is by Grandview Flat Road from State Highway 31 (also known as Lehigh Avenue).

Before the RA, the Site consisted of three main levels: a former mine operations area (Upper Level Mine Area), a former mill operations area (Lower Level Mill Area), and a tailings deposit (Tailings Accumulation Area). These areas are depicted in Figure 2-2.

2.2 Surrounding Land Uses

The Site is located in the Metaline Mining District within the Colville National Forest. Mining, forestry, recreation, livestock grazing, and localized agriculture are the main land uses in the area. Teck American Incorporated’s Pend Oreille Mine is located less than a mile north of the Site; Pend Oreille Mine operations include an underground zinc mine, a mill, and a lined tailings impoundment (Formation 2009). Pend Oreille Village, an unincorporated community of approximately 30 residents, is located immediately adjacent to the south of the western portion (i.e., Tailings Accumulation Area) of the Site. The Circle Motel is located at the intersection of State Highway 31 and Grandview Flat Road and is approximately 0.25 miles east of the Site. A caretaker for the former Grandview Mine facility lives in a log cabin at the Site.

2.3 Site History, Operations, and Ownership

Mine operations began in the Metaline Mining District in the early 1900s, and large-scale production and construction of the mill began at the Grandview Mine and Mill Site by 1928. Ore from the Grandview Mine as well as other area mines was processed at the Grandview Mill. Mine operations continued periodically until 1964. Most of the mining and milling equipment was removed from the Site at that time; however, several buildings and some miscellaneous equipment remain (E & E 2001). A caretaker for the former Grandview Mine facility has lived in a log cabin at the Site for over 20 years.

Lead and zinc ore was mined from underground workings originating at an adit in the Upper Level Mine Area. Resulting waste rock was stockpiled at the Upper Level Mine Area, while ore was transported to the Lower Level Mill Area for processing. The Upper Level Mine Area and the Lower Level Mill Area are separated by a short forested slope. The ore was crushed and milled, and lead and zinc concentrates were recovered by flotation and subsequently transported off-Site for further processing. Tailings resulting from the flotation plant were discharged from the Lower Level Mill Area toward the Tailings Accumulation Area and eventually over the bluff into the Pend Oreille River through a 900-foot long ditch via a wooden flume structure. This ditch is now referred to as the "Drainage Ditch" (Figure 2-2). Tailings became deposited in a large surface depression at the Tailings Accumulation Area, approximately 0.5 miles downgradient of the Lower Level Mill Area, and approximately 500 feet upgradient from the edge of the bluff along the Pend Oreille River. Tailings were also discharged over the bluff into the Pend Oreille River from the "Downgradient Ditch," located downgradient of the Tailings Accumulation Area, and the "Man-Made Ditch", which appeared to be a man-made alternative drainage route diverting tailings directly from the "Drainage Ditch" over the edge of the bluff (Formation 2009). These features are depicted in Figure 2-2.

Before the RA, several buildings and some miscellaneous equipment remained at the Site. A Cultural Resources Survey of the Site was conducted by Archaeological and Historical Services / Eastern Washington University (AHS/EWU) in September 2009 to comply with Section 106 of the National Historic Preservation Act to locate and characterize cultural resources within the project area and to offer recommendations regarding resource eligibility for listing in the National Register of Historic Places. Several structures, or cultural resources, were identified at the Site. The survey concluded that only one structure at the Site is eligible for listing on the National Register of Historic Places: the log cabin currently occupied by the Site caretaker (see location depicted in Figure 2-2; AHS/EWU 2009).

Structures remaining at the Upper Level Mine Area before the RA included concrete piers and cart track remnants; a core sample shed; a compressor house containing a compressor, boiler, and electrical dynamo; a spring box; a fallen electrical tower; a concrete platform of unknown function; two ore cart engines; two concrete building foundations of unknown function; and an empty explosive powder storage house. Structures remaining at the Lower Level Mill Area before the RA included an ore cart; a sluice valve spigot house and control (water was presumably discharged from the spigot to force tailings down the "Drainage Ditch"); an assay shed / wash house; a mill foundation including large equipment mounting blocks; a concrete building foundation of unknown function; a concrete crushed rock storage silo (approximately 20 feet in diameter and 90 feet high); a toppled concrete pier; a rock crusher; and a coal storage bin (large metal barrel). Structures in use by the caretaker include the log cabin; a generator house currently used as a shop; a shed currently used for storage; a garage/shed currently used for storage; and an electrical enclosure fence are present adjacent to the Lower Level Mill Area to the east (see Figure 2-2 for location of structures in use by the caretaker). Detailed descriptions of these structures are included in the Cultural Resources Survey report (AHS/EWU 2009).

An area referred to herein as the "Historic Homesite Area" is located south of the log cabin on the east side of Grandview Flat Road (see Figure 2-2). This area includes an overgrown access road, several concrete foundations, and household appliances.

The Site currently has three owners. The Upper Level Mine Area and Lower Level Mill Area are located on Washington Resources, LLC (Washington Resources) property, the Tailings Accumulation Area is located on Teck American Incorporated property, and the area between the Tailings Accumulation Area and the Pend Oreille River is owned by Seattle City Light (Formation 2009). In addition to the three current property owners, Blue Tee Corp. is also one of the Responsible Parties for the Site.

2.4 Previous Site Investigations and Cleanup Actions

Several investigations have been conducted at the Grandview Mine and Mill Site since 2000, which are summarized in the EE/CA (Formation 2009) and described in detail in the following documents:

- *Preliminary Assessment / Site Inspection, Grandview Mine, Metaline Falls, Washington*, E & E, June 2001 (E & E 2001).
- *Final Draft Site Characterization Report, Grandview Tailings, Pend Oreille Village, Washington*, URS Corporation (URS), January 2007 (URS 2007).
- *Removal Assessment Report, Revision 2*, Techlaw, Inc. (Techlaw), March 2008 (Techlaw 2008).
- *Final Draft Supplemental Investigation Report, Grandview Mine / Mill Site Reconnaissance, Metaline Falls, Washington*, Entact, LLC (Entact), December 2008 (Entact 2008).
- *Draft Final Grandview Mine and Mill Site Engineering Evaluation / Cost Analysis*, Formation Environmental, LLC (Formation), December 2009 (Formation 2009).

These investigations provided sufficient data to indicate a risk to human health and ecological receptors from exposure to mine-waste-contaminated materials. Arsenic, lead, cadmium, mercury, and zinc were identified as the contaminants of concern (COCs) for the Site (Liverman 2011). Concentrations of these metals exceeded applicable cleanup levels in waste rock and tailings, including Washington State Model Toxics Control Act (MTCA) Method A Soil Cleanup Levels for Unrestricted Land Use (Washington Administrative Code [WAC] 173-340-740). Maximum concentrations of COCs in waste rock and tailings at the Site and applicable cleanup levels are summarized in Table 2-1.

Mine-waste-contaminated materials included waste rock, tailings, and soil that had evidently been impacted by semivolatile organic compounds (SVOCs) at the Former Drum Storage Area (see Figure 2-2). Based on these previous investigations, the total estimated volume of contaminated materials over the entire Site was approximately 41,800 cubic yards (CY), which included an estimated 41,300 CY of waste rock and tailings and an estimated 500 CY of soil from the Former Drum Storage Area. Waste rock had been placed as surfacing material along the Grandview Flat Road, along the access road to the Upper Level Mine Area, at the Upper Level Mine Area, at the Lower Level Mill Area, and at the Historic Homesite Area. Waste rock was also present in piles at the Lower Level Mill Area. The total waste quantity estimate for the entire Site also included an estimated 19,700 CY of tailings present at the Tailings Accumulation Area over an approximate 2-acre area (Formation 2009). Tailings were also identified in the Drainage Ditch, Downgradient Ditch, Man-Made Ditch, and in a Distressed/Unvegetated area

located west of Grandview Flat Road (referred to as the "Distressed/Unvegetated Area," see Figure 2-2) (Entact 2008).

In 2007, URS performed the Toxicity Characteristic Leaching Procedure (TCLP) (EPA Method 1311) test on ten samples (five tailings and five soil) for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver to determine if the tailings could be characterized as a Washington State Dangerous Waste as a result of the toxicity characteristic. Concentrations in each of the five tailings samples exceeded the Washington State Dangerous Waste Regulatory Level (WAC 173-303-90) for lead of 5 milligrams per liter (mg/L) (URS 2007).

In June 2000, Washington Resources collected and disposed of approximately 175 drums that were discovered at the Former Drum Storage Area (see Figure 2-2). Fifteen of the drums contained residual material determined to be petroleum hydrocarbon compounds (Liverman 2011). Surface soil sampling performed following drum removal indicated elevated concentrations of several metals and SVOCs (E & E 2001).

A Biological Assessment (BA) was completed by Formation in July 2011 to identify the presence of listed threatened and endangered species within the vicinity of the RA, to address potential impacts of the project on these species, and to describe conservation measures and best management practices (BMPs) designed to avoid or minimize such impacts. The BA determined that there were three threatened or endangered species that may occur at or near the Site: Canada lynx (*Lynx Canadensis*), Grizzly bear (*Ursus arctos horribilis*), and Bull trout (*Salvelinus confluentus*). The BA concluded that the RA would not adversely affect any of the species; rather, it will have an overall beneficial effect on wildlife in general (Formation 2011).

TABLE 2-1
MAXIMUM CONCENTRATIONS OF COCS IN WASTE ROCK AND TAILINGS
GRANDVIEW MINE AND MILL SITE
PEND OREILLE COUNTY, WASHINGTON

	Maximum Concentration (mg/kg)					Source
	Arsenic	Lead	Cadmium	Mercury	Zinc	
MTCA Method A Soil Cleanup Level for Unrestricted Land Use (mg/kg)	20	250	2	2	--	WAC 173-340-740 Table 740-1
MTCA Method B Soil Cleanup Level for Unrestricted Land Use (mg/kg)	--	--	--	--	24,000	WAC 173-340-740, Liverman 2011
Natural Background Soil Metals Concentration (mg/kg)	9.34	14.91	0.72	0.02	66.4	Ecology 1994
MTCA Ecological Indicator Soil Concentration for Protection of Terrestrial Plants and Animals (mg/kg)	7	50	4	0.1	86	WAC 173-340-749 Table 749-3
Waste Rock Piles in Northern Portion of Lower Level Mill Area	44	4,930	23.3	1.5	7,420	E & E 2001
Waste Rock Surfacing Material Grandview Flat Road and Access Road to Upper Level Mine Area	5.71	470	4.5	0.0822	1,350	Entact 2008
Waste Rock Surfacing Material in Lower Level Mill Area	7.73	1,370	17.4	0.274	10,100	Entact 2008
Waste Rock Surfacing Material in Homesite Area	11	12,300	60.7	0.945	19,800	Entact 2008
Tailings Accumulation Area and Downgradient Ditch	43	3,380	93.1	1.65	28,900	URS 2007
Drainage Ditch	7.52	1,190	19.4	0.492	6,520	Entact 2008
Man-Made Ditch	12.5	1,110	15.4	0.548	3,570	Entact 2008
Distressed/Unvegetated Area	98.4	9,150	1,230	78.6	521,000	Entact 2008
Former Drum Storage Area	64.9	14,600	99.5	6	36,200	E & E 2001

Key:

COC = contaminant of concern
Ecology = Washington Department of Ecology
E & E = Ecology and Environment, Inc.
Entact = Entact, LLC.
mg/kg = milligrams per kilogram
MTCA = Model Toxics Control Act
URS = URS Corporation
WAC = Washington Administrative Code

Source: Maptech, Inc. 2001.

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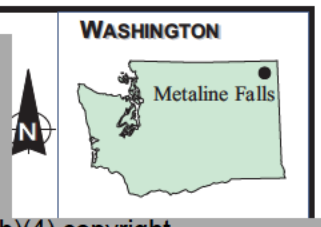

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Seattle, Washington

GRANDVIEW MINE AND MILL SITE
Pend Oreille County, Washington

Figure 2 1

SITE LOCATION MAP

0 1000 2000
Approximate Scale in Feet

Date: 7 08 11

Drawn by: AES

10:START 3\11050007\fig 2 1

R:\3 START 3\Grandview Mine\GIS\MAPS\MXD\Fig2-2.mxd

Aerial Photo Source: 2009 ESRI, i-cubed, GeoEye

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Figure 2-2 Site Layout Pre-Removal Action
Grandview Mine and Mill Site
Pend Oreille County, Washington

Roads
Ditch
Site Features

0 150 300 600 Feet

N

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3 Removal Action Description

From August 15 through October 4, 2011, EPA performed an RA at the Site to address the potential risks to human health and ecological receptors from exposure to mine-waste-contaminated materials (waste rock and tailings).

3.1 Removal Action Objectives

The following objectives were identified for the RA (Liverman 2011):

1. Protect human health and ecological receptors by preventing direct contact, ingestion, and inhalation exposure to mine-waste-contaminated materials exceeding actionable cleanup levels.
2. Reduce the potential for mine-waste-contaminated materials impacts to surface water and groundwater.

3.2 Removal Action Work Plan and Conceptual Design

EPA tasked E & E, under START-3 contract number EP-S7-06-02, TDD number 11-05-0007, to prepare a Work Plan and Conceptual Design, providing a preliminary approach and conceptual design for guidance during implementation of the RA. Based on the selected removal action as described in the Action Memorandum for the Grandview Mine and Mill (Liverman 2011), the RA conceptual design consisted of the removal of mine-waste-contaminated materials (waste rock and tailings) for consolidation in an on-Site repository beneath an impermeable cover to be constructed against the bluff at the north end of the Lower Level Mill Area.

The RA Work Plan and Conceptual Design (E & E 2011b) specified that mine-waste-contaminated materials be excavated from the Site according to the cleanup levels provided in the Action Memorandum (Liverman 2011), or as otherwise directed by EPA, and hauled to the Lower Level Mill Area for consolidation in an on-Site repository beneath an impermeable cover. Cleanup levels are summarized in Table 3-1.

Based on previous investigations, the total estimated volume of waste rock and tailings material was 41,300 CY. The repository was designed for a 50,000 CY capacity, over an approximate 2.2-acre footprint, with a final height of approximately 30 feet at the north end against the bluff. The repository cover was to consist of a textured 40-mil Linear Low Density Polyethylene (LLDPE) liner, overlain by a geocomposite drainage layer, overlain by an 18-inch minimum layer of random fill, overlain by a 12-inch minimum layer of topsoil. Following topsoil placement, the repository cover was to be seeded and mulched.

3.3 Changes to the Removal Action Work Plan and Conceptual Design during Cleanup

Several minor changes were made to the RA approach and design, mainly due to field conditions, and are described in Section 5. The changes are discussed in this subsection.

3.3.1 Design of the Repository

The RA Work Plan and Conceptual Design (E & E 2011b) included a drainage feature in which the liner and geocomposite material would be extended down between the repository and bluff to direct any potential seepage down along the liner into a French drain that was to be constructed at the base of the bluff. However, due to constructability concerns, and because there are no known groundwater issues and no seeps were observed, the impermeable cover was only extended to the bluff, and the v-ditch was constructed to divert stormwater run-on off of the repository. Additionally, the v-ditch was only constructed along the top and sides of the repository because the French drain was considered to be a sufficient water conveyance downgradient from the repository.

3.3.2 Construction of Permitted On-Site Sewage Disposal System

The log cabin had an unpermitted on-Site sewage disposal system that discharged to the upper portion of the Drainage Ditch. The discharge of all wastewater from the cabin, including untreated human waste, into the environment posed unacceptable human health and environmental risks and threatened to re-contaminate the cleaned Drainage Ditch. Thus ERRS arranged for the design and installation of a permitted on-Site sewage disposal system for the cabin. Wesley Smith designed the system, and Newman Landscaping installed the tank and drain field on September 29, 2011.

3.3.3 Mine-Waste-Contaminated Materials Left In Place

Ditches

The Drainage Ditch, the Downgradient Ditch, and the Man-Made Ditch were estimated to contain 6,580 cubic yards (yds^3), 1,000 yds^3, and 1,155 yds^3 of mine-waste-contaminated materials, respectively. Of these amounts, an estimated 5,500 yds^3 of contaminated materials were removed from the Drainage Ditch, an estimated 600 yds^3 of contaminated materials were removed from the Downgradient Ditch, and an estimated 300 yds^3 of contaminated materials were removed from the Man-Made Ditch. The remaining mine-waste-contaminated materials were left in place because of the unacceptable damage or disruption to the ecosystem that would have occurred with accessing and removing the materials and the minimal reduction of risk afforded by additional cleanup.

Since the mining and milling operations at the mine ceased in the mid-1960s, the narrow ditches have been overgrown by a variety of mature hardwood and trees and understory vegetation. Additionally, with few exceptions, the contaminated materials are overlain by a thick layer of decomposing leaves, needles, sticks, and other tree and plant debris covering the ground (i.e., duff). Access to the ditches is difficult because of the presence of fallen timber, vegetation, and/or steep terrain.

Attaining the cleanup levels for mine waste contaminants found in the center reach of the Drainage Ditch, in the lower reach of the Downgradient Ditch, and in the Man-Made Ditch would have required the widespread felling of mature trees, destruction of the understory vegetation, and destruction of the duff covering the forest floor because of access related to the size of equipment needed to excavate and haul contaminated materials. In each instance, the contaminated materials are confined to narrow, shallow accumulations of partially exposed

tailings spread over a distance of several hundred feet. The minimal risks posed by the presence of the residual mine waste contaminants found in the ditches was outweighed by the likely adverse impacts that would have been caused by accessing and removing the contaminated materials. Gaining accessing to the contaminated materials with heavy equipment would have also resulted in the harmful removal of vegetation within and beyond the affected areas. Additionally, the potential duration and frequency for exposure to the contaminated material is limited because of the relatively small areas where contaminated materials are left in place.

Lower Level – Historic Homesite Area

Waste rock in two small sub-areas was discovered late in the RA, after the repository was already shaped and lined. In these sub-areas, a protective barrier consisting of greater than one foot of compacted clean borrow material was placed.

Lower Level - Grandview Flat Road

Waste rock was used as surfacing material along Grandview Flat Road; however, most of the road length contained metal concentrations below the cleanup action levels (see Section 7.3), and the road is well-compacted and intact; therefore, removal and replacement of the entire road was determined by EPA to be impracticable. The cul-de-sac in front of the caretaker's log cabin was of concern, however, due to the potential for exposure there, and metals were detected at concentrations above the cleanup action levels (see Section 7.3). Since utilities were known to be present below the cul-de-sac, the waste rock was not removed down to native soil; rather, six inches of waste rock from the surface was removed, geocomposite material was placed over the bottom of the excavation as a visual marker, and approximately six inches of clean imported ¾-inch minus rock was placed and compacted over the area. The repository was already shaped and lined by the time the cul-de-sac work was addressed; therefore, clean borrow material placed in the northeast corner of the Lower Level Mill Area was pulled back, the waste rock scraped from the cul-de-sac was placed against the waste rock remaining at the northeast corner, and the clean borrow material was pushed back over the waste rock.

TABLE 3-1
MINE-WASTE-CONTAMINATED MATERIAL CLEANUP LEVELS
GRANDVIEW MINE AND MILL SITE
PEND OREILLE COUNTY, WASHINGTON

	COC	Cleanup Level (mg/kg)	Source
Upper Level Mine Area, Lower Level Mill Area, Tailings Accumulation Area, Homesite Area, and Distressed/Unvegetated Area	Arsenic	9.34	Natural Background Soil (Ecology 1994)
	Cadmium	2	MTCA Method A Soil Cleanup Level for Unrestricted Land Use (WAC 173-340-740, Table 740-1)
	Lead	250	MTCA Method A Soil Cleanup Level for Unrestricted Land Use (WAC 173-340-740, Table 740-1)
	Mercury	2	MTCA Method A Soil Cleanup Level for Unrestricted Land Use (WAC 173-340-740, Table 740-1)
	Zinc	24,000	MTCA Method B Soil Cleanup Level for Unrestricted Land Use (WAC 173-340-740, Liverman 2011)
Drainage Ditch, Man-Made Ditch, and Downgradient Ditch	Arsenic	9.34	Natural Background Soil (Ecology 1994)
	Cadmium	2	MTCA Method A Soil Cleanup Level for Unrestricted Land Use (WAC 173-340-740, Table 740-1)
	Lead	50	MTCA Ecological Indicator Soil Concentration for Protection of Terrestrial Plants and Animals (WAC 173-340-749, Table 749-3)
	Mercury	0.1	MTCA Ecological Indicator Soil Concentration for Protection of Terrestrial Plants and Animals (WAC 173-340-749, Table 749-3)
	Zinc	66.4	Natural Background Soil (Ecology 1994)

Key:

COC = contaminant of concern
Ecology = Washington Department of Ecology
mg/kg = milligrams per kilogram
MTCA = Model Toxics Control Act
WAC = Washington Administrative Code

4 Project Organization, Cost, and Timeline

This section describes the participating organizations and roles, the project costs, and timeline.

4.1 Key Organizations and Roles

The RA was performed by EPA and its contractors:

On-Scene Coordinator: The RA was performed under the supervision of an EPA On-Scene Coordinator (OSC).

Emergency and Rapid Response Services: RA cleanup work was performed by EQM under the EPA Region 10 ERRS contract.

Superfund Technical Assistance and Response Team: E & E, under an EPA Region 10 START contract, provided on-Site technical assistance, collected environmental samples, and documented Site activities.

4.2 Project Costs

Costs for the RA included ERRS and START costs. Estimated costs for the RA through March 2012 are summarized below in Table 4-1.

Table 4-1 Project Costs

	Costs to Date ($)	Ceiling Costs ($)
Extramural Costs		
ERRS	$1,165,404	$1,389,148
START-3	$152,000	$200,000
Total	**$1,317,404**	**$1,589,148**

4.3 Project Timeline

EPA performed the RA from August 15 through October 4, 2011. A summary of the project timeline is provided in Table 4-2.

Table 4-2 Project Timeline

Activity	Date
EPA, ERRS, and START mobilized to the Site and ERRS began Site preparation activities (setup of command post and support area, and development of access roads, repository footprint, and borrow area).	August 15 – 16, 2011
START conducted an asbestos-containing material (ACM) survey of structures planned for demolition.	August 16 – 18, 2011
ERRS excavated tailings from Tailings Accumulation Area.	August 19 – September 2, 2011
ERRS excavated tailings from Distressed/Unvegetated Area.	August 31 – September 3, 2011
ERRS demolishes concrete silo and mill foundation located within repository footprint using hydraulic jack hammer.	September 1 – , 2011
ERRS excavated tailings from Upper Level Mine Area.	September 1 – 7, 2011
ERRS excavated tailings from Drainage Ditch.	September 2 – 6, 2011
ERRS excavated tailings from Lower Level Mill Area (southern portion and cul-de-sac in front of the log cabin at the end of Grandview Flat Road).	September 7 – 12, 2011
ERRS excavated tailings from Former Drum Storage Area.	September 7 – 9, 2011
ERRS and liner crew installed repository 40-mil LLDPE liner.	September 13 – 17, 2011
ERRS placed clean borrow material as backfill and cover in excavated areas and over repository.	September 9 – 21, 2011
Surveyors (Storhaug, under contract with Washington Resources) surveyed the as-built repository footprint.	September 24, 2011
START demobilized from the Site.	September 24, 2011
ERRS performed Site restoration activities (regraded borrow area, placed slash over repository and across borrow area).	September 22 – 28, 2011
ERRS decontaminated / demobilized equipment.	September 22 – October 4, 2011
ERRS demobilized from the Site.	October 4, 2011

5 Removal Activities

This section describes the RA activities that took place between August 15 and October 4, 2011. The Site layout during the RA is depicted in Figure 5-1. Photographs taken throughout the RA are presented in Appendix A.

5.1 Mobilization

Cleanup personnel mobilized to the Site on August 15, 2011, and began to prepare the Site for the RA. Approximately 13 ERRS personnel were on-Site throughout the RA. START mobilized to the Site on August 16, 2011.

5.1.1 Equipment

ERRS mobilized the following equipment to the Site for the RA:

- 5 haul trucks;
- 2 excavators;
- 2 bull dozers;
- 1 front-end loader;
- 1 compactor;
- 2 water trucks;
- 1 fuel truck;
- 2 office trailers;
- 1 storage container; and
- miscellaneous support trucks and all-terrain vehicles.

START mobilized the following equipment to the Site for the RA:

- 2 DataRam dust monitors;
- 1 Personal DataRam;
- air sampling equipment; and
- 1 field portable x-ray fluorescence (FPXRF) unit.

5.1.2 Command Post and Support Area

The command post and support area were set up at the Upper Level Mine Area to minimize disturbing the Site caretaker during cleanup activities. The command post and support area included two office trailers, two portable toilets, a conex box, a generator with secondary containment, a dumpster, and parking for personal vehicles, all-terrain vehicles, and heavy equipment.

5.1.3 Fuel Storage Area

A fuel storage area, including a fuel tank with secondary containment and an equipment service truck at the Lower Level Mill Area, was set-up just east of the repository. This location used an existing concrete slab and was conveniently located in the main work area for heavy equipment to refuel throughout the day.

5.1.4 Site Access and Security

During the RA, Grandview Flat Road (i.e., Entrance Road) served as the main access to the Site. The access road between the Upper Level Mine Area and Lower Level Mill Area (i.e., Upper Road or Office Road) was improved and used for access to the Upper Level Mine Area, command post, and borrow area from Grandview Flat Road. An overgrown existing access road was used for access between the Tailings Accumulation Area and the repository at the Lower Level Mill Area, and use was limited to haul trucks to haul excavated tailings to the repository. Access through Pend Oreille Village was limited to personal vehicles. Another overgrown existing access road (i.e., High Road), provided occasional access to the Upper Level Mine Area from Highway 31.

Waste rock was placed as needed to temporarily improve the access roads. At the end of the RA, with the exception of Grandview Flat Road, waste rock was removed from the access roads down to native soil and graded and/or backfilled with clean, compacted borrow material. Site access roads used during the RA are depicted in Figure 5-1.

For security, ERRS installed gates at the Site entrances at Grandview Flat Road, the High Road, and the access through Pend Oreille Village. The gates were locked whenever the Site was unoccupied.

5.1.5 Borrow Area

The location of the borrow area used for the RA is shown in Figure 5-1. The borrow area was cleared and grubbed, and trees and brush were stockpiled for reuse as erosion control slash. In accordance with the Site-Specific Sampling Plan (SSSP) (E & E 2011a), borrow material was screened with the FPXRF unit to ensure it met acceptance criteria prior to use as backfill and cover material.

During the RA, a total of approximately 30,648 CY of borrow material was excavated for placement as backfill and cover. Following construction, the borrow area was graded to blend with the adjacent topography and allow for drainage. Approximately 1,392 CY of stockpiled erosion control slash was placed over the exposed soil and the area was seeded.

5.2 ACM Survey

At the beginning of the RA, START conducted an ACM survey of Site structures that were potentially to be demolished as part of the RA. A START Asbestos Hazard Emergency Response Act-certified building inspector inspected several structures for suspect ACM, including the assay shed / wash house, mill foundation and large equipment mounting blocks, crushed rock storage silo, core sample shed, and compressor house. Bulk samples of suspect ACM were collected and submitted the samples to an off-Site laboratory for asbestos analysis in accordance with the SSSP (E & E 2011a). Asbestos bulk sampling results indicated the presence of ACM in the compressor house, which was therefore not demolished as part of the RA. Asbestos bulk sampling is discussed in greater detail in Section 7.4.

5.3 Excavation of Waste Rock and Tailings

A total of approximately 67,500 CY of mine-waste-contaminated materials were excavated from the Site and consolidated in the repository constructed at the Lower Level Mill Area. This waste

quantity is significantly higher than the Site-wide estimate of 41,800 CY from previous investigations. In addition, approximately 2,400 CY of metal and concrete debris removed as part of the Site-wide cleanup activities was incorporated into the repository. Table 5-1 provides a summary of the volumes of excavated mine-waste-contaminated materials consolidated in the repository and includes a comparison to the expected estimated waste quantities from previous investigations.

The following subsections discuss each Site removal area. In general, waste rock and tailings were to be excavated from each removal area until the cleanup levels specified in Table 3-1 were reached, or as otherwise determined by EPA. In accordance with the SSSP (E & E 2011a), where practicable, following visual removal of waste rock and tailings, *in situ* screening with the FPXRF unit was performed until the results indicated that the cleanup levels were reached. Once *in situ* screening indicated that the cleanup levels had been met, confirmation soil samples were collected approximately every 50-foot x 50-foot (2,500 square feet) across the removal area for *ex situ* FPXRF screening analysis in the job trailer. FPXRF field screening and confirmation sampling is discussed further in Section 7.3.

Following excavation, excavated areas were graded and/or backfilled with clean material obtained from the on-Site borrow area to eliminate areas of standing water or abrupt changes in topography. Additionally, as discussed in Section 3.3 and below, some mine-waste-contaminated materials remain in place. All areas disturbed during the RA were to be graded to control for surface water drainage and stabilized to facilitate the reestablishment of vegetation appropriate for the area.

5.3.1 Lower Level Mill Area

Site work began with preparation of the repository footprint at the base of the bluff at the north end of the Lower Level Mill Area. The repository footprint was cleared and grubbed, and approximately 456 CY of this material was stockpiled for later use as erosion control slash material. An estimated 5,905 CY of waste rock already present within the repository footprint was then spread and compacted. Another estimated 2,472 CY of waste rock used as surfacing material in the Lower Level Mill Area in and around the repository footprint was scraped and spread and compacted within the repository footprint. Concrete, metal, and minimal wood debris were spread across the repository footprint in a stable manner, compacted in layers with waste rock and tailings. Repository construction is discussed further in Section 5.4.

Remnants of structures once present within the repository footprint included a large concrete silo (approximately 20 feet in diameter and 80 feet high), a mill foundation including large equipment mounting blocks, a toppled concrete pier, a rock crusher, and a coal storage bin (large metal barrel). These remnants were demolished and incorporated into the repository. A hydraulic jack hammer was used to demolish the concrete silo and equipment mounting blocks associated with the mill foundation. The wash building, located at the southern end of the Lower Level Mill Area, was also demolished and incorporated into the repository; this building was outside of the repository footprint but was located in the immediate work area and in the way of the haul road.

In the northeast corner of the Lower Level Mill Area where the area connects with the Upper Level Mine Area, waste rock was observed to extend deeper than six feet, as was the case for the

northwestern portion of the Upper Level Mine Area. This portion of the Site appeared to have been filled in with waste rock from extraction of ore from the adit at the Upper Level Mine Area, which formed a ramp to transport ore down to the mill for processing. Since the volume of waste rock in this area was found to be so extensive, complete excavation of the waste rock was determined to be impracticable given schedule and repository size constraints. Specific quantities of waste rock removed from the upper part of this ramp in the Upper Level Mine Area are discussed in Section 5.3.2. To provide a protective barrier over the remaining waste rock, a large quantity of clean borrow material (minimum of two feet) was placed over the area to restore the pre-existing topography, blending the area with the capped waste rock at the Upper Level Mine Area (see Section 5.3.2) and the repository slopes (see Section 5.4).

5.3.2 Upper Level Mine Area

An estimated total of 7,296 CY of waste rock was excavated from the Upper Level Mine Area and incorporated into the repository.

At the beginning of the RA, five test pits were excavated within the waste rock footprint at the Upper Level Mine Area to get a better estimate of the depth and volume of waste rock. In the southern portion, waste rock was observed between one and three feet deep, and in the northwest portion, waste rock was observed from six feet deep to greater than ten feet deep. Due to the extensive quantity of waste rock present and the resulting impact on the project schedule, budget, and repository size constraints, not all of the waste rock was removed; however, the waste rock footprint was reduced from approximately 1.5 acres to 0.4 acres. A protective barrier consisting of a minimum of two feet of compacted clean borrow material was placed over the reduced footprint (see Figure 5-2); an estimated 6,480 CY of clean borrow material was placed.

The core sample shed was demolished because it was located within the waste rock footprint, and the explosive powder storage house was also demolished because it was located within the borrow area at the eastern side of the Upper Level Mine Area. The demolition debris was incorporated into the repository. The compressor house remains in place because it was not necessary to remove as part of the RA, and ACM was found during the ACM survey (see Section 5.2). At the request of the Site caretaker, the two ore cart engines were moved out of the waste rock footprint and placed adjacent to the compressor house.

All disturbed areas were graded and/or backfilled with clean borrow material and seeded.

5.3.3 Access Roads

Waste rock used as surfacing material was removed down to native soil along the access road between the Upper Level Mine Area and Lower Level Mill Area (i.e., Upper Road or Office Road) and along the access road providing access to the Upper Level Mine Area from Highway 31 (i.e., High Road). An estimated 1,272 CY of waste rock was excavated from the Upper Road and 4,344 CY was excavated from the High Road, and incorporated into the repository. Following excavation of the waste rock, the roads were graded and/or backfilled with clean borrow material as needed. An estimated 432 CY of clean borrow material was placed along the Upper Road, and 1,848 CY was placed along the High Road.

5.3.4 Historic Homesite Area and Distressed/Unvegetated Area

Previous investigations identified waste rock surfacing material in the Historic Homesite Area and tailings in the Distressed/Unvegetated Area. A total of approximately 1,560 CY of material was removed to native soil from these areas during the RA and incorporated into the repository.

An estimated total of 984 CY of clean borrow material was placed as backfill and cap material in the Historic Homesite and Distressed/Unvegetated Areas. The Historic Homesite and Distressed/Unvegetated Areas were seeded at the end of the RA.

5.3.5 Tailings Accumulation Area

An estimated total of 35,112 CY of tailings were excavated from the Tailings Accumulation Area and incorporated into the repository. Tailings were removed down to native soil, except for thin lenses extending outside of main footprint. Tailings were excavated up to thicker vegetation and mature trees, and the edges were blended and covered with the native soil. The excavated area was graded to drain, stockpiled erosion control slash material was placed across the area to provide habitat and encourage establishment of vegetation, and the area was seeded.

The vault that contained the water pump was buried in place. Monitoring well (MW)-1 was decommissioned; however, MW-2 is still present to the east of the gate installed during the RA.

5.3.6 Ditches

Previous investigations identified 6,580 CY of tailings present in the Drainage Ditch, 1,000 CY present in the Downgradient Ditch, and 1,155 CY present in the Man-Made Ditch. Approximately 4,656 CY of tailings were excavated from the upper portion of the Drainage Ditch; however, as discussed in Section 3.3, a limited amount of mine-waste-contaminated materials were left in place. These materials were characterized with FPXRF field screening, which is discussed in Section 7.3.

5.3.7 Former Drum Storage Area

Approximately 4,848 CY of soil was excavated from the Former Drum Storage Area (also the most upgradient end of the Drainage Ditch) and incorporated into the repository.

5.4 Repository

As designed in the RA Work Plan and Conceptual Design (E & E 2011b), the repository had a 50,000 CY capacity, over an approximate 2.2-acre footprint, with a final height of approximately 30 feet against the bluff at the north end of the Lower Level Mill Area. However, at the end of the RA, the repository contained approximately 69,900 CY of material, over an approximate 1.8 acre footprint, with a final height of approximately 40 feet. At the request of Washington Resources, the repository footprint was pulled back approximately 100 feet north from the extent depicted in the RA Work Plan and Conceptual Design (E & E 2011b). The surveyed repository footprint is shown in Figure 5-2.

The total of approximately 69,900 CY of material consolidated in the repository included 2,400 CY of metal and concrete debris and 67,500 CY of mine-waste-contaminated materials, compared to an estimated 41,800 CY of mine-waste contaminated material from previous investigations.

As discussed in Section 5.3.1, Site work began with preparation of the repository footprint at the base of the bluff at the north end of the Lower Level Mill Area. The repository area was cleared and grubbed the repository footprint and stockpiled erosion control slash material for later use. Beginning at the base of the silo, the excavated mine waste-contaminated was spread and compacted. Concrete, metal, and minimal wood debris was spread across the repository footprint in a stable manner and was compacted in layers with waste rock and tailings. After mine-waste-contaminated materials had been placed approximately halfway up the silo, a hydraulic jack hammer was used to break down the upper half; debris from the silo demolition was pushed inside the bottom portion of the silo and compacted with tailings and waste rock using the excavator bucket. The hydraulic jack hammer was also used to break down the mill foundation equipment mounting blocks located within the repository footprint.

Following placement of the excavated mine-waste-contaminated materials within the repository footprint, an approximate 3-foot x 3-foot anchor trench was dug and served both as the anchor trench for the liner and the French drain, and prepared for liner installation. Prior to arrival of the Northwest Linings and Geotextiles, Inc. liner crew, the side slopes were graded to 3:1 (horizontal:vertical), debris such as roots and rocks were removed, and final grading and shaping of the repository was completed. The liner crew arrived on September 14, 2011, and upon inspection required additional grading and placement of additional soil as cushion for the liner. An additional 1,656 CY of clean borrow material was placed over the mine-waste-contaminated materials. Installation of the impermeable 40-mil textured LLDPE liner and geocomposite material occurred from September 14 to 17, 2011. The liner crew welded the seams of the liner and geocomposite and provided QA/QC samples.

During repository soil cover material placement, care was taken not to drive heavy equipment directly over the liner and geocomposite material by constructing a road of at least two feet of compacted cover material out in front of the heavy equipment, over the liner and geocomposite, from the Upper Level Mine Area across the northeast corner of the Lower Level Mill Area. Approximately 16,584 CY of clean borrow material was placed as cover over the geocomposite drainage layer, reduced the side slopes to 4:1 (horizontal:vertical) in some areas for added stability, placed approximately 2,472 CY of stockpiled erosion control slash over the surface, and seeded. The RA Work Plan and Conceptual Design (E & E 2011b) had specified an 18-inch minimum layer of random fill, overlain by a 12-inch minimum layer of topsoil for the repository cover, at a total of 13,000 CY of material. An additional 3,584 CY of cover material other than what was specified was placed, and the borrow soil, slash, and seed was determined to be sufficient in lieu of topsoil.

After the liner and geocomposite were placed in the anchor trench, the French drain was constructed by backfilling the trench with drain rock around a 4-inch perforated polyvinyl chloride (PVC) pipe wrapped in geotextile, as specified in the RA Work Plan and Conceptual Design (E & E 2011b). Approximately 336 tons of ¾-inch to 2½-inch drain rock was used for the French drain which was extended out to the Drainage Ditch excavation. Drain rock ranging in size from 3 to 6 inches was placed at the 4-inch perforated PVC pipe discharge for energy dissipation. ERRS also extended the French drain up from the periphery of the repository to intercept the seep area in the northeast portion of the Lower Level Mill Area. Following

installation of the French drain, the v-ditch was constructed along the top and sides of the repository. Approximately 1,503 tons of 3-inch to 6-inch rock was used for the v-ditches and various other uses around the Site.

The post-removal Site layout, incorporating the surveyed repository footprint, is depicted in Figure 5-2.

5.5 Best Management Practices

5.5.1 Temporary Erosion and Sediment Controls

Throughout the RA, existing vegetation was preserved to the extent possible, and where clearing and grubbing was necessary, brush and trees were stockpiled for placement as erosion control slash over areas disturbed during the RA. Erosion and sediment controls such as silt fences, compost/straw wattles, hay bales or sediment traps were not needed as there was no significant stormwater runoff from the Site during the RA.

5.5.2 Spill Prevention

Throughout the RA, the following spill contingency plan was implemented to minimize fuel spills and/or demonstrate the ability to respond immediately in the event that a fuel spill did occur:

- Fuel tanks were stored in secondary containment on a concrete pad in the designated Fuel Storage Area, away from any receiving waters;
- Refueling was conducted at the designated Fuel Storage Area;
- Heavy equipment was inspected and maintained regularly and any issues were immediately reported to the ERRS Removal Manager; and
- Emergency spill response and containment kits containing sorbent boom were kept on-Site.

5.5.3 Dust Control

A water truck was used continuously throughout the RA to spray water on the repository, tailings and waste rock excavation areas, borrow area, and access roads for dust suppression. This BMP minimized airborne dust, limiting the potential of worker and community exposure to airborne dust and associated metals.

START performed dust monitoring to evaluate dust suppression techniques and ensure that off-Site migration of dust was minimized. Air sampling was performed to determine baseline airborne particulate and metal concentrations in dust generated during the RA activities. Dust monitoring was conducted daily during Site activities from August 16 to September 23, 2011. Two DataRam dust monitors were deployed each day: one in the Lower Level Mine Area near the repository, and one at either the Tailings Accumulation Area or the Upper Level Mine Area, depending on the Site activities. Workers inside the excavation zone also periodically wore personal dust monitors to measure their potential exposure to dust. Air samples were collected from perimeter locations and from personal sampling pumps worn by select workers. Dust monitoring and air sampling results indicated no action level or exposure limit exceedance for Site personnel or the surrounding community, and the methods and results are discussed further in Section 7.

5.5.4 Avoidance of Community Disturbance

In order to reduce the impact of construction-related noise, construction activities were performed from 7:00 AM to 5:30 PM. The use of Highway 31 and the access through Pend Oreille Village was limited to minimize disturbance to the local community. Additionally, the site command post and support area was set up to minimize disturbance to the resident caretaker.

5.5.5 Greener Cleanup Best Management Practices

Greener cleanup BMPs implemented during the RA included: (1) minimizing energy consumption (e.g., used well-maintained equipment); (2) minimizing generation and transport of fugitive dust (e.g., used a water truck to suppress dust and conducted dust monitoring to ensure dust airborne dust was minimized): (3) minimizing waste generation (e.g., reused cleared/grubbed brush and trees as erosion control slash and incorporated debris into the repository rather than disposing off-Site); (4) minimizing areas requiring activity or use limitations (e.g., consolidated as much of the contaminated mine waste material as practicable in one repository location); (5) minimizing unnecessary soil and habitat disturbance (e.g., existing vegetation was preserved to the extent possible, soil was only disturbed where necessary for implementation of the RA, and tailings were left in place where vegetation and trees were well-established over a thin lens); and (6) minimizing noise and light disturbance (e.g., construction activities were only performed between 7:00 AM and 5:30 PM).

5.7 Site Restoration and Demobilization

Following the completion of the removal activities, the Site was restored as close as possible to pre-RA conditions. The haul road between the Tailings Accumulation Area and the repository was obliterated, and the equipment was decontaminated and demobilized from the Site. The borrow area and excavated areas were regraded to drain and blend in as much as possible with the surrounding area. Stockpiled slash material was placed over the Tailings Accumulation Area, repository, and borrow area for erosion control, and all excavated areas were seeded.

5.8 Survey

A survey of the repository footprint was completed on September 24, 2011, by Storhaug, State of Washington licensed surveyors, as a subcontractor to Washington Resources. This survey was completed before the ditches were installed. Excavation and cover material placement areas were GPS-located by START personnel. The post-removal Site layout, incorporating the approximate repository footprint, excavation areas, and cover material placement areas, is depicted in Figure 5-2.

5.9 Off-Site Disposal

No hazardous or otherwise contaminated materials were disposed of off-Site during the RA. Non-hazardous solid waste, including trash and food waste from the command post, was collected in a trash dumpster located at the command post and disposed of as solid waste by a subcontractor.

TABLE 5-1
EXCAVATED MINE-WASTE-CONTAMINATED MATERIAL CONSOLIDATED IN REPOSITORY
GRANDVIEW MINE AND MILL SITE
PEND OREILLE COUNTY, WASHINGTON

Area Name	Volume Estimates from Previous Investigations		Actual Volumes Excavated		Comments
	Location Name Used	Volume (CY)	Location Name Used	Volume (CY)	
Lower Level Mill Area	Waste Rock Piles in Northern Portion of Lower Level Mill Area	5,905	Lower Level Mill Area	5,905	Footprint reduced and waste rock regraded within repository footprint - volumes not calculated, so assuming estimated volume.
	Waste Rock Surfacing Material in Lower Level Mill Area	2,935	Entrance Road (Grandview Flat Road)	2,472	Waste rock excavated from southern portion of Lower Level Mill Area connecting to Entrance Road and cul-de-sac in front of the log cabin.
Upper Level Mine Area and Roads	NA	NA	Upper Level Mine Area	7,296	The waste rock footprint was reduced and remains in-place at the northern end against the hillside; tailings were excavated 6 feet and the area was backfilled and regraded - the bottom of the waste rock is unknown.
	NA	NA	High Road (Access Road from Highway 31)	4,344	Waste rock removed down to native soil.
	Waste Rock Surfacing Material Grandview Flat Road and Access Road to Upper Level Mine Area	2,490	Grandview Flat Road (Entrance Road)	NA	Waste rock excavated from cul-de-sac only and included in row above.
			Upper Road (Office Road, Access Road to Upper Level Mine Area)	1,272	Waste rock removed down to native soil.
Historic Homesite Area and Distressed / Unvegetated Area	Waste Rock Surfacing Material in Historic Homesite Area	890	Distressed Area	1,560	Waste rock in two of three areas remains in-place because it was discovered too late for placement in the repository. Covered with > 1' of clean borrow material.
	Tailings in Distressed/Unvegetated Area	640			Tailings removed down to native soil.
Tailings Accumulation Area	Tailings Accumulation Area	19,700	Lower Pond	35,112	Tailings removed down to native soil except for thin lenses extending outside of main footprint.
Ditches	Drainage Ditch	6,580	Drainage Ditch	4,656	Tailings in lower portion of ditch remain in-place due to rocky, steep terrain.
	Downgradient Ditch	1,000	NA	NA	Tailings remain in-place because a thin lens of tailings spread across a large, well-vegetated area with established trees.
	Man-Made Ditch	1,155	NA	NA	Tailings remain in-place because a thin lens of tailings along well-vegetated ditch line with established trees, and difficult to access.
Former Drum Storage Area	Former Drum Storage Area	NA	Drum Storage Area	4,848	Tailings removed down to native soil.
Metal and Concrete Debris	NA	NA	Metal and Concrete Debris	2,376	Removed from all over site.
	TOTAL:	**41,295**		**69,841**	

Key:

CY = Cubic Yards
NA = Not Applicable

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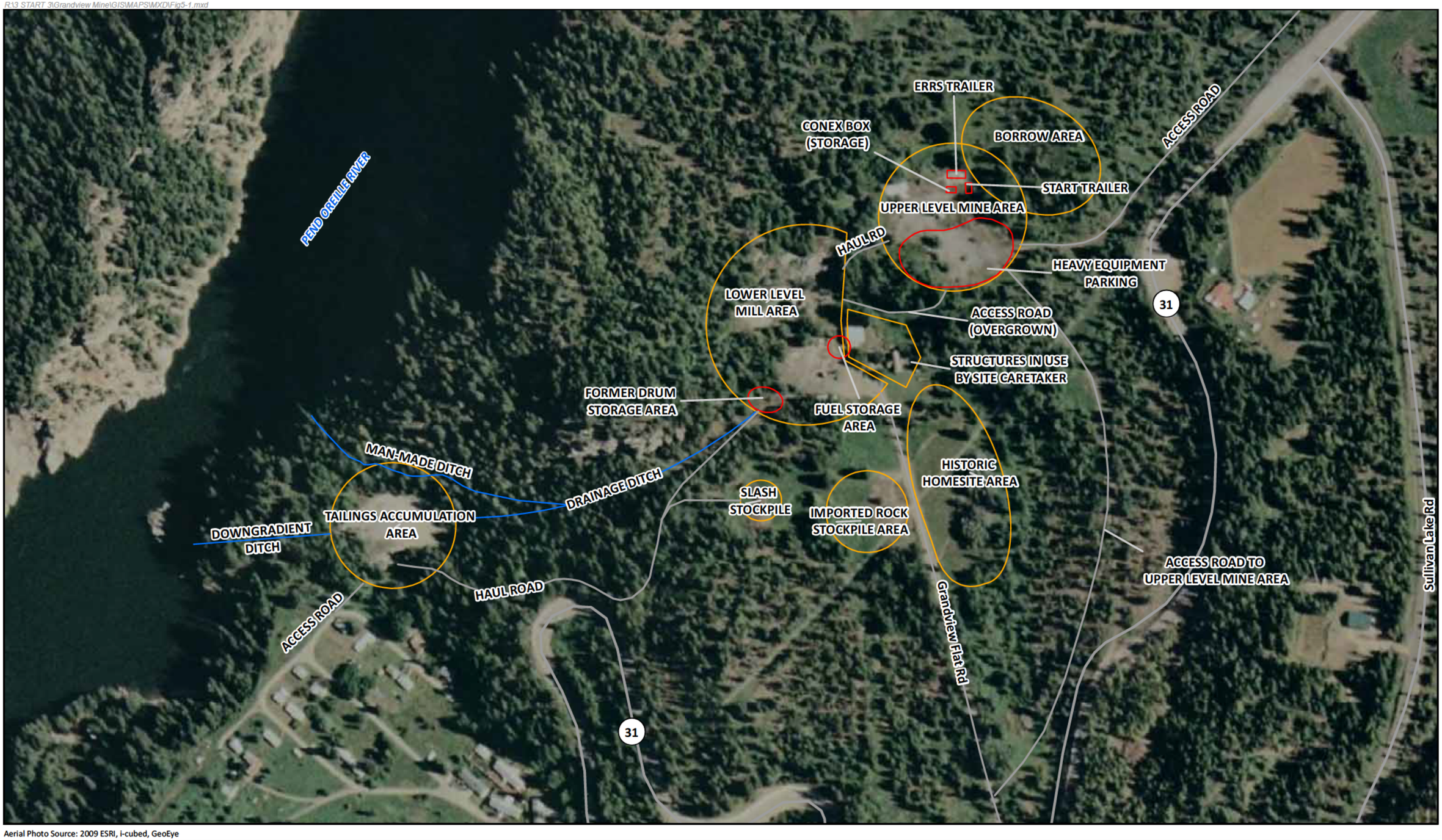

Aerial Photo Source: 2009 ESRI, i-cubed, GeoEye

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Figure 5-1 Site Layout During Removal Action
Grandview Mine and Mill Site
Pend Oreille County, Washington

Roads
Ditch
Site Features

0 150 300 600 Feet

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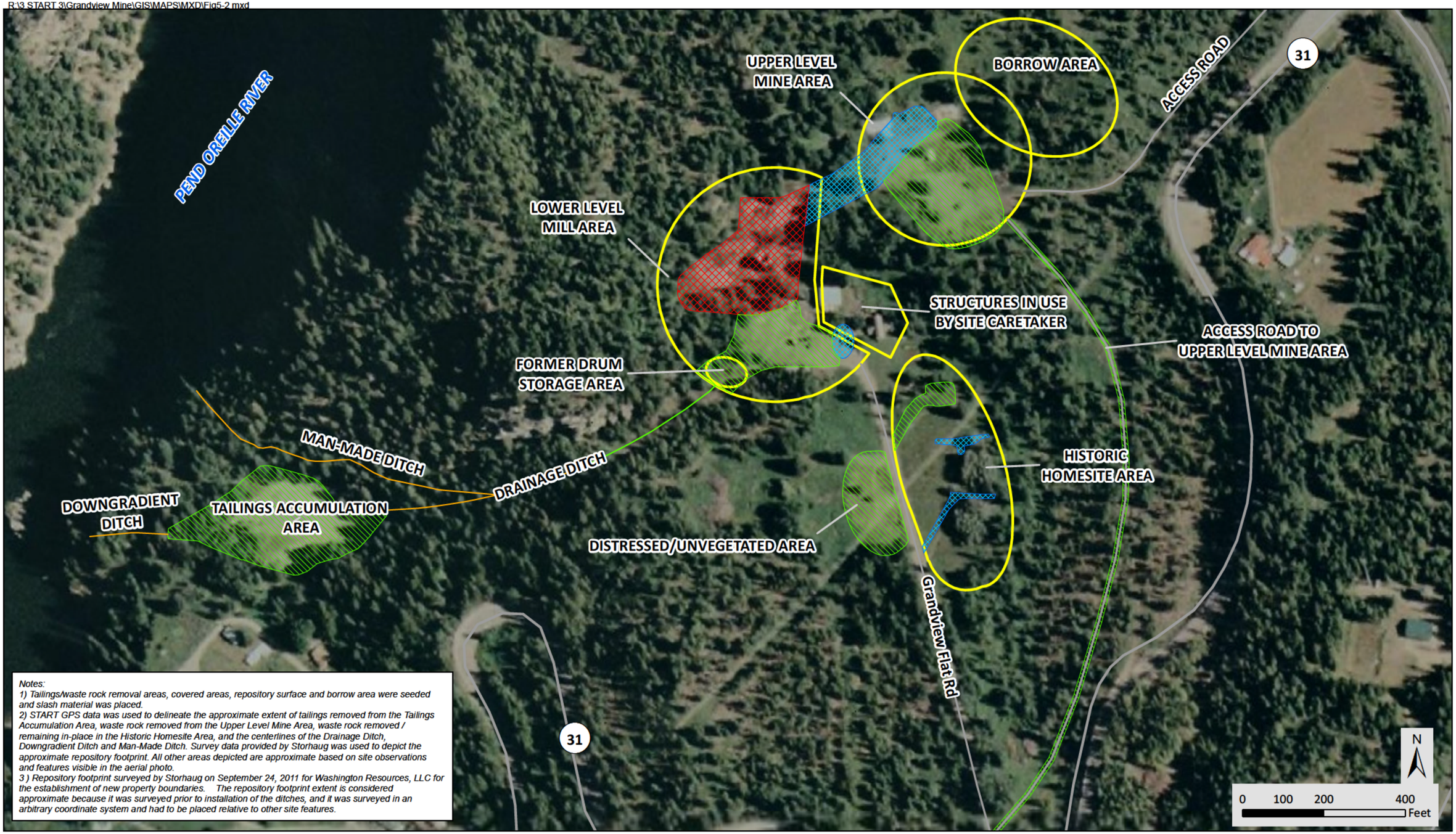

Notes:
1) Tailings/waste rock removal areas, covered areas, repository surface and borrow area were seeded and slash material was placed.
2) START GPS data was used to delineate the approximate extent of tailings removed from the Tailings Accumulation Area, waste rock removed from the Upper Level Mine Area, waste rock removed / remaining in-place in the Historic Homesite Area, and the centerlines of the Drainage Ditch, Downgradient Ditch and Man-Made Ditch. Survey data provided by Storhaug was used to depict the approximate repository footprint. All other areas depicted are approximate based on site observations and features visible in the aerial photo.
3) Repository footprint surveyed by Storhaug on September 24, 2011 for Washington Resources, LLC for the establishment of new property boundaries. The repository footprint extent is considered approximate because it was surveyed prior to installation of the ditches, and it was surveyed in an arbitrary coordinate system and had to be placed relative to other site features.

Aerial Photo Source: 2009 ESRI, i-cubed, GeoEye

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Figure 5-2 Site Layout Post Removal Action
Grandview Mine and Mill Site
Pend Oreille County, Washington

Tailings Inaccessible for Removal
Tailings/Waste Rock Removed to Native Soil
Protective Barrier Placed Over Waste Rock
Approximate Repository Footprint (See Note 3)

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6 Post-Removal Site Controls

A long-term monitoring and maintenance program will be conducted by one or more of the Responsible Parties and will be subject to Washington State Department of Ecology (Ecology) oversight. Additionally, under the Uniform Environmental Covenants Act (UECA), restrictive covenants will be implemented to ensure the continued effectiveness of the RA and to monitor Site conditions. As part of the monitoring plan, semi-annual or periodic inspections of the repository cover, drainage ditches, and French Drain integrity and performance will be required, and maintenance should be conducted as necessary. Periodic groundwater monitoring will also be required using the existing monitoring wells (Liverman 2011).

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7 Monitoring and Sampling Activities

Monitoring and sampling activities were performed to monitor potential exposure to dust and associated metals and to support removal decisions. START performed dust monitoring and air sampling between August 17 and September 24, 2011, to evaluate dust suppression techniques and determine baseline airborne particulate and metal concentrations in dust generated during the removal activities. EPA also analyzed on-Site soil with the FPXRF unit to determine metal concentrations and submitted a portion of these field-analyzed samples for fixed laboratory analysis. Field monitoring, sampling, and analyses activities were performed in accordance with the SSSP (E & E 2011a).

7.1 Dust Monitoring

Airborne dust monitoring was conducted daily during excavation with two DataRam dust monitors (DR-1 and DR-2) to ensure that dust suppression methods were working and that off-Site migration of dust was minimized. The DataRam monitors were deployed at the Lower Level Mining Area and either the Tailings Accumulation Area or the Upper Level Mine Area, depending on where excavation was occurring. Workers inside the excavation zone also periodically wore a personal DataRam (PDR) to measure potential exposure to dust.

The Site-specific action level for airborne particulates was established at 390 micrograms per cubic meter ($\mu g/m^3$), time-weighted average (TWA). This action level was the concentration at which Site personnel in the exclusion zone were required to upgrade to Level C personal protection equipment (PPE), including respiratory protection. As detailed in the SSSP (E & E 2011a), this action level was calculated based on the maximum concentrations of the metals of concern detected at the Site and the Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) for lead.

Daily TWA dust monitoring results were generally well below the action level. The only two exceedances occurred when the PDR was placed on the exterior of the excavator; these readings were not representative of extended personnel exposure and are not considered personnel exceedances. A summary of dust monitoring results is provided in Table 7-1.

7.2 Air Sampling

Air samples were collected to monitor potential exposure to airborne metals. Because the DataRams and PDR only monitor for total particulates, air samples were collected and analyzed off-Site for the metals of concern to confirm that the Site dust action level was appropriate and that Site workers were not exposed to metals above exposure limits. Samples were collected from dust monitoring locations DR-1 (in the Tailings Accumulation Area at the gate) and DR-2 (at the Lower Level Mill Area in the southwest corner of the fuel storage area). Personal samples were collected from locations EO-1 (interior of excavator), CM-1 (interior of compactor), and HT-1 and HT-2 (interiors of haul trucks), where equipment operators were working in areas with the greatest potential for exposure to airborne dust. Eight air samples were collected between August 20 and 24, 2011.

Air samples were collected on 47-millimeter diameter mixed cellulose ester filter cassettes with a pore size of 0.8 microns. Perimeter samples were collected by placing filter cassettes inside the DataRams while they were being used for dust monitoring. Personal samples were collected by placing a personal air sampling pump on the worker to be monitored, with the filter cassette placed in the worker's breathing zone and attached to the pump with polyethylene tubing. The personal pumps were set at flow rates of approximately 2 liters per minute and were allowed to run for approximately six to ten hours. The flow rates of the pump were recorded before and after sampling with a flow meter, and the average flow rate for the entire sampling time was calculated. The sample volume was then calculated using the average flow rate and the sample duration.

The eight air filter samples were analyzed in accordance with the START SSSP (E & E 2011a) for the metals arsenic, cadmium, lead, and zinc following National Institute for Occupational Safety and Health (NIOSH) Method 7300. The analyses were performed by Test America, Inc. in Phoenix, Arizona, as a subcontractor to E & E. The analytical data report and data validation memorandum is presented in Appendix B.

Air sampling results and the corresponding dust monitoring results are provided in Table 7-1. Arsenic, cadmium, and lead were not detected in any of the samples. Zinc was detected in three samples at low concentrations, but all results were well below the OSHA PELs and the NIOSH Recommended Exposure Limits (RELs). Note that mercury wasn't included in the air sample analyses for several reasons: mercury cannot be analyzed by Method 7300, specialized media are required for the analysis of mercury in air, and mercury was determined to be the Site COC least likely to exceed applicable exposure limits based on the OSHA and NIOSH exposure limits and historical Site data.

7.3 FPXRF Field Screening and Soil Sampling

Field screening analyses were performed on Site soil with the FPXRF unit to determine metal concentrations of Site soils. Following visual removal of tailings and waste rock, *in situ* screening with the FPXRF unit was performed until the results indicated that the cleanup levels were met, or as otherwise determined by EPA. In general, excavation in each area continued until the cleanup levels were obtained as determined by *in situ* screening with the FPXRF unit. However, as discussed previously, contaminated material remained in some Site areas following excavation because more mine waste-contaminated material was encountered than expected. In these areas, field screening with the FPXRF and confirmation analyses were used to characterize the remaining materials.

Once excavation in a specific area was completed, composite samples were collected approximately every 2,500 square feet across the removal area for *ex situ* FPXRF screening analysis in the job trailer. The composite samples were collected from each 2,500-square foot sampling area by collecting approximately 20 to 30 grab samples from the surface of the area (approximately 0 to 4 inches of soil). The grab samples were placed in a dedicated bowl, homogenized with a dedicated plastic scoop, and the composite sample was placed in a dedicated, plastic resealable bag. *Ex situ* testing with the FPXRF was performed on each sample through the plastic bag.

A total of 66 *ex situ* samples were collected for field screening with the FPXRF unit (Table 7-2). Between August 20 and 24, 2011, ten grab soil samples (locations UM-01-SS through UM-04-SS, LL-01-SS through LL-03-SS, and TA-01-SS through TA-03-SS; sample numbers 11081701 through 11081710, respectively) were collected by START personnel for analysis with the FPXRF unit for arsenic, cadmium, lead, mercury, and zinc, and the samples were also submitted for fixed laboratory analysis (EPA SW-846 6000/7000 Series methods) for the same elements to determine the accuracy and precision of the FPXRF unit as a field screening device. The ten samples were collected from different locations at the Site areas (Upper Level Mine Area, Lower Level Mill Area, and Tailings Accumulation Area) to represent a range of concentrations (i.e., in order to get a better correlation, samples were collected from locations suspected to reveal concentrations ranging from non-detect to high). An additional six soil samples (locations TA-05-SS, UR-02-SS, DU-01-SS, FD-01-SS, LL-05-SS, and DD-07-SS) were submitted in late September 2011 to the fixed laboratory for analysis of the same elements. Fixed laboratory soil sample results are provided in Table 7-3.

The following subsections discuss FPXRF unit field screening and/or confirmation sampling conducted for each removal area.

7.3.1 Lower Level Mill Area

In addition to *in situ* screening performed during removal, FPXRF unit *in situ* screening was conducted at the Lower Level Mill Area to characterize waste rock left in place in the northeast corner where the Lower Level Mill Area connects with the Upper Level Mine Area (Table 7-2, rows 205 through 209), and in the southeastern portion of the Lower Level Mill Area, in the cul-de-sac at the end of Grandview Flat Road in front of the log cabin (Table 7-2, rows 96 and 97 and 243 through 246). One *ex situ* characterization composite sample was collected from the ledge of waste rock left in place in the northwest corner (LL-04-SS) and one *ex situ* confirmation composite sample was collected from the southern portion of the Lower Level Mill Area (LL-05-SS) to confirm that waste rock surfacing material had been removed and cleanup action levels had been met.

7.3.2 Upper Level Mine Area

In addition to *in situ* screening performed during removal, FPXRF unit *in situ* screening was conducted at the Upper Level Mine Area to characterize waste rock left in place in the northwestern portion in the reduced waste rock footprint. See Table 7-2, rows 196 through 200 for *in situ* screening results and Figure 7-1 for *in situ* screening locations (UM-1 through UM-5). Four *ex situ* characterization composite samples were also collected at locations UM-05-SS through UM-08-SS.

7.3.3 Grandview Flat Road and Access Roads

FPXRF unit *in situ* screening was conducted along Grandview Flat Road to characterize waste rock used as surfacing material (Table 7-2, rows 83 through 95). FPXRF *in situ* screening was conducted approximately every 300 feet along the Upper Road (Table 7-2, rows 233 through 239) to confirm that waste rock surfacing material had been removed and cleanup levels had been met. Three *ex situ* confirmation grab samples were also collected at locations UR-01-SS through UR-03-SS at every other *in situ* screening location.

7.3.4 Historic Homesite Area and Distressed/Unvegetated Area

In the north waste rock area of the Historic Homesite Area, waste rock was removed to native soil and then regraded and backfilled with borrow material before FPXRF *in situ* screening was conducted. FPXRF *in situ* screening was conducted in the middle and south waste rock areas to characterize waste rock left in place. See Table 7-2, rows 211 through 227 for *in situ* screening results and Figure 7-1 for *in situ* screening locations (HA-1 through HA-17). Five *ex situ* confirmation composite samples were also collected at locations HA-03-SS through HA-07-SS.

Tailings were removed to native soil in the Distressed/Unvegetated Area and three FPXRF *in situ* screening locations were analyzed (Table 7-2, rows 247 through 249) to confirm that tailings had been removed and cleanup levels had been met. Two *ex situ* confirmation composite samples were also collected at locations DU-01-SS through DU-02-SS.

7.3.5 Tailings Accumulation Area

Except for thin lenses extending outside of main footprint, tailings were removed down to native soil in the Tailings Accumulation Area. Several *in situ* screening locations were analyzed for characterization during the removal, and 21 *ex situ* confirmation composite samples were collected at locations TA-04-SS through TA-24-SS to confirm that tailings had been removed and cleanup levels had been met.

7.3.6 Ditches

Tailings were removed to native soil in the upper portion of the Drainage Ditch; however tailings remain in place in the lower portion of the Drainage Ditch, and for the length of the Downgradient Ditch and Man-Made Ditch.

In the upper portion of the Drainage Ditch, four FPXRF unit *in situ* screening locations were analyzed (Table 7-2, rows 255 through 258) to confirm that tailings had been removed and cleanup levels had been met. One *ex situ* confirmation composite sample was also collected at location DD-07-SS. Results in the lower portion of the Drainage Ditch where tailings were left in place are provided in Table 7-2, rows 133 through 162 for *in situ* screening results and Figure 7-2 for *in situ* screening locations DD-1 through DD-28. Six *ex situ* characterization composite samples were also collected at locations DD-01-SS through DD-06-SS.

For the Downgradient Ditch, see Table 7-2, rows 114 through 132 for *in situ* screening results and Figure 7-2 for *in situ* screening locations DG-1 through DG-18. Four *ex situ* characterization composite samples were also collected at locations DG-01-SS through DG-04-SS.

For the Man-Made Ditch, see Table 7-2, rows 163 through 176 for *in situ* screening results and Figure 7-2 for *in situ* screening locations MD-1 through MD-14. Four *ex situ* characterization composite samples were also collected at locations MD-01-SS through MD-04-SS.

7.3.7 Former Drum Storage Area

Tailings and potential SVOC-contaminated soil were removed from the Former Drum Storage Area as part of the excavation of the upper Drainage Ditch, since it was located at the most

upgradient end of the Drainage Ditch. One *ex situ* characterization composite sample was collected at location FD-01-SS.

7.4 Bulk Asbestos Sampling

START personnel collected 20 bulk samples for asbestos analyses using polarized light microscopy (EPA Method 600/R-93-116 and/or NESHAP Final Rule 40 CFR Part 61 Point Count) from locations with suspected ACM including locations TL-01 through TL-08 from the Test Lab, SL-01 and SL-02 from the Staging/Loading Building, CF-01 through CF-03 from the Concrete Slab, SI-01 from Tar on the Silo, RC-01 and RC-02 from the Rock Crusher, CH-01 and CH-02 from the Compressor House, and CS-01 and CS-02 from the Core Shack. Bulk asbestos sample results are provided in Table 7-4. Locations SI-01 (3 %), CH-01 (70 %), and CH-02 (70 %) were the only samples that had positive results.

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TABLE 7-1
DUST MONITORING AND AIR SAMPLE RESULTS
GRANDVIEW MINE AND MILL SITE
PEND OREILLE COUNTY, WASHINGTON

Date	Dust Monitoring					Air Sampling						
	Instr. ID	Description	Total Time (minutes)	Volume (liters)	Particulates (ug/m^3, TWA)	Location ID	EPA Sample ID	Lab Analysis	Results (ug/m^3) Arsenic	Cadmium	Lead	Zinc
				OSHA PEL:	**15,000 / 5,000** (1)			**OSHA PEL:**	**10**	**5**	**50**	**15,000**
		Site-Specific Action Level (Based on OSHA PEL and Max. Site Metals Conc.):			**390**			**NIOSH REL:**	**2**	**N/A**	**50**	**10,000**
8/17/2011	DR-1	Upper Level Mine Area (command post)	480	--	27 7	--	--	no sample	--	--	--	--
8/17/2011	DR-2	Repository level (near cabin)	500	--	5 1	--	--	no sample	--	--	--	--
8/17/2011	PDR	ERRS worker Darren Lee	507	--	99	--	--	no sample	--	--	--	--
8/18/2011	DR-1	Upper Level Mine Area (command post)	575	--	17 9	--	--	no sample	--	--	--	--
8/18/2011	DR-2	Repository level (near break station)	564	--	17 8	--	--	no sample	--	--	--	--
8/18/2011	PDR	Exterior of excavator (clearing repository foot print)	559	--	711(2)	--	--	no sample	--	--	--	--
8/19/2011	DR-1	Tailings Accumulation Area (at gate)	515	--	34 8	--	--	no sample	--	--	--	--
8/19/2011	DR-2	Repository level (SW corner of fuel containment)	513	--	19 6	--	--	no sample	--	--	--	--
8/19/2011	PDR	Exterior of excavator (tailings area) Battery failure	20	--	646(2)	--	--	no sample	--	--	--	--
8/20/2011	DR-1	Tailings Accumulation Area (at gate)	524	1048	28 6	DR-1	11081601	Metals (As, Cd, Pb, Zn)	< 2 39	< 0 0239	< 0 298	4 58
8/20/2011	DR-2	Repository level (SW corner of fuel containment)	546	1092	62 2	DR-2	11081602	Metals (As, Cd, Pb, Zn)	< 2 29	< 0 0229	< 0 286	< 2 29
8/20/2011	N/A	Equipment operator (John Webb)	--	661	--	EO-1	11081603	Metals (As, Cd, Pb, Zn)	< 3 78	< 0 0378	< 0 472	< 3 78
8/20/2011	PDR	Interior of haul truck (Darren Lee)	525	961	95 0	HT-1	11081604	Metals (As, Cd, Pb, Zn)	< 2 60	< 0 0260	< 0 325	< 2 60
8/22/2011	PDR	Interior of haul truck (Joe Johnson)	347	674	113 0	HT-2	11081605	Metals (As, Cd, Pb, Zn)	< 3 71	< 0 0371	< 0 463	< 3 71
8/22/2011	DR-1	Tailings Accumulation Area (at gate)	394	--	26 0	--	--	no sample	--	--	--	--
8/22/2011	DR-2	Repository level (SW corner of fuel containment)	388	--	17 7	--	--	no sample	--	--	--	--
8/24/2011	DR-1	Tailings Accumulation Area (at gate)	560	1120	8 3	DR-1	11081606	Metals (As, Cd, Pb, Zn)	< 2 23	< 0 0223	< 0 279	< 2 23
8/24/2011	DR-2	Repository level (SW corner of fuel containment)	578	1156	29 8	DR-2	11081607	Metals (As, Cd, Pb, Zn)	< 2 16	< 0 0216	< 0 270	13 1
8/24/2011	PDR	Interior of compactor (Ruston Olsen) at repository	411	980	5 0	CM-1	11081608	Metals (As, Cd, Pb, Zn)	< 2 55	< 0 0255	< 0 318	14 4
8/25/2011	DR-1	Tailings Accumulation Area (at gate)	582	--	8 6	--	--	no sample	--	--	--	--
8/25/2011	DR-2	Repository level (SW corner of fuel containment)	598	--	29 3	--	--	no sample	--	--	--	--
8/25/2011	PDR	On START personnel (Steve Hall)	616	--	25	--	--	no sample	--	--	--	--
8/26/2011	DR-1	Tailings Accumulation Area (at gate)	345	--	35 1	--	--	no sample	--	--	--	--
8/26/2011	DR-2	Repository level (SW corner of fuel containment)	247	--	18 5	--	--	no sample	--	--	--	--
8/27/2011	DR-1	Tailings Accumulation Area (at gate)	559	--	28 0	--	--	no sample	--	--	--	--
8/27/2011	DR-2	Repository level (SW corner of fuel containment)	561	--	35 1	--	--	no sample	--	--	--	--
8/29/2011	DR-1	Tailings Accumulation Area (at gate)	454	--	31 3	--	--	no sample	--	--	--	--
8/29/2011	DR-2	Repository level (SW corner of fuel containment)	467	--	34 3	--	--	no sample	--	--	--	--
8/30/2011	DR-1	Tailings Accumulation Area (at gate)	492	--	18 2	--	--	no sample	--	--	--	--
8/30/2011	DR-2	Repository level (SW corner of fuel containment)	355	--	21 2	--	--	no sample	--	--	--	--
8/31/2011	DR-1	Tailings Accumulation Area (at gate)	140	--	9 1	--	--	no sample	--	--	--	--
8/31/2011	DR-2	Repository level (SW corner of fuel containment)	142	--	19 2	--	--	no sample	--	--	--	--
9/1/2011	DR-2	Repository level (SW corner of fuel containment)	541	--	11 1	--	--	no sample	--	--	--	--
9/2/2011	DR-2	Repository level (SW corner of fuel containment)	539	--	16 2	--	--	no sample	--	--	--	--
9/3/2011	DR-1	Upper Level Mine Area (in tree line west of southern portion of waste rock footprint)	223	--	26 9	--	--	no sample	--	--	--	--
9/3/2011	DR-2	Repository level (SW corner of fuel containment)	196	--	15 3	--	--	no sample	--	--	--	--
9/3/2011	PDR	Interior of haul truck (Thuan Ngo)	211	--	83	--	--	no sample	--	--	--	--
9/5/2011	DR-1	Upper Level Mine Area (in tree line west of southern portion of waste rock footprint)	492	--	29 3	--	--	no sample	--	--	--	--
9/5/2011	DR-2	Repository level (SW corner of fuel containment) - unit SWitched off	217	--	93 7	--	--	no sample	--	--	--	--
9/6/2011	DR-1	Upper Level Mine Area (SW corner of conex)	564	--	33 5	--	--	no sample	--	--	--	--
9/6/2011	DR-2	Repository level (SW corner of fuel containment)	568	--	21 6	--	--	no sample	--	--	--	--
9/7/2011	DR-1	Upper Level Mine Area (SW corner of conex)	575	--	37 0	--	--	no sample	--	--	--	--
9/7/2011	DR-2	Repository level (SW corner of fuel containment)	573	--	18 5	--	--	no sample	--	--	--	--
9/8/2011	DR-1	Repository level (SW corner of fuel containment)	585	--	50 8	--	--	no sample	--	--	--	--
9/8/2011	DR-2	Upper Level Mine Area (SE Corner of ERRS trailer pad)	596	--	206 0	--	--	no sample	--	--	--	--
9/9/2011	DR-1	Upper Level Mine Area (SE Corner of ERRS trailer pad)	569	--	115 0	--	--	no sample	--	--	--	--
9/9/2011	DR-2	Repository level (SW corner of fuel containment)	565	--	42 0	--	--	no sample	--	--	--	--
9/9/2011	PDR	Interior of water truck (Mark Wells)	589	--	96 0	--	--	no sample	--	--	--	--
9/10/2011	DR-1	Upper Level Mine Area (SW Corner of START trailer pad)	538	--	35 8	--	--	no sample	--	--	--	--
9/10/2011	DR-2	Repository level (SW corner of fuel containment)	547	--	12 6	--	--	no sample	--	--	--	--
9/10/2011	PDR	Interior of water truck (Mark Wells) - morning	232	--	132 0	--	--	no sample	--	--	--	--
9/10/2011	PDR	Interior of water truck (Mark Wells) - afternoon	274	--	163 0	--	--	no sample	--	--	--	--
9/13/2011	DR-1	Upper Level Mine Area (on S side of conex box)	556	--	34 9	--	--	no sample	--	--	--	--
9/13/2011	DR-2	Repository level (near NW corner of fueling area)	538	--	26 6	--	--	no sample	--	--	--	--
9/14/2011	DR-1	Upper Level Mine Area (on SW corner of START trailer gravel pad)	472	--	26 5	--	--	no sample	--	--	--	--
9/14/2011	DR-2	Repository level (near NW corner of fueling area)	460	--	26 0	--	--	no sample	--	--	--	--
9/15/2011	DR-1	Upper Level Mine Area (on SW corner of START trailer gravel pad)	188	--	23 3	--	--	no sample	--	--	--	--
9/15/2011	DR-2	Repository level (near NW corner of fueling area)	175	--	1 1	--	--	no sample	--	--	--	--
9/16/2011	DR-1	Upper Level Mine Area (on SW corner of START trailer gravel pad)	537	--	15 1	--	--	no sample	--	--	--	--
9/16/2011	DR-2	Repository level (near NW corner of fueling area)	563	--	12 4	--	--	no sample	--	--	--	--
9/17/2011	DR-1	Upper Level Mine Area (on SW corner of START trailer gravel pad)	545	--	8 1	--	--	no sample	--	--	--	--
9/17/2011	DR-2	Repository level (near NW corner of fueling area)	527	--	9 8	--	--	no sample	--	--	--	--
9/19/2011	DR-1	Upper Level Mine Area (on SW corner of START trailer gravel pad)	326	--	10 0	--	--	no sample	--	--	--	--
9/19/2011	DR-2	Repository level (near NW corner of fueling area)	304	--	9 8	--	--	no sample	--	--	--	--
9/20/2011	DR-1	Upper Level Mine Area (on SW corner of START trailer gravel pad)	Logging was accidentally disabled			--	--	--	--	--	--	--
9/20/2011	DR-2	Repository level (near NW corner of fueling area)	529	--	8 3	--	--	no sample	--	--	--	--
9/21/2011	DR-1	Upper Level Mine Area (on SW corner of START trailer gravel pad)	574	--	7 5	--	--	no sample	--	--	--	--
9/21/2011	DR-2	Repository level (near NW corner of fueling area)	561	--	5 8	--	--	no sample	--	--	--	--
9/22/2011	DR-1	Upper Level Mine Area (on SW corner of START trailer gravel pad)	572	--	10 7	--	--	no sample	--	--	--	--
9/22/2011	DR-2	Repository level (near NW corner of fueling area)	572	--	15 3	--	--	no sample	--	--	--	--
9/23/2011	DR-1	Upper Level Mine Area (on SW corner of START trailer gravel pad)	191	--	8 4	--	--	no sample	--	--	--	--
9/23/2011	DR-2	Repository level (near NW corner of fueling area)	180	--	12 1	--	--	no sample	--	--	--	--

Notes: (1) 15,000 for total particulates, 5,000 for respirable particulates
(2) Exterior of excavator; NOT representative of extended personnel exposure

Key:
ug/m^3 = micrograms per cubic meter
As = Arsenic
Cd = Cadmium
Conc = concentration
EPA = United States Environmental Protection Agency
ERRS = Emergency and Rapid Response Services
ID = Identification
Instr = Instrument
Max = maximum
N/A = not applicable
NIOSH = National Institute for Occupational Safety and Health
NW = Northwest
OSHA = Occupational Safety and Health Administration
PEL = Permissible Exposure Limit
Pb = Lead
REL = Recommended Exposure Limit
S = South
SE = Southeast
START = Superfund Technical Assessment and Response Team
SW = Southwest
TWA = Time-Weighted Average
Zn = Zinc

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TABLE 7-2
FIELD PORTABLE X-RAY FLUORESCENCE UNIT FIELD SCREENING RESULTS
GRANDVIEW MINE AND MILL SITE
PEND OREILLE COUNTY, WASHINGTON

Row #	Date	Time	Daily Tag #	In-situ / Ex-situ	Purpose	Location ID	Figure ID	Description	Results (mg/kg)				
									Arsenic	Cadmium	Lead	Zinc	Mercury
								Cleanup Level - HH (UM, LL, TA):	**9.34**	**2**	**250**	**24,000**	**2**
								Cleanup Level - ECO (Drainage Ditches):	**9.34**	**2**	**50**	**66.4**	**2**
1	8/20/2011	11:56:25	5	In-situ	Pre-removal characterization	UM		Upper Level Mine Area	33	29	2,751	5,131	--
2	8/20/2011	13:10:25	10	In-situ	Pre-removal characterization	UM		Upslope; brown, fine soil	5	--	24	113	--
3	8/20/2011	13:13:12	11	In-situ	Pre-removal characterization	UM		Behind conex; brown, fine soil	6	2	104	347	--
4	8/20/2011	13:15:28	12	In-situ	Pre-removal characterization	UM		South of conex; brown, fine soil	--	12	524	853	--
5	8/20/2011	13:18:57	13	In-situ	Pre-removal characterization	UM		South of conex; gray gravel	126	--	2,331	3,283	--
6	8/20/2011	13:20:56	14	In-situ	Pre-removal characterization	UM		Start of driveway; gray gravel	45	7	779	1,448	--
7	8/20/2011	13:23:03	15	In-situ	Pre-removal characterization	UM		South of parking; brown, fine soil	6	7	569	1,142	--
8	8/20/2011	13:25:34	16	In-situ	Pre-removal characterization	UM		Vegetated area by slash pile; gray soil	--	25	2,179	3,423	--
9	8/20/2011	13:27:12	17	In-situ	Pre-removal characterization	UM		Duplicate of tag #16 location	--	16	2,200	3,387	--
10	8/20/2011	13:35:34	18	In-situ	Pre-removal characterization	UM		Between trailers; brown, fine soil	10	--	34	167	--
11	8/20/2011	13:37:57	19	In-situ	Pre-removal characterization	UM		Halfway upslope; brown, fine cover material	1	7	31	118	--
12	8/20/2011	13:41:21	20	In-situ	Pre-removal characterization	UM		Between pads; gravel	5	--	23	159	--
13	8/20/2011	13:43:07	21	In-situ	Pre-removal characterization	UM		Gray, fine soil near location of tag #20	240	9	2,789	3,328	--
14	8/20/2011	13:45:19	22	In-situ	Pre-removal characterization	UM		Soil ramp to command post; brown-gray, fine soil	56	7	1,315	2,779	--
15	8/20/2011	13:47:04	23	In-situ	Pre-removal characterization	UM		Soil ramp to command post; brown, fine soil	--	--	816	1,272	--
16	8/20/2011	14:01:52	24	In-situ	Pre-removal characterization	UM		South of conex; gray-brown soil; UM-02-SS	--	2	898	1,268	--
17	8/20/2011	14:09:59	26	In-situ	Pre-removal characterization	UM		Gray gravel at borrow source; UM-03-SS	76	12	799	3,102	--
18	8/20/2011	14:17:15	27	In-situ	Pre-removal characterization	UM		Gray gravel at conex box; UM-04-SS	115	9	2,123	5,265	--
19	8/20/2011	14:57:36	30	In-situ	Pre-removal characterization	LL		Repository base; brown clay at surface	--	--	555	1,526	--
20	8/20/2011	15:00:13	31	In-situ	Pre-removal characterization	LL		Repository base; same location as tag #30 with surface scraped	14	2	85	133	--
21	8/24/2011	16:10:52	3	In-situ	Pre-removal characterization	LL		In front of fueling area; brown soil	--	250	57,017	70,511	--
22	8/24/2011	16:13:13	4	In-situ	Pre-removal characterization	LL		At foot of repository; 24-30" below ground surface, clean	62	19	2,711	4,795	--
23	8/24/2011	16:14:35	5	In-situ	Pre-removal characterization	LL		Duplicate of tag #4 location, with more surface material scraped away; LL-01 SS	72	20	427	2,858	--
24	8/24/2011	16:21:20	6	In-situ	Pre-removal characterization	LL		Between footers; brown soil; LL-02-SS	8	11	113	2,504	--
25	8/24/2011	16:29:49	7	In-situ	Pre-removal characterization	LL		Tailings on repository	--	67	807	12,326	--
26	8/24/2011	16:38:35	8	In-situ	Pre-removal characterization	LL		Distressed/Unvegetated Area; brownish-gray soil; LL-03-SS	170	639	3,769	428,890	--
27	8/24/2011	16:49:41	9	In-situ	Pre-removal characterization	TA		South of the access road; brown soil; TA-01-SS	2	10	54	362	--
28	8/24/2011	16:56:00	10	In-situ	Pre-removal characterization	TA		Tailings on south slope; fine, gray; TA-02-SS	--	54	485	10,635	--
29	8/24/2011	17:01:35	11	In-situ	Pre-removal characterization	TA		Tailings on east side near ravine; TA-03-SS	--	74	1,282	20,698	--
30	8/25/2011	15:18:20	14	Ex-situ	Grab sample, lab correlation	UM		UM-01-SS (11081701)	2	5	50	203	--
31	8/25/2011	15:24:58	15	Ex-situ	Grab sample, lab correlation	UM		UM-01-SS (duplicate)	1	--	50	257	--
32	8/25/2011	15:26:53	16	Ex-situ	Grab sample, lab correlation	UM		UM-02-SS (11081702)	8	3	1,311	2,615	--
33	8/25/2011	15:28:59	17	Ex-situ	Grab sample, lab correlation	UM		UM-03-SS (11081703)	26	16	800	1,864	--
34	8/25/2011	15:31:06	18	Ex-situ	Grab sample, lab correlation	UM		UM-04-SS (11081704)	203	35	2,727	6,160	--
35	8/25/2011	15:47:02	19	Ex-situ	Grab sample, lab correlation	LL		LL-01-SS (11081705)	4	21	12	2,865	--
36	8/25/2011	15:50:01	20	Ex-situ	Grab sample, lab correlation	LL		LL-02-SS (11081706)	5	10	9	2,571	--
37	8/25/2011	16:01:10	23	Ex-situ	Grab sample, lab correlation	LL		LL-02-SS (duplicate)	3	11	9	2,571	--
38	8/25/2011	16:04:25	24	Ex-situ	Grab sample, lab correlation	LL		LL-03-SS (11081707)	132	382	2,033	264,291	--
39	8/25/2011	16:07:07	25	Ex-situ	Grab sample, lab correlation	TA		TA-01-SS (11081708)	7	--	61	424	--
40	8/25/2011	16:09:37	26	Ex-situ	Grab sample, lab correlation	TA		TA-02-SS (11081709)	--	61	723	16,584	--
41	8/25/2011	16:12:29	27	Ex-situ	Grab sample, lab correlation	TA		TA-03-SS (11081710)	--	82	1,548	19,868	--
42	8/25/2011	16:15:24	28	Ex-situ	Grab sample, lab correlation	LL		LL-03-SS (duplicate)	16	119	830	45,956	--
43	8/25/2011	16:18:17	29	Ex-situ	Grab sample, lab correlation	LL		LL-03-SS (duplicate)	--	129	245	25,626	--
44	8/25/2011	16:20:08	30	Ex-situ	Grab sample, lab correlation	LL		LL-03-SS (duplicate)	140	294	2,349	205,310	--
45	8/26/2011	15:42:17	3	Ex-situ	Grab sample, lab correlation	UM		UM-01-SS (rerun test)	--	2	69	208	--
46	8/26/2011	15:46:32	4	Ex-situ	Grab sample, lab correlation	UM		UM-04-SS (rerun test)	57	6	3,045	5,768	--

TABLE 7-2
FIELD PORTABLE X-RAY FLUORESCENCE UNIT FIELD SCREENING RESULTS
GRANDVIEW MINE AND MILL SITE
PEND OREILLE COUNTY, WASHINGTON

Row #	Date	Time	Daily Tag #	In-situ / Ex-situ	Purpose	Location ID	Figure ID	Description	Results (mg/kg)				
									Arsenic	Cadmium	Lead	Zinc	Mercury
47	8/26/2011	15:49:26	5	Ex-situ	Grab sample, lab correlation	TA		TA-03-SS (rerun test)	--	89	1,543	23,321	--
48	8/29/2011	13:18:45	6	In-situ	Characterization during removal	TA		Brown, clayey soil	--	12	134	2,471	--
49	8/29/2011	13:20:45	7	In-situ	Characterization during removal	TA		Gray clay	1	6	12	83	--
50	8/29/2011	13:31:46	8	In-situ	Characterization during removal	TA		Brown, clayey soil	2	3	6	475	--
51	8/29/2011	13:40:41	9	In-situ	Characterization during removal	TA		Brown, clayey soil	1	4	19	639	--
52	8/29/2011	13:48:52	10	In-situ	Characterization during removal	TA		Light brownish-gray, silty soil	--	9	7	471	--
53	8/29/2011	13:53:19	11	In-situ	Characterization during removal	TA		Light brown, silty soil	2	7	13	393	--
54	8/29/2011	14:00:48	12	In-situ	Characterization during removal	TA		Brown, clayey soil	3	6	15	707	--
55	8/29/2011	14:05:03	13	In-situ	Characterization during removal	TA		Brown, clayey soil	6	5	35	1,612	--
56	8/29/2011	14:09:05	14	In-situ	Characterization during removal	TA		Reddish-brown, clayey soil	2	2	52	1,687	--
57	8/29/2011	14:14:27	15	In-situ	Characterization during removal	TA		Brown soil	1	3	17	281	--
58	8/29/2011	14:19:00	16	In-situ	Characterization during removal	TA		Brown soil	1	2	43	673	--
59	8/31/2011	8:44:31	3	In-situ	Characterization during removal	DA		Just below surface vegetation, gray	62	295	2,124	175,067	--
60	8/31/2011	8:48:51	4	In-situ	Characterization during removal	DA		Following excavation, light brown	4	--	20	393	--
61	8/31/2011	8:52:28	5	In-situ	Characterization during removal	DA		Following excavation, gray spot	78	42	592	31,029	--
62	8/31/2011	8:54:21	6	In-situ	Characterization during removal	DA		Same location as tag #5 below gray spot; dark brown	8	26	19	2,184	--
63	8/31/2011	8:59:43	7	In-situ	Characterization during removal	DA		Reddish brown	3	7	12	106	--
64	8/31/2011	9:03:41	8	In-situ	Characterization during removal	DA		Gray spot	40	281	2,892	191,166	--
65	8/31/2011	9:05:34	9	In-situ	Characterization during removal	DA		Same location as tag #8 below gray spot; reddish brown	7	26	20	2,962	--
66	9/2/2011	14:37:48	3	In-situ	Characterization during removal	TA		Brown-orange soil at south end	2	8	16	982	--
67	9/2/2011	14:39:58	4	In-situ	Characterization during removal	TA		Thin gray on surface	--	65	1,629	8,790	--
68	9/2/2011	14:42:05	5	In-situ	Characterization during removal	TA		Same location as tag #4, just below gray, brown-orange soil	--	7	33	1,891	--
69	9/5/2011	7:47:50	3	In-situ	Characterization during removal	DD		Light brown silt with wood fragments	--	53	5,247	13,358	--
70	9/5/2011	7:50:10	4	In-situ	Characterization during removal	DD		Wet clayey light brown	--	126	8,755	26,985	--
71	9/5/2011	7:51:52	5	In-situ	Characterization during removal	DD		Gray with rock fragments	--	22	2,777	6,573	--
72	9/5/2011	7:57:21	6	In-situ	Characterization during removal	DD		Following scraping with dozer, gray-brown	--	33	3,221	8,903	--
73	9/5/2011	10:38:38	7	Ex-situ	Composite sample, confirmation	TA		TA-04-SS	1	--	39	1,077	--
74	9/5/2011	10:54:55	8	Ex-situ	Composite sample, confirmation	TA		TA-05-SS	--	3	40	831	--
75	9/5/2011	10:59:29	9	Ex-situ	Composite sample, confirmation	TA		TA-06-SS	--	12	110	1,555	--
76	9/5/2011	11:09:45	10	Ex-situ	Composite sample, confirmation	TA		TA-07-SS	--	11	58	1,479	--
77	9/5/2011	11:13:15	11	Ex-situ	Composite sample, confirmation	TA		TA-08-SS	--	1	62	1,618	--
78	9/5/2011	13:15:16	16	Ex-situ	Composite sample, confirmation	TA		TA-09-SS	1	--	30	916	--
79	9/5/2011	13:22:25	17	Ex-situ	Composite sample, confirmation	TA		TA-10-SS	--	--	49	1,255	--
80	9/5/2011	14:27:07	18	In-situ	Characterization during removal	HA		Northern area (1 of 3 homesite areas); small gravel patch	48	44	4,188	12,985	--
81	9/5/2011	14:31:48	19	In-situ	Characterization during removal	HA		Northern area (1 of 3 homesite areas); bare dirt to east of gravel patch	20	23	2,502	6,293	--
82	9/5/2011	14:34:37	20	In-situ	Characterization during removal	HA		Northern area (1 of 3 homesite areas); ~10' further east	141	11	2,165	5,169	--
83	9/5/2011	14:43:12	21	In-situ	Characterization during removal	LL		Grandview Flat Road, ~10' from intersection with Hwy 31, center	3	6	147	561	--
84	9/5/2011	14:47:38	22	In-situ	Characterization during removal	LL		Grandview Flat Road, ~300' further down road at intersection with road to UM, center	4	--	394	1,328	--
85	9/5/2011	14:51:58	23	In-situ	Characterization during removal	LL		Grandview Flat Road, ~300' further down road, tree w/no branches is ~50' away to north	7	--	201	953	--
86	9/5/2011	15:15:59	25	In-situ	Characterization during removal	LL		Grandview Flat Road; same location as tag #23, on east side of road	10	2	243	981	--
87	9/5/2011	15:20:04	26	In-situ	Characterization during removal	LL		Grandview Flat Road; ~300' further down road, adjacent to cable caution sign, center	8	4	379	1,951	--
88	9/5/2011	15:21:44	27	In-situ	Characterization during removal	LL		Grandview Flat Road; same location as tag #26, on east side of road	10	7	252	1,291	--
89	9/5/2011	15:23:27	28	In-situ	Characterization during removal	LL		Grandview Flat Road; same location as tag #26, on west side of road	5	27	774	4,882	--
90	9/5/2011	15:26:47	29	In-situ	Characterization during removal	LL		Grandview Flat Road; ~150' further down road, adjacent to telephone pole, center	--	17	589	4,439	--

TABLE 7-2
FIELD PORTABLE X-RAY FLUORESCENCE UNIT FIELD SCREENING RESULTS
GRANDVIEW MINE AND MILL SITE
PEND OREILLE COUNTY, WASHINGTON

Row #	Date	Time	Daily Tag #	In-situ / Ex-situ	Purpose	Location ID	Figure ID	Description	Results (mg/kg)				
									Arsenic	Cadmium	Lead	Zinc	Mercury
91	9/5/2011	15:28:44	30	In-situ	Characterization during removal	LL		Grandview Flat Road; same location as #29, east side of road	--	16	585	4,047	--
92	9/5/2011	15:30:14	31	In-situ	Characterization during removal	LL		Grandview Flat Road; same location as #29, west side of road, berm adjacent to Distressed/Unvegetated Area	12	57	922	17,092	--
93	9/5/2011	15:33:41	32	In-situ	Characterization during removal	LL		Grandview Flat Road; ~200' further down road, adjacent to next telephone pole, center	10	20	1,024	4,499	--
94	9/5/2011	15:35:18	33	In-situ	Characterization during removal	LL		Grandview Flat Road; same location as tag #32, east side of road	39	17	594	6,296	--
95	9/5/2011	15:36:59	34	In-situ	Characterization during removal	LL		Grandview Flat Road; same location as tag #32, west side of road, berm	17	30	1,141	7,800	--
96	9/5/2011	15:39:24	35	In-situ	Characterization during removal	LL		Grandview Flat Road; cul-de-sac, center	--	13	847	3,668	--
97	9/5/2011	15:41:49	36	In-situ	Characterization during removal	LL		Grandview Flat Road; in front of cabin	4	12	621	2,599	--
98	9/5/2011	16:12:54	37	Ex-situ	Composite sample, confirmation	TA		TA-11-SS	3	--	82	2,447	--
99	9/5/2011	16:14:44	38	Ex-situ	Composite sample, confirmation	TA		TA-12-SS	4	--	27	766	--
100	9/5/2011	16:18:50	39	Ex-situ	Composite sample, confirmation	TA		TA-13-SS	3	5	52	1,426	--
101	9/5/2011	16:24:34	40	Ex-situ	Composite sample, confirmation	TA		TA-14-SS	6	--	29	684	--
102	9/5/2011	16:30:07	42	Ex-situ	Composite sample, confirmation	TA		TA-15-SS	1	5	38	700	--
103	9/5/2011	16:32:03	43	Ex-situ	Composite sample, confirmation	TA		TA-16-SS	4	--	84	835	--
104	9/5/2011	16:34:13	44	Ex-situ	Composite sample, confirmation	TA		TA-17-SS	4	--	197	1,543	--
105	9/5/2011	16:35:47	45	Ex-situ	Composite sample, confirmation	TA		TA-18-SS	--	--	64	1,208	--
106	9/5/2011	16:41:10	46	Ex-situ	Composite sample, confirmation	TA		TA-19-SS	2	11	67	1,351	--
107	9/5/2011	16:42:56	47	Ex-situ	Composite sample, confirmation	TA		TA-20-SS	2	1	79	1,777	--
108	9/5/2011	16:44:38	48	Ex-situ	Composite sample, confirmation	TA		TA-21-SS	--	6	44	1,185	--
109	9/5/2011	16:46:09	49	Ex-situ	Composite sample, confirmation	TA		TA-22-SS	--	--	62	1,504	--
110	9/5/2011	16:47:58	50	Ex-situ	Composite sample, confirmation	TA		TA-23-SS	3	10	124	1,500	--
111	9/5/2011	16:49:29	51	Ex-situ	Composite sample, confirmation	TA		TA-24-SS	5	9	43	2,011	--
112	9/6/2011	14:20:21	5	Ex-situ	Composite sample, confirmation	TA		HA-01-SS	--	12	330	847	--
113	9/6/2011	14:24:37	6	Ex-situ	Composite sample, confirmation	TA		HA-02-SS	2	1	178	337	--
114	9/7/2011	13:58:15	5	In-situ	Characterization, remains in-place	DG	DG-1	5' west of end, 5' south of center	--	5	711	2,004	--
115	9/7/2011	14:03:04	7	In-situ	Characterization, remains in-place	DG	DG-2	5' west of end, center	--	31	318	6,717	3
116	9/7/2011	14:05:51	8	In-situ	Characterization, remains in-place	DG	DG-3	5' west of end, 5' north of center	--	3	694	1,719	--
117	9/7/2011	14:14:07	10	In-situ	Characterization, remains in-place	DG	DG-4	5' west of end, 15' north of center	--	2	145	502	--
118	9/7/2011	14:19:05	11	In-situ	Characterization, remains in-place	DG	DG-5	50' west of end, 15' north of center	--	8	190	858	--
119	9/7/2011	14:21:08	12	In-situ	Characterization, remains in-place	DG	DG-6	50' west of end, 10' north of center	--	--	352	1,198	--
120	9/7/2011	14:23:42	13	In-situ	Characterization, remains in-place	DG	DG-7	70' west of end, 15' north of center	--	7	277	889	--
121	9/7/2011	14:27:22	14	In-situ	Characterization, remains in-place	DG	DG-8	100' west of end, 10' north of center	--	1	287	1,154	--
122	9/7/2011	14:29:39	15	In-situ	Characterization, remains in-place	DG	DG-9	100' west of end, 6' north of center	--	17	820	2,737	--
123	9/7/2011	14:31:20	16	In-situ	Characterization, remains in-place	DG	DG-10	100' west of end, 5' south of center	--	19	2,066	2,220	--
124	9/7/2011	14:35:40	17	In-situ	Characterization, remains in-place	DG	DG-11	100' west of end, 25' south of center	1	8	181	600	--
125	9/7/2011	14:38:13	18	In-situ	Characterization, remains in-place	DG	DG-12	85' west of end, 50' south of center	--	3	213	623	--
126	9/7/2011	14:42:57	19	In-situ	Characterization, remains in-place	DG	DG-13	75' west of end, 25' south of center	--	4	311	1,144	--
127	9/7/2011	14:44:47	20	In-situ	Characterization, remains in-place	DG	DG-14	50' west of end, 10' south of center	--	1	662	2,213	7
128	9/7/2011	14:47:04	21	In-situ	Characterization, remains in-place	DG	DG-15	25' west of end, 15' south of center	--	14	534	2,745	3
129	9/7/2011	14:48:44	22	In-situ	Characterization, remains in-place	DG	DG-16	5' west of end, 50' south of center	--	4	93	392	--
130	9/7/2011	14:53:11	23	In-situ	Characterization, remains in-place	DG	DG-17	5' east of end, 15' south of center	--	12	760	1,865	--
131	9/7/2011	14:56:47	24	In-situ	Characterization, remains in-place	DG	DG-18	5' east of end, 25' south of center	--	9	111	415	--
132	9/7/2011	14:58:04	25	In-situ	Characterization, remains in-place	DG	DG-18	Same location as tag #24	--	10	115	416	--
133	9/8/2011	11:28:25	5	In-situ	Characterization, remains in-place	DD	DD-1	Face of ditch center	--	25	2,339	5,552	--
134	9/8/2011	11:33:33	6	In-situ	Characterization, remains in-place	DD	DD-2	10' north of center	--	20	903	4,469	--
135	9/8/2011	11:39:18	7	In-situ	Characterization, remains in-place	DD	DD-3	15' east, 6' north of center	1	5	364	1,517	--
136	9/8/2011	11:43:54	9	In-situ	Characterization, remains in-place	DD	DD-4	25' east, 8' north of center	--	22	1,933	7,218	--

TABLE 7-2
FIELD PORTABLE X-RAY FLUORESCENCE UNIT FIELD SCREENING RESULTS
GRANDVIEW MINE AND MILL SITE
PEND OREILLE COUNTY, WASHINGTON

Row #	Date	Time	Daily Tag #	In-situ / Ex-situ	Purpose	Location ID	Figure ID	Description	Results (mg/kg)				
									Arsenic	Cadmium	Lead	Zinc	Mercury
137	9/8/2011	11:45:58	10	In-situ	Characterization, remains in-place	DD	DD-5	40' east, 8' north of center	--	10	550	2,240	3
138	9/8/2011	11:47:52	11	In-situ	Characterization, remains in-place	DD	DD-6	50' east, 3' north of center, west end of rock	--	21	1,200	3,951	--
139	9/8/2011	11:49:45	12	In-situ	Characterization, remains in-place	DD	DD-6	50' east, 3' north of center, west end of rock	--	12	1,176	3,889	--
140	9/8/2011	11:52:11	13	In-situ	Characterization, remains in-place	DD	DD-7	60' east, 2' north of center	40	5	593	3,719	--
141	9/8/2011	11:54:20	14	In-situ	Characterization, remains in-place	DD	DD-8	65' east of center	--	45	4,225	9,180	--
142	9/8/2011	11:57:25	15	In-situ	Characterization, remains in-place	DD	DD-9	75' east, 6' north of center at confluence with MD	--	9	4,162	5,116	--
143	9/8/2011	11:59:22	16	In-situ	Characterization, remains in-place	DD	DD-10	85' east, 3' north of center	--	13	1,201	3,296	--
144	9/8/2011	12:01:39	17	In-situ	Characterization, remains in-place	DD	DD-11	85' east, 10' north of center	31	7	495	2,678	--
145	9/8/2011	12:03:38	18	In-situ	Characterization, remains in-place	DD	DD-12	95' east, 1' north of center	--	22	1,104	4,952	--
146	9/8/2011	12:05:50	19	In-situ	Characterization, remains in-place	DD	DD-13	110' east, 10' north of center	9	15	479	2,815	--
147	9/8/2011	12:07:57	20	In-situ	Characterization, remains in-place	DD	DD-14	130' east, 5' north of center	--	23	1,787	4,765	--
148	9/8/2011	12:10:11	21	In-situ	Characterization, remains in-place	DD	DD-15	150' east, 6' north of center	--	21	1,356	4,222	1
149	9/8/2011	12:12:17	22	In-situ	Characterization, remains in-place	DD	DD-16	175' east, 10' north of center	--	21	1,401	5,205	--
150	9/8/2011	12:14:16	23	In-situ	Characterization, remains in-place	DD	DD-17	200' east, 8' north of center	90	60	2,515	25,515	--
151	9/8/2011	12:15:37	24	In-situ	Characterization, remains in-place	DD	DD-17	200' east, 8' north of center	21	90	2,889	25,394	--
152	9/8/2011	12:18:10	25	In-situ	Characterization, remains in-place	DD	DD-18	225' east, 5' north of center, east end	--	24	1,443	4,281	2
153	9/8/2011	12:25:50	26	In-situ	Characterization, remains in-place	DD	DD-19	195' east, 5' south of center	--	37	3,388	5,996	--
154	9/8/2011	12:28:53	27	In-situ	Characterization, remains in-place	DD	DD-20	150' east, 10' south of center	--	10	598	892	6
155	9/8/2011	12:35:03	28	In-situ	Characterization, remains in-place	DD	DD-21	120' east, 10' south of center	--	8	306	1,527	2
156	9/8/2011	12:37:09	29	In-situ	Characterization, remains in-place	DD	DD-22	97' east, 4' south of center	6	13	546	2,816	--
157	9/8/2011	12:39:24	30	In-situ	Characterization, remains in-place	DD	DD-23	South slope of MD at confluence	3	7	63	308	--
158	9/8/2011	12:42:06	31	In-situ	Characterization, remains in-place	DD	DD-24	50' east, 5' south of center, across from #11	--	15	504	2,176	--
159	9/8/2011	12:44:24	32	In-situ	Characterization, remains in-place	DD	DD-25	20' east, 8' south of center	--	12	379	1,740	--
160	9/8/2011	12:48:56	33	In-situ	Characterization, remains in-place	DD	DD-26	30' west, 5' north of center, peninsula, 8" thick tailings	--	24	2,081	4,348	--
161	9/8/2011	12:51:37	34	In-situ	Characterization, remains in-place	DD	DD-27	30' northwest of #5, peninsula	--	3	289	1,252	--
162	9/8/2011	12:56:01	35	In-situ	Characterization, remains in-place	DD	DD-28	40' west of #5, peninsula, 12" thick tailings	--	36	751	5,470	9
163	9/9/2011	10:28:21	7	In-situ	Characterization, remains in-place	MD	MD-1	10' northwest of confluence with DD	--	21	672	3,416	4
164	9/9/2011	10:33:44	9	In-situ	Characterization, remains in-place	MD	MD-2	25' northwest of confluence	--	18	5,074	5,674	--
165	9/9/2011	10:35:30	10	In-situ	Characterization, remains in-place	MD	MD-3	35' northwest of confluence	165	38	7,957	5,147	--
166	9/9/2011	10:37:27	11	In-situ	Characterization, remains in-place	MD	MD-4	65' northwest of confluence	--	20	1,905	3,623	4
167	9/9/2011	10:39:36	12	In-situ	Characterization, remains in-place	MD	MD-5	100' northwest of confluence	--	19	816	3,895	7
168	9/9/2011	10:42:43	13	In-situ	Characterization, remains in-place	MD	MD-6	130' northwest of confluence	--	14	938	3,139	4
169	9/9/2011	10:44:47	14	In-situ	Characterization, remains in-place	MD	MD-7	180' northwest of confluence	--	24	676	4,064	11
170	9/9/2011	10:48:38	15	In-situ	Characterization, remains in-place	MD	MD-8	230' northwest of confluence	29	25	1,057	5,830	3
171	9/9/2011	10:50:39	16	In-situ	Characterization, remains in-place	MD	MD-9	270' northwest of confluence	--	2	315	2,065	10
172	9/9/2011	10:53:05	17	In-situ	Characterization, remains in-place	MD	MD-10	320' northwest of confluence	8	25	985	2,953	6
173	9/9/2011	10:56:01	18	In-situ	Characterization, remains in-place	MD	MD-11	370' northwest of confluence	--	9	957	3,260	8
174	9/9/2011	11:00:06	20	In-situ	Characterization, remains in-place	MD	MD-12	50' north of split	--	8	731	1,533	2
175	9/9/2011	11:04:56	22	In-situ	Characterization, remains in-place	MD	MD-13	100' north of split	--	17	980	3,526	2
176	9/9/2011	11:07:25	23	In-situ	Characterization, remains in-place	MD	MD-14	150' north of split	--	27	3,926	4,931	--
177	9/9/2011	11:58:13	24	In-situ	Characterization, remains in-place	DD		Rock at west edge of ditch	--	32	1,329	12,062	--
178	9/9/2011	13:04:34	26	In-situ	Characterization during removal	LL		North side of repository	--	1	688	1,950	--
179	9/9/2011	13:08:53	27	In-situ	Characterization during removal	LL		Northeast side of repository	56	28	1,697	11,885	--
180	9/9/2011	13:12:40	28	In-situ	Characterization during removal	LL		20' east of #27, tailings	--	150	5,651	50,475	--
181	9/9/2011	15:53:23	33	Ex-situ	Characterization, remains in-place	DG		DG-01-SS	5	25	323	9,949	2
182	9/9/2011	15:55:15	34	Ex-situ	Characterization, remains in-place	DG		DG-02-SS	--	11	613	3,743	4
183	9/9/2011	15:59:02	36	Ex-situ	Characterization, remains in-place	DG		DG-03-SS	--	10	611	2,395	--
184	9/9/2011	16:00:54	37	Ex-situ	Characterization, remains in-place	DG		DG-04-SS	--	20	2,927	4,119	--
185	9/9/2011	16:11:06	39	Ex-situ	Characterization, remains in-place	DD		DD-01-SS	--	27	2,546	4,842	4

TABLE 7-2
FIELD PORTABLE X-RAY FLUORESCENCE UNIT FIELD SCREENING RESULTS
GRANDVIEW MINE AND MILL SITE
PEND OREILLE COUNTY, WASHINGTON

Row #	Date	Time	Daily Tag #	In-situ / Ex-situ	Purpose	Location ID	Figure ID	Description	Results (mg/kg)				
									Arsenic	Cadmium	Lead	Zinc	Mercury
186	9/9/2011	16:12:46	40	Ex-situ	Characterization, remains in-place	DD		DD-02-SS	--	102	5,227	32,999	--
187	9/9/2011	16:18:20	41	Ex-situ	Characterization, remains in-place	DD		Duplicate of DD-02-SS	36	79	4,354	25,787	--
188	9/9/2011	16:20:16	42	Ex-situ	Characterization, remains in-place	DD		DD-03-SS	--	36	2,685	9,010	--
189	9/9/2011	16:21:51	43	Ex-situ	Characterization, remains in-place	DD		DD-04-SS	--	30	2,604	9,215	--
190	9/9/2011	16:28:11	44	Ex-situ	Characterization, remains in-place	DD		DD-05-SS	--	53	4,267	8,305	--
191	9/9/2011	16:30:27	45	Ex-situ	Characterization, remains in-place	DD		DD-06-SS	--	58	3,966	14,540	--
192	9/9/2011	16:37:36	46	Ex-situ	Characterization, remains in-place	MD		MD-01-SS	--	22	7,597	5,627	--
193	9/9/2011	16:39:16	47	Ex-situ	Characterization, remains in-place	MD		MD-02-SS	--	16	577	2,181	14
194	9/9/2011	16:45:02	48	Ex-situ	Characterization, remains in-place	MD		MD-03-SS	--	17	1,142	3,824	6
195	9/9/2011	16:46:57	49	Ex-situ	Characterization, remains in-place	MD		MD-04-SS	--	23	5,370	4,589	--
196	9/10/2011	9:02:26	8	In-situ	Characterization, remains in-place	UM	UM-1	South slope, waste rock footprint	27	9	166	806	--
197	9/10/2011	9:06:14	9	In-situ	Characterization, remains in-place	UM	UM-2	Northwest side of waste rock footprint	8	--	30	250	--
198	9/10/2011	9:11:19	11	In-situ	Characterization, remains in-place	UM	UM-3	Northeast side of waste rock footprint	6	--	27	207	3
199	9/10/2011	9:13:11	13	In-situ	Characterization, remains in-place	UM	UM-4	East side of waste rock footprint	10	7	1,282	3,536	--
200	9/10/2011	9:14:57	17	In-situ	Characterization, remains in-place	UM	UM-5	Southeast side of waste rock footprint	18	6	381	820	--
201	9/10/2011	11:07:19	18	Ex-situ	Characterization, remains in-place	UM		UM-05-SS	44	23	2,159	4,446	--
202	9/10/2011	11:12:12	19	Ex-situ	Characterization, remains in-place	UM		UM-06-SS	32	--	192	399	2
203	9/10/2011	11:14:26	20	Ex-situ	Characterization, remains in-place	UM		UM-07-SS	27	7	353	1,704	--
204	9/10/2011	11:16:32	21	Ex-situ	Characterization, remains in-place	UM		UM-08-SS	8	5	157	415	1
205	9/13/2011	8:55:17	4	In-situ	Characterization, remains in-place	LL		Northeast ledge to east of repository; silty soil	4	5	41	95	--
206	9/13/2011	8:58:37	5	In-situ	Characterization, remains in-place	LL		Northeast ledge to east of repository; sandy soil	4	--	10	64	--
207	9/13/2011	9:01:35	6	In-situ	Characterization, remains in-place	LL		Northeast ledge to east of repository; sandy soil	1	4	18	74	--
208	9/13/2011	9:04:35	7	In-situ	Characterization, remains in-place	LL		Northeast ledge to east of repository; silty-sandy soil	4	9	10	54	--
209	9/13/2011	9:06:53	8	In-situ	Characterization, remains in-place	LL		Northeast ledge to east of repository; waste rock slope	12	9	505	1,149	--
210	9/13/2011	10:02:36	9	Ex-situ	Characterization, remains in-place	LL		LL-04-SS	--	4	683	849	--
211	9/14/2011	11:09:50	3	In-situ	Characterization, remains in-place	HA	HA-1	Middle area (2 of 3 homesite areas)	251	49	3,795	15,571	--
212	9/14/2011	11:25:21	4	In-situ	Characterization, remains in-place	HA	HA-2	Middle area (2 of 3 homesite areas)	45	72	3,689	14,456	--
213	9/14/2011	11:30:04	5	In-situ	Characterization, remains in-place	HA	HA-3	Middle area (2 of 3 homesite areas)	71	100	2,491	46,301	--
214	9/14/2011	11:41:16	6	In-situ	Characterization, remains in-place	HA	HA-4	Middle area (2 of 3 homesite areas)	208	46	2,773	16,367	--
215	9/14/2011	11:46:06	7	In-situ	Characterization, remains in-place	HA	HA-5	Middle area (2 of 3 homesite areas)	--	33	2,645	8,557	--
216	9/14/2011	11:52:35	8	In-situ	Characterization, remains in-place	HA	HA-6	Middle area (2 of 3 homesite areas)	91	11	2,120	2,633	--
217	9/14/2011	11:57:16	9	In-situ	Characterization, remains in-place	HA	HA-7	Middle area (2 of 3 homesite areas)	88	16	1,893	5,164	--
218	9/14/2011	12:05:27	10	In-situ	Characterization, remains in-place	HA	HA-8	Middle area (2 of 3 homesite areas)	67	15	1,845	4,280	--
219	9/14/2011	12:07:28	11	In-situ	Characterization, remains in-place	HA	HA-9	Middle area (2 of 3 homesite areas)	--	12	448	1,953	--
220	9/14/2011	12:09:25	12	In-situ	Characterization, remains in-place	HA	HA-10	Middle area (2 of 3 homesite areas)	4	36	3,226	8,390	--
221	9/14/2011	12:58:06	13	In-situ	Characterization, remains in-place	HA	HA-11	Southern area (3 of 3 homesite areas)	5	19	903	2,292	--
222	9/14/2011	13:02:39	14	In-situ	Characterization, remains in-place	HA	HA-12	Southern area (3 of 3 homesite areas)	134	26	2,281	5,350	--
223	9/14/2011	13:08:05	15	In-situ	Characterization, remains in-place	HA	HA-13	Southern area (3 of 3 homesite areas)	10	17	1,105	6,187	--
224	9/14/2011	13:31:44	16	In-situ	Characterization, remains in-place	HA	HA-14	Southern area (3 of 3 homesite areas)	--	10	1,340	5,001	--
225	9/14/2011	13:37:07	17	In-situ	Characterization, remains in-place	HA	HA-15	Southern area (3 of 3 homesite areas)	19	14	1,215	4,222	--
226	9/14/2011	13:41:27	18	In-situ	Characterization, remains in-place	HA	HA-16	Southern area (3 of 3 homesite areas)	--	15	1,176	4,015	--
227	9/14/2011	13:49:25	19	In-situ	Characterization, remains in-place	HA	HA-17	Southern area (3 of 3 homesite areas)	--	25	836	2,288	--
228	9/14/2011	15:56:09	23	Ex-situ	Characterization, remains in-place	HA		HA-03-SS	13	45	4,669	14,128	--
229	9/14/2011	15:58:53	24	Ex-situ	Characterization, remains in-place	HA		HA-04-SS	136	31	5,135	9,496	--
230	9/14/2011	16:02:47	25	Ex-situ	Characterization, remains in-place	HA		HA-05-SS	115	14	2,431	6,785	--
231	9/14/2011	16:04:45	26	Ex-situ	Characterization, remains in-place	HA		HA-06-SS	40	29	1,615	5,753	--
232	9/14/2011	16:10:58	27	Ex-situ	Characterization, remains in-place	HA		HA-07-SS	106	17	1,502	5,919	--
233	9/16/2011	9:33:05	3	In-situ	Confirmation	UR		Upper Road	2	11	18	83	--
234	9/16/2011	9:39:33	4	In-situ	Confirmation	UR		Upper Road, took sample UR-01-SS	2	--	25	298	--

TABLE 7-2
FIELD PORTABLE X-RAY FLUORESCENCE UNIT FIELD SCREENING RESULTS
GRANDVIEW MINE AND MILL SITE
PEND OREILLE COUNTY, WASHINGTON

Row #	Date	Time	Daily Tag #	In-situ / Ex-situ	Purpose	Location ID	Figure ID	Description	Results (mg/kg)				
									Arsenic	Cadmium	Lead	Zinc	Mercury
235	9/16/2011	9:46:49	5	In-situ	Confirmation	UR		Upper Road	4	1	13	66	--
236	9/16/2011	10:07:23	6	In-situ	Confirmation	UR		Upper Road, took sample UR-02-SS	4	--	17	63	--
237	9/16/2011	10:16:29	7	In-situ	Confirmation	UR		Upper Road	--	--	26	94	--
238	9/16/2011	10:30:09	8	In-situ	Confirmation	UR		Upper Road, took sample UR-03-SS	7	5	54	267	--
239	9/16/2011	10:41:53	9	In-situ	Confirmation	UR		Upper Road	--	3	47	162	--
240	9/16/2011	14:52:25	14	Ex-situ	Grab sample, confirmation	UR		UR-01-SS	7	3	14	115	--
241	9/16/2011	14:56:47	15	Ex-situ	Grab sample, confirmation	UR		UR-02-SS	5	--	12	69	--
242	9/16/2011	14:59:37	16	Ex-situ	Grab sample, confirmation	UR		UR-03-SS	2	--	23	155	--
243	9/19/2011	16:03:18	3	In-situ	Characterization during removal	LL		In front of cabin, ~6' west of tree	3	8	572	2,760	--
244	9/19/2011	16:05:33	4	In-situ	Characterization during removal	LL		~2.5' south of fence line	--	26	4,084	8,804	--
245	9/19/2011	16:08:24	5	In-situ	Characterization during removal	LL		West side of cul-de-sac, at centerline of garden	--	20	1,792	8,149	--
246	9/19/2011	16:14:08	6	In-situ	Characterization during removal	LL		West side of cul-de-sac in line with tree	--	48	1,734	9,619	--
247	9/24/2011	13:32:37	3	In-situ	Confirmation	DA		Distressed/Unvegetated Area	8	--	112	1,626	--
248	9/24/2011	13:38:26	4	In-situ	Confirmation	DA		Distressed/Unvegetated Area by tree	13	42	137	14,894	--
249	9/24/2011	13:40:05	5	In-situ	Confirmation	DA		Distressed/Unvegetated Area, unvegetated soil	3	1	30	1,413	--
250	9/24/2011	13:57:16	6	In-situ	Confirmation	FD		Former drum storage area	2	--	48	1,048	--
251	9/24/2011	13:58:42	7	In-situ	Confirmation	FD		Former drum storage area	1	38	113	4,334	--
252	9/24/2011	13:59:59	8	In-situ	Confirmation	FD		Former drum storage area	2	11	77	3,475	--
253	9/24/2011	14:01:56	9	In-situ	Confirmation	LL		Southwest portion, near DD	2	--	15	76	--
254	9/24/2011	14:03:10	10	In-situ	Confirmation	LL		Southwest portion, near DD	3	7	13	72	--
255	9/24/2011	14:04:33	11	In-situ	Confirmation	DD		Upper Drainage Ditch	7	3	45	1,651	--
256	9/24/2011	14:05:41	12	In-situ	Confirmation	DD		Upper Drainage Ditch	4	11	19	1,867	--
257	9/24/2011	14:06:59	13	In-situ	Confirmation	DD		Upper Drainage Ditch	6	--	33	1,395	--
258	9/24/2011	14:08:11	14	In-situ	Confirmation	DD		Upper Drainage Ditch	--	12	229	779	--
259	9/24/2011	15:04:19	15	Ex-situ	Composite sample, confirmation	DA		DU-01-SS	4	18	17	1,751	--
260	9/24/2011	15:07:10	16	Ex-situ	Composite sample, confirmation	DA		DU-02-SS	--	6	54	1,208	--
261	9/24/2011	15:13:12	18	Ex-situ	Composite sample, confirmation	FD		FD-01-SS	5	3	41	2,055	--
262	9/24/2011	15:16:02	19	Ex-situ	Composite sample, confirmation	LL		LL-05-SS	--	1	68	335	--
263	9/24/2011	15:20:10	20	Ex-situ	Composite sample, confirmation	DD		DD-07-SS	4	10	34	1,657	--

Key:

DA = Distressed/Unvegetated Area
DD = Drainage Ditch
DG = Downgradient Ditch
ECO = ecological
FD = Former Drum Storage Area
HA = Homesite Area
HH = human health
LL = Lower Level Mill Area
MD = Man-made Ditch
mg/kg = milligrams per kilogram
SS = surface soil
TA = Tailings Accumulation Area
UM = Upper Level Mine Area
UR = Upper Road

TABLE 7-3
SOIL SAMPLE RESULTS
GRANDVIEW MINE AND MILL SITE
PEND OREILLE COUNTY, WASHINGTON

Sample Number	Sampling Location	Date Sampled	Metals (mg/kg)									
			Arsenic		Cadmium		Lead		Mercury		Zinc	
			Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Cleanup Level - HH (UM, LL, TA)			**9.34**		**2**		**250**		**2**		**24,000**	
Cleanup Level - ECO (Drainage Ditches)			**9.34**		**2**		**50**		**2**		**66.4**	
11081701	UM-01-SS	8/20/2011	**3.54**		**0.736**		**39.1**	**JK**	0.0137	U	**160**	**JK**
11081702	UM-02-SS	8/20/2011	**8.26**		**35.4**		**1,560**	**JK**	**0.383**		**9,580**	**JK**
11081703	UM-03-SS	8/20/2011	**6.81**		**4.47**		**493**	**JK**	**0.203**		**1,020**	**JK**
11081704	UM-04-SS	8/20/2011	**25**		**17**		**3,150**	**JK**	**0.9**		**5,060**	**JK**
11081705	LL-01-SS	8/24/2011	**4.94**		**14.5**		**1,470**	**JK**	**0.024**		**4,130**	**JK**
11081706	LL-02-SS	8/24/2011	**4.07**		**10.6**		**13**	**JK**	**0.0209**		**3,420**	**JK**
11081707	LL-03-SS	8/24/2011	**23.8**		**371**		**2,230**	**JK**	**9.49**		**146,000**	**JK**
11081708	TA-01-SS	8/24/2011	**6.69**		**1.5**		**58.6**	**JK**	**0.0515**		**391**	**JK**
11081709	TA-02-SS	8/24/2011	**4.64**		**42.9**		**884**	**JK**	**0.969**		**15,100**	**JK**
11081710	TA-03-SS	8/24/2011	**22.8**		**88.6**		**4,160**	**JK**	**1.19**		**29,400**	**JK**
11081712	TA-05-SS	9/2/2011	**3.36**		**1.69**		**42.7**		**0.0532**		**1,410**	
11081759	UR-02-SS	9/16/2011	**4.81**		**0.564**		**11**		0.0394	UJL	**75**	
11081761	DU-01-SS	9/24/2011	**5.41**		**14.3**		**21.5**		**0.0529**		**2,140**	
11081763	FD-01-SS	9/24/2011	**5.46**		**6.87**		**47.5**		**0.0285**		**2,100**	
11081764	LL-05-SS	9/24/2011	**5.71**		**1.57**		**112**		**0.0319**		**466**	
11081765	DD-07-SS	9/24/2011	**5.84**		**3.47**		**37.2**		**0.0327**		**1,800**	

Bold results are greater than the sample quantitation limit.

Key

JK = The result is estimated with an unknown bias.

mg/kg = milligrams per kilogram

UJL = The material was analyzed for but was not detected. The reported detection limit is estimated with a low bias because quality control criteria were not met.

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TABLE 7-4
BULK ASBESTOS SAMPLE RESULTS
GRANDVIEW MINE AND MILL SITE
PEND OREILLE COUNTY, WASHINGTON

Sample Number	Sampling Location	Date Sampled	Asbestos PLM (%)	Point Count (%)
11081501	**TL-01**	**8/16/2011**	Not Detected	NA
11081502	**TL-02**	**8/16/2011**	Not Detected	NA
11081503	**TL-03**	**8/16/2011**	Not Detected	NA
11081504	**TL-04**	**8/16/2011**	Not Detected	NA
11081505	**TL-05**	**8/16/2011**	Trace	< 1
11081506	**TL-06**	**8/16/2011**	Not Detected	NA
11081507	**TL-07**	**8/16/2011**	Not Detected	NA
11081508	**TL-08**	**8/16/2011**	Not Detected	NA
11081509	**SL-01**	**8/16/2011**	Not Detected	NA
11081510	**SL-02**	**8/16/2011**	Not Detected	NA
11081511	**CF-01**	**8/16/2011**	Not Detected	NA
11081512	**CF-02**	**8/16/2011**	Not Detected	NA
11081513	**CF-03**	**8/16/2011**	Not Detected	NA
11081514	**SI-01**	**8/16/2011**	**3**	NA
11081515	**RC-01**	**8/16/2011**	Not Detected	NA
11081516	**RC-02**	**8/16/2011**	Not Detected	NA
11081517	**CH-01**	**8/18/2011**	**70**	NA
11081518	**CH-02**	**8/18/2011**	**70**	NA
11081519	**CS-01**	**8/18/2011**	Not Detected	NA
11081520	**CS-02**	**8/18/2011**	Not Detected	NA

Bold results are greater than the sample quantitation limit.
Key:
NA = Not applicable
PLM = Polarized Light Microscopy
U = The material was analyzed for but not detected. The associated numerical value is the sample quantitation limit.

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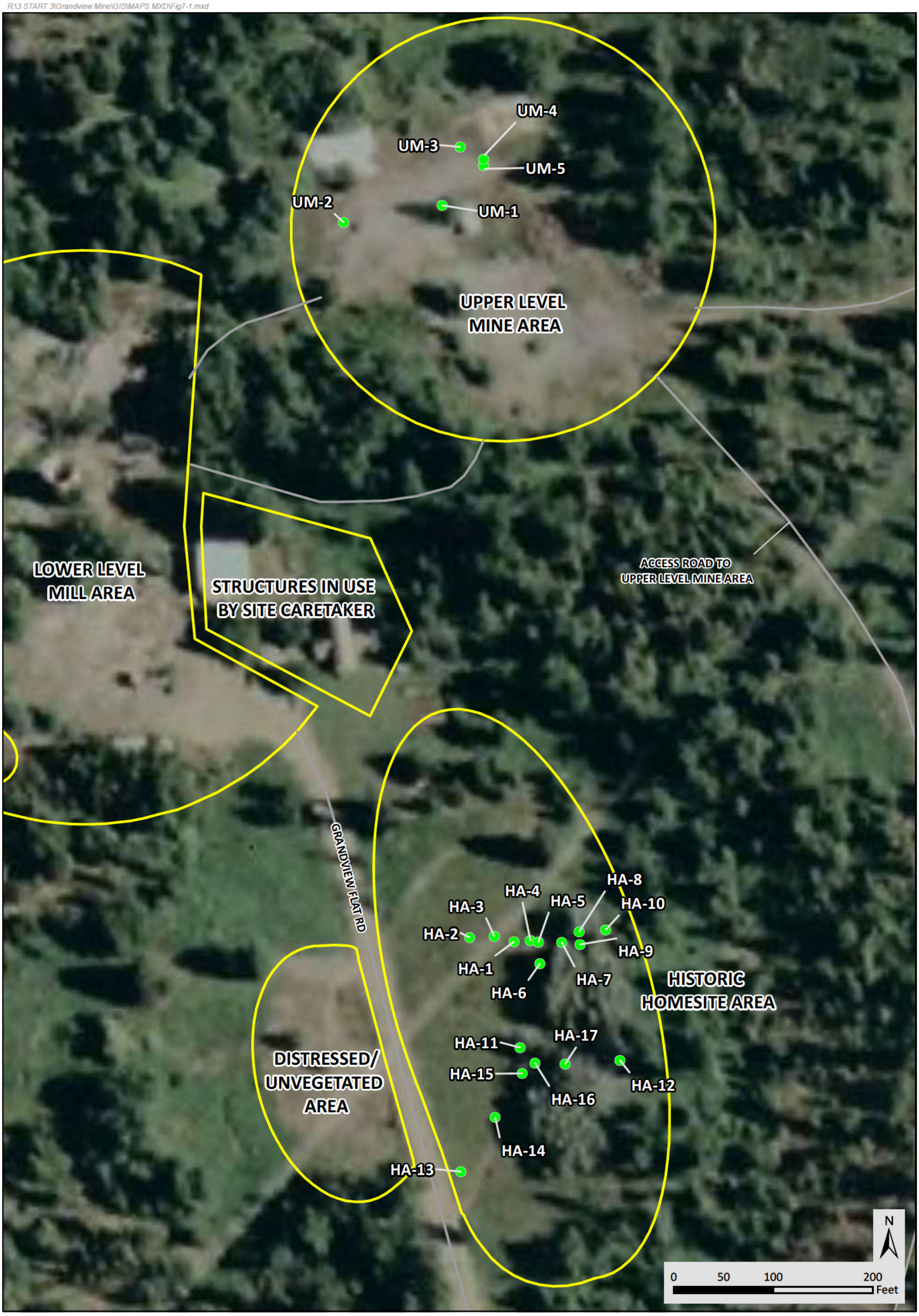

Aerial Photo Source: 2009 ESRI, i-cubed, GeoEye

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Figure 7-1 In-Situ FPXRF
Screening Locations Where Waste Rock Remains In-Place
Upper Level Mine Area and Historic Homesite Area
Grandview Mine and Mill Site
Pend Oreille County, Washington

- GPS Field Data
- Access Road
- Ditch
- Site Features

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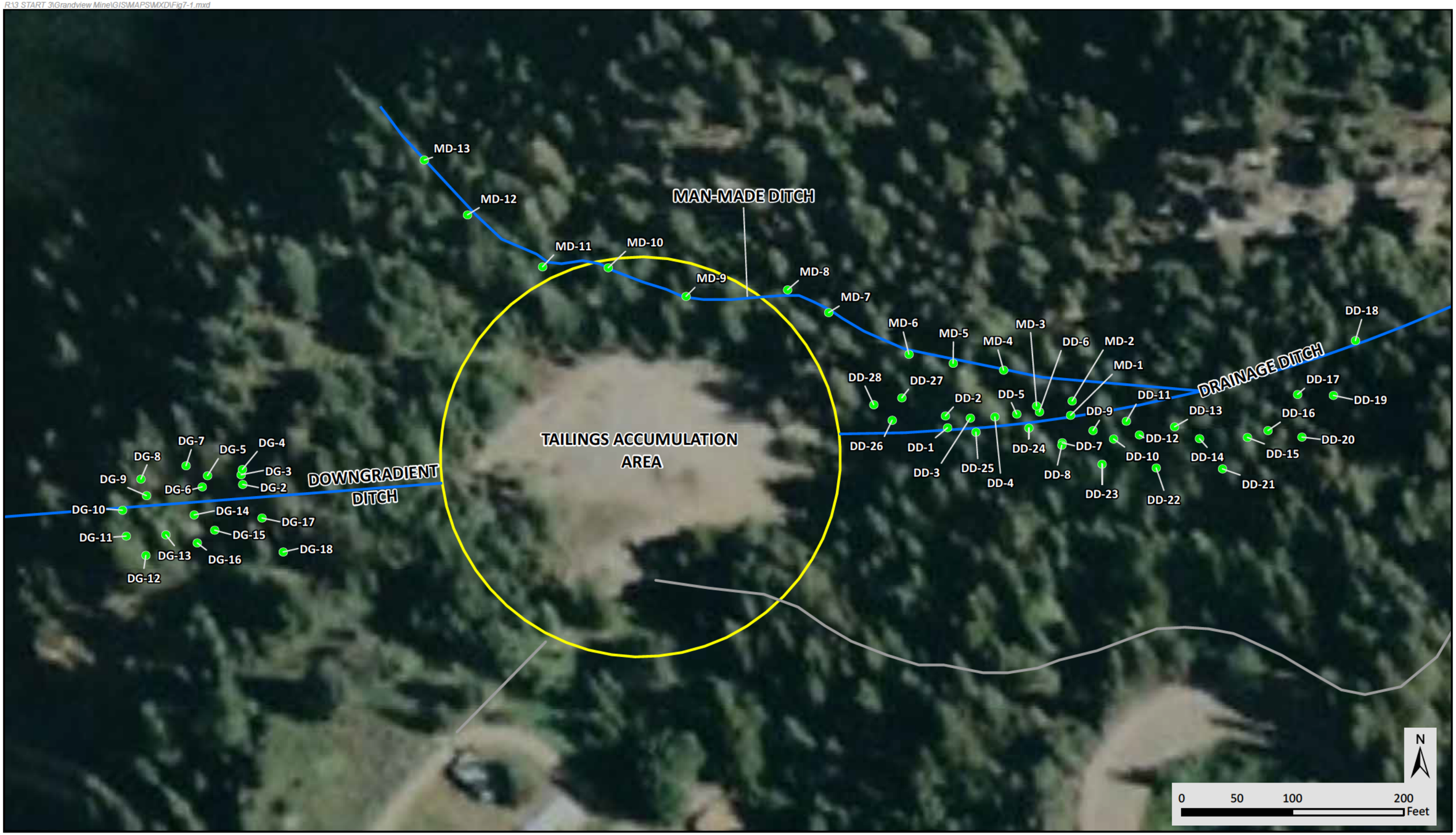

Aerial Photo Source: 2009 ESRI, i-cubed, GeoEye

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Figure 7-2 In-Situ FPXRF
Screening Locations Where Tailings Remains In-Place — Ditches
Grandview Mine and Mill Site
Pend Oreille County, Washington

GPS Field Data
Access Road
Tailings Accumulation Area
Ditch

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8 Quality Assurance / Quality Control

QA/QC data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination of sampling equipment, glassware, and reagents. Specific QC requirements for laboratory analyses are incorporated in the *Contract Laboratory Program Statement of Work for Inorganic Analyses* (EPA 2010a). These QC requirements or equivalent requirements found in the analytical methods were followed for analytical work on the project. This section describes the QA/QC measures taken for the project and provides an evaluation of the usability of data presented in this report.

Data from the START-subcontracted commercial laboratory and FPXRF were reviewed and validated by a START chemist. Data qualifiers were applied as necessary according to the following guidance:

- EPA (2010b) *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review*.

In the absence of other QC guidance, method- and/or standard operating procedure (SOP)-specific QC limits were also utilized to apply qualifiers to the data.

8.1 Satisfaction of Data Quality Objectives

The following EPA (EPA 2000) guidance document was used to establish data quality objectives (DQOs) for this project:

- *Guidance for the Data Quality Objectives Process* (EPA QA/G-4), EPA/600/R-96/055.

EPA determined that definitive data without error and bias determination would be used for the sampling and analyses conducted during the field activities. The data quality achieved during the field work produced sufficient data that met the DQOs stated in the SSSP (E & E 2011a). A detailed discussion of accomplished project objectives is presented in the following subsections.

8.2 QA/QC Samples

Rinsate blank QA samples are only required for samples collected using non-dedicated sampling equipment and were not collected for this project. Trip blank QA samples are only required for volatile organic compound analyses and were not collected for this project. QC samples included matrix spike (MS) and duplicate samples at a rate of one MS and duplicate per 20 samples per matrix.

8.3 Project-Specific Data Quality Objectives

The laboratory data were reviewed to ensure that DQOs for the project were met. The following describes the laboratories' abilities to meet project DQOs for precision, accuracy and completeness and the field team's ability to meet project DQOs for representativeness and comparability. The laboratories and the field team were able to meet DQOs for the project.

8.3.1 Precision

Precision measures the reproducibility of the sampling and analytical methodology. Laboratory and field precision is defined as the relative percent difference (RPD) between duplicate sample analyses. All duplicate results were within QC limits; therefore, the project DQO for precision of 90% was met.

8.3.2 Accuracy

Accuracy indicates the conformity of the measurements to fact. Laboratory accuracy is defined as the MS % recovery (% R). The % R values were reviewed for all MS analyses. All MS results were within QC limits; therefore, the project DQO for accuracy of 90% was met.

8.3.3 Completeness

Data completeness is defined as the percentage of usable data (usable data divided by the total possible data). All laboratory data were reviewed for data validation and usability. No sample results were rejected; therefore, the project DQO for completeness of 90% was met.

8.3.4 Representativeness

Data representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or environmental condition. The number and selection of samples were determined in the field to account accurately for Site variations and sample matrices. The DQO for representativeness was met.

8.3.5 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. Data produced for this Site followed applicable field sampling techniques and specific analytical methodology. The DQO for comparability was met.

8.4 Laboratory QA/QC Parameters

The fixed laboratory data also were reviewed for holding times/temperatures/sample containers, laboratory blank samples, serial dilution analyses, and interference check sample analyses. These QA/QC parameters are summarized below.

8.4.1 Holding Times, Temperatures, and Sample Containers

All holding times, sample temperatures, and containers were acceptable.

8.4.2 Laboratory Blanks

All laboratory blanks met the frequency criteria. Mercury was the only potential contaminant of concern that was detected in the laboratory blanks that affected sample results. See the data validation memoranda to see the qualified sample results.

8.4.3 Serial Dilution

Serial dilution analyses met the frequency criteria. A total of 20 sample results (approximately 25% of the data) were qualified as estimated quantities (J or UJ) based on serial dilution outliers.

8.4.4 Interference Check Sample

Interference check sample (ICS) analyses met the frequency criteria. All ICS results were within QC limits.

8.5 FPXRF and Fixed Laboratory Correlation

FPXRF analyses were performed following EPA Method 6200, the START SOP, and manufacturer's directions. Instrument blank samples were typically analyzed daily with no contaminants detected in any instrument blank. Instrument standardizations were performed daily and were within QC limits. Check standard analyses were performed daily using the National Institute of Standards and Technology (NIST) 2710 reference standard, and most of the check standards were within the appropriate ranges. No qualifiers were applied based on the field screening outliers. As discussed below, the correlations between the FPXRF and fixed laboratory data were greater than the EPA criteria of 0.700, providing additional confidence in the FPXRF data.

Approximately 5.8% of the samples analyzed using the FPXRF unit were submitted to a fixed laboratory for confirmation analysis. A correlation between the FPXRF and fixed laboratory samples was performed and results from this correlation are presented in Table 8-1. The correlation coefficients for arsenic, cadmium, lead, and zinc all exceeded 0.700, indicating that these FPXRF results are acceptable to use as field screening data. The arsenic correlation coefficient is 0.78 when using all 16 pairs of results, and the correlation coefficient becomes 0.97 if the four pairs of results with FPXRF values below the quantitation limit are removed, further confirming that the arsenic FPXRF results are acceptable to use as field screening data. The cadmium correlation coefficient is 0.99 when using all 16 pairs of results and remains 0.99 if the two pairs of results with FPXRF values below the quantitation limit are removed, further confirming that the cadmium FPXRF results are acceptable to use as field screening data. The mercury FPXRF results were all below the quantitation limits; therefore, a correlation is not applicable.

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TABLE 8-1
FIELD PORTABLE X-RAY FLUORESCENCE AND FIXED LABORATORY CORRELATION
GRANDVIEW MINE AND MILL SITE
PEND OREILLE COUNTY, WASHINGTON

			Results (mg/kg)														
			Arsenic			Cadmium			Lead			Zinc			Mercury		
EPA Sample ID	Location ID	Sample Date	FPXRF	Off-Site Laboratory	Ratio of Lab to FPXRF Results	FPXRF	Off-Site Laboratory	Ratio of Lab to FPXRF Results	FPXRF	Off-Site Laboratory	Ratio of Lab to FPXRF Results	FPXRF	Off-Site Laboratory	Ratio of Lab to FPXRF Results	FPXRF	Off-Site Laboratory	Ratio of Lab to FPXRF Results
11081701	UM-01-SS	8/20/2011	2	3.54	177%	5	0.736	15%	50	39.1	78%	203	160	79%	0	0.0137 U	--
11081702	UM-02-SS	8/20/2011	8	8.26	103%	3	35.4	1180%	1,311	1,560	119%	2,615	9,580	366%	0	0.383	--
11081703	UM-03-SS	8/20/2011	26	6.81	26%	16	4.47	28%	800	493	62%	1,864	1,020	55%	0	0.203	--
11081704	UM-04-SS	8/20/2011	203	25	12%	35	17	49%	2,727	3,150	116%	6,160	5,060	82%	0	0.9	--
11081705	LL-01-SS	8/24/2011	4	4.94	124%	21	14.5	69%	12	1,470	12250%	2,865	4,130	144%	0	0.024	--
11081706	LL-02-SS	8/24/2011	5	4.07	81%	10	10.6	106%	9	13	144%	2,571	3,420	133%	0	0.0209	--
11081707	LL-03-SS	8/24/2011	132	23.8	18%	382	371	97%	2,033	2,230	110%	264,291	146,000	55%	0	9.49	--
11081708	TA-01-SS	8/24/2011	7	6.69	96%	0	1.5	--	61	58.6	96%	424	391	92%	0	0.0515	--
11081709	TA-02-SS	8/24/2011	0	4.64	--	61	42.9	70%	723	884	122%	16,584	15,100	91%	0	0.969	--
11081710	TA-03-SS	8/24/2011	0	22.8	--	82	88.6	108%	1,548	4,160	269%	19,868	29,400	148%	0	1.19	--
11081712	TA-05-SS	9/2/2011	0	3.36	--	3	1.69	56%	40	42.7	107%	831	1,410	170%	0	0.0532	--
11081759	UR-02-SS	9/16/2011	5	4.81	96%	0	0.564	--	12	11	92%	69	75	109%	0	0.0394 U	--
11081761	DU-01-SS	9/24/2011	4	5.41	135%	18	14.3	79%	17	21.5	126%	1,751	2,140	122%	0	0.0529	--
11081763	FD-01-SS	9/24/2011	5	5.46	109%	3	6.87	229%	41	47.5	116%	2,055	2,100	102%	0	0.0285	--
11081764	LL-05-SS	9/24/2011	0	5.71	--	1	1.57	157%	68	112	165%	335	466	139%	0	0.0319	--
11081765	DD-07-SS	9/24/2011	4	5.84	146%	10	3.47	35%	34	37.2	109%	1,657	1,800	109%	0	0.0327	--
	Correlation coefficient (r; all samples)		0.78			0.99 (2)			0.85 (3)			0.99 (4)				--	
	Correlation coefficient (r; without outliers) (1)		0.97			0.99											

Note: (1) The highlighted cells indicate data pairs that affect the correlations for arsenic and cadmium due to FPXRF results less than the detection limit. The correlations of the data without these outliers is presented.
(2) The correlation coefficient (r) for cadmium is 0.80 for the log-transformed values, which is recommended by SW-846 Method 6200 when the concentrations span more than one order of magnitude.
(3) The correlation coefficient (r) for lead is 0.83 for the log-transformed values, which is recommended by SW-846 Method 6200 when the concentrations span more than one order of magnitude.
(4) The correlation coefficient (r) for zinc is 0.97 for the log-transformed values, which is recommended by SW-846 Method 6200 when the concentrations span more than one order of magnitude.

Key:
EPA = United States Environmental Protection Agency
FPXRF = field portable x-ray fluorescence
ID = identification

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9 Community Relations

EPA provided periodic briefings for local and county officials, as well as county and federal law enforcement officials. Additionally, EPA coordinated removal activities closely with the Site caretaker

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10 Health and Safety

EPA maintained ultimate authority and responsibility for Site safety during the RA. ERRS and START each developed a Site-Specific Health and Safety Plan. EPA conducted a general Site safety meeting at the beginning of the RA to establish the health and safety procedures for the Site. Daily safety meetings were conducted at the beginning of each day of Site work and attended by all personnel present, including EPA, ERRS, and START. During the daily safety meetings, Site personnel discussed the planned activities for that day and any task-specific health and safety issues. The daily safety meeting also included a review of any health and safety issue from the previous day. Communications and traffic safety were emphasized throughout the RA.

The main physical hazards present at the Site were heavy equipment (e.g., haul trucks, excavators, dozer, compactor, and water truck), uneven terrain, and wildlife. The minimum level of PPE for the Site was Level D, including safety glasses, hard hat, safety vest, and steel-toed safety shoes.

The main chemical hazard present at the Site was metals, including arsenic, cadmium, lead, mercury, and zinc. Depending on the results of dust monitoring and air sampling, there was the potential for an upgrade to Level C PPE with respiratory protection. The results of dust monitoring and air sampling (personal and ambient) for the metals of concern indicated that the Site activities were performed in a manner that was safe for Site personnel and nearby residents (see Section 7), and therefore Site PPE remained at Level D throughout the RA.

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11 Difficulties Encountered

Throughout the RA, EPA encountered and overcame the following challenges:

- Minimizing Disturbance. Pend Oreille Village is located immediately adjacent to the south of the western portion of the Site, the Circle Motel is located at the intersection of Highway 31 and Grandview Flat Road, and the caretaker of the former Grandview Mine facility resides in a log cabin at the Site. Cleanup-related disturbances to nearby residents was minimized by limiting the use of Highway 31 and the access through Pend Oreille Village during construction. The access through Pend Oreille Village was used for personal vehicles only. Disturbance of the caretaker was minimized by setting up the command post and support area at the Upper Level Mine Area rather than the Lower Level Mill Area.

- Steep and Rocky Terrain. Construction of the haul road from the Tailings Accumulation Area to the repository at the Lower Level Mill Area was difficult due to steep and rocky terrain between the areas, and the constriction of Highway 31 to the south. An overgrown access road was located and improved for use as the haul road. Haul truck drivers had to take precautionary measures at a particularly steep location along the haul road.

- Structure Demolition. Several dilapidated and unused Site structures were demolished during the RA because they interfered with cleanup activities. EPA conducted an ACM survey of each structure before demolition. Asbestos bulk sampling results indicated the presence of ACM in the compressor house at the Upper Level Mine Area, which was therefore not demolished. Structures demolished and incorporated into the repository included all of the structures located within the repository footprint, the wash building located at the southern end of the Lower Level Mill Area, and the core sample shed and explosive powder storage house located in the Upper Level Mine Area.

- Quantity of Mine-Waste-Contaminated Materials. Significantly more waste rock and tailings were encountered at the Grandview Mine Site than had been estimated during previous investigations. Approximately 25,700 CY additional mine waste-contaminated material was incorporated into the repository than was expected, and at the request of Washington Resources, the repository footprint was reduced. To accommodate the additional quantity of mine waste-contaminated material, the material was compacted as much as possible, and the repository height was extended 10 feet higher than planned. A significantly greater quantity of waste rock was encountered at the Upper Level Mine Area, much of which remains in place. However, EPA did reduce the footprint of waste rock at the Upper Level Mine Area from 1.5 acres to 0.4 acres. In addition, EPA placed a protective barrier over waste rock remaining in place at the Upper Level Mine Area and the Historic Homesite Area.

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12 Summary and Conclusions

From August 15 through October 4, 2011, EPA performed the Grandview Mine and Mill Site RA to mitigate the threat to human health and ecological receptors from exposure to mine-waste-contaminated materials and to reduce the potential for these materials to impact surface water and groundwater.

START conducted an ACM survey of Site structures at the beginning of the RA. ERRS demolished structures only to the extent necessary to implement the RA, which included structures within the repository footprint, the core sample shed and explosive powder storage house at the Upper Level Mine Area, and the wash building at the southern end of the Lower Level Mill Area. ACM was discovered in the compressor building at the Upper Level Mine Area and this building remains in place.

Approximately 67,500 CY of mine waste-contaminated material was excavated from the Tailings Accumulation Area, Lower Level Mill Area, Upper Level Mine Area, access roads, upper Drainage Ditch, Historic Homesite Area, Distressed/Unvegetated Area, and Former Drum Storage Area, and consolidated in a repository constructed at the north end of the Lower Level Mill Area against the bluff. The repository is approximately 40 feet high and the footprint covers approximately 1.8 acres. The repository included an impermeable cover consisting of a textured 40-mil LLDPE liner, overlain by a geocomposite drainage layer, overlain by at least a 30-inch minimum layer of cover material from the on-Site borrow area. Stockpiled erosion control slash material was placed over the repository and the cover was seeded. A French drain and v-ditch were installed around the periphery of the repository to control stormwater run-on and run-off and groundwater.

Removal areas were graded and/or backfilled with clean material obtained from the on-Site borrow area, and all areas disturbed during the removal activities were restored using erosion control slash material and seeding.

Mine-waste-contaminated materials were left in place at several locations due to several reasons, including the potential disproportionate adverse impact associated with cleanup activities, and the extensive quantity of waste rock present and the resulting impact on the project schedule, budget, and repository size constraints. These areas include the northeast corner of the Lower Level Mill Area where it connects with the Upper Level Mine Area, the southeastern portion of the Lower Level Mill Area, the cul-de-sac at the end of Grandview Flat Road in front of the log cabin, along Grandview Flat Road, the northwest portion of the Upper Level Mine Area, the middle and southern areas of the Historic Homesite Area. Additionally, mine-waste-contaminated materials were left in place in the lower portion of the Drainage Ditch, and along the length of the Downgradient Ditch and Man-Made Ditch. A minimum of one foot of compacted cover material was placed over waste rock or tailings remaining in place in the northeast corner of the Lower Level Mill Area, the northwest portion of the Upper Level Mine Area, and the middle and southern areas of the Historic Homesite Area. Demarcation material and approximately six inches of clean imported ¾-inch minus rock were placed over waste rock remaining in place in the cul-de-sac at the end of Grandview Flat Road in front of the log cabin.

Throughout the RA, a FPXRF unit was used to monitor for the Site contaminants of concern and to provide data to support removal decisions. Confirmation samples were also collected and analyzed by FPXRF and at an off-Site laboratory to characterize the materials left in place. During removal activities, dust control techniques and other BMPs were employed, and dust monitoring and air sampling of Site workers and the perimeter of work zones confirmed that the dust suppression and BMPs were effective.

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A Photographic Documentation

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Photo 1 ERRS clearing debris from repository footprint.

Direction: *North* *Date: 8/16/11* *Time: 17:13* *Taken by: SH*

Photo 2 ERRS begins clearing at soil borrow area.

Direction: *Northeast* *Date: 8/18/11* *Time: 09:46* *Taken by: SH*

Photo 3 Compressor house exterior.

Direction: *Northwest* *Date: 8/18/11* *Time: 11:49* *Taken by: SH*

Photo 4 DataRam dust monitor at LL; repository preparation in background.

Direction: *North* *Date: 8/18/11* *Time: 14:52* *Taken by: SH*

Photo 5 Haul trucks unloading tailings within repository footprint.

Direction: North *Date: 8/19/11* *Time: 16:00* *Taken by: SH*

Photo 6 Stockpiled tailings at TA.

Direction: Northeast *Date: 8/19/11* *Time: 16:13* *Taken by: SH*

Photo 7 Haul truck coming down haul road to TA from LL.

Direction: Northwest *Date: 8/19/11* *Time: 16:24* *Taken by: SH*

Photo 8 View of command post and waste rock area at UM.

Direction: Southwest *Date: 8/20/11* *Time: 13:39* *Taken by: SH*

Photo 9 Compacted tailings around silo.

Direction: *North* *Date: 8/22/11* *Time: 14:42* *Taken by: SH*

Photo 10 Native soil at foot of repository; location of samples LL-01-SS and LL-02-SS.

Direction: *Southwest* *Date: 8/24/11* *Time: 16:27* *Taken by: SH*

Photo 11 Tailings in TA; viewed from bottom of excavation.

Direction: *Southwest* *Date: 8/26/11* *Time: 08:12* *Taken by: SH*

Photo 12 Hauling and unloading tailings at repository.

Direction: *Northwest* *Date: 8/27/11* *Time: 14:34* *Taken by: VR*

Photo 13 Tailings excavation from TA.

Direction: East *Date: 8/27/11* *Time: 14:48* *Taken by: VR*

Photo 14 West end of TA; extent of excavation before filling in with native soil and regrading to drain.

Direction: West *Date: 8/29/11* *Time: 14:23* *Taken by: VR*

Photo 15 Work at repository.

Direction: Southwest *Date: 8/30/11* *Time: 10:08* *Taken by: VR*

Photo 16 Work at repository.

Direction: Southwest *Date: 8/30/11* *Time: 10:09* *Taken by: VR*

Photo 17 Demolition of core sample shed.

Direction: Northwest *Date: 8/30/11* *Time: 13:46* *Taken by: VR*

Photo 18 Jack hammer at repository working to take silo down.

Direction: Southwest *Date: 9/1/11* *Time: 15:10* *Taken by: VR*

Photo 19 Work at repository after silo is down.

Direction: Southwest *Date: 9/1/11* *Time: 16:57* *Taken by: VR*

Photo 20 Jack hammer breaking down concrete footers at toe of repository.

Direction: Northwest *Date: 9/2/11* *Time: 08:00* *Taken by: VR*

Photo 21 Tailings excavation from Distressed/Unvegetated Area.

Direction: Northwest *Date: 9/2/11* *Time: 08:12* *Taken by: VR*

Photo 22 Tailings in Man-Made Ditch.

Direction: West *Date: 9/3/11* *Time: 09:58* *Taken by: VR*

Photo 23 TA following tailings excavation.

Direction: Southwest *Date: 9/3/11* *Time: 11:12* *Taken by: VR*

Photo 24 START Burford taking an in situ XRF reading in the cul-de-sac.

Direction: North *Date: 9/5/11* *Time: 15:40* *Taken by: VR*

Photo 25 Excavation of waste rock from northwest corner of UM.

Direction: Northwest *Date: 9/7/11* *Time: 09:51* *Taken by: DB*

Photo 27 START Burford sampling soil at Man-Made Ditch.

Direction: Southeast *Date: 9/9/11* *Time: 11:38* *Taken by: DB*

Photo 26 Excavated upper portion (east end) of Drainage Ditch.

Direction: East *Date: 9/8/11* *Time: 12:20* *Taken by: DB*

Photo 28 Excavation in upper portion of Drainage Ditch.

Direction: Southwest *Date: 9/13/11* *Time: 08:15* *Taken by: VR*

Photo 30 Stockpiled drain rock for french drain and v-ditches.

Direction: Northwest *Date: 9/13/11* *Time: 08:21* *Taken by: VR*

Photo 29 Septic discharge pipe from log cabin.

Direction: East *Date: 9/13/11* *Time: 08:15* *Taken by: VR*

Photo 31 Shaping repository.

Direction: Southwest *Date: 9/13/11* *Time: 08:46* *Taken by: VR*

Photo 32 Cover material placement in UM.

Direction: Northeast *Date: 9/13/11* *Time: 08:48* *Taken by: VR*

Photo 33 Digging anchor trench along west side of repository.

Direction: Southwest *Date: 9/13/11* *Time: 09:17* *Taken by: VR*

Photo 34 Anchor trench on south side of repository.

Direction: Southeast *Date: 9/14/11* *Time: 09:41* *Taken by: VR*

Photo 35 Grading cover material placed over UM waste rock.

Direction: West *Date: 9/14/11* *Time: 10:26* *Taken by: VR*

Photo 36 Southern waste rock area of three waste rock areas in Historic Homesite Area.

Direction: West *Date: 9/14/11* *Time: 14:37* *Taken by: VR*

Photo 37 ERRS placing layer of borrow material over repository and preparing spreader bar to roll out liner.

Direction: North *Date: 9/14/11* *Time: 15:06* *Taken by: VR*

Photo 38 Liner installation on west side.

Direction: Northwest *Date: 9/14/11* *Time: 17:09* *Taken by: VR*

Photo 39 Liner installation on south side.

Direction: Southeast *Date: 9/15/11* *Time: 08:38* *Taken by: VR*

Photo 40 Geocomposite installation on south side.

Direction: Northeast *Date: 9/15/11* *Time: 14:53* *Taken by: VR*

Photo 41 Closeup view of geocomposite over liner.

Direction: Down *Date: 9/15/11* *Time: 14:53* *Taken by: VR*

Photo 42 Liner on east side of repository.

Direction: West *Date: 9/15/11* *Time: 15:04* *Taken by: VR*

Photo 43 Geocomposite installation on east side.

Direction: Northwest *Date: 9/16/11* *Time: 07:58* *Taken by: VR*

Photo 44 Backfilled and graded UM.

Direction: North *Date: 9/16/11* *Time: 10:38* *Taken by: VR*

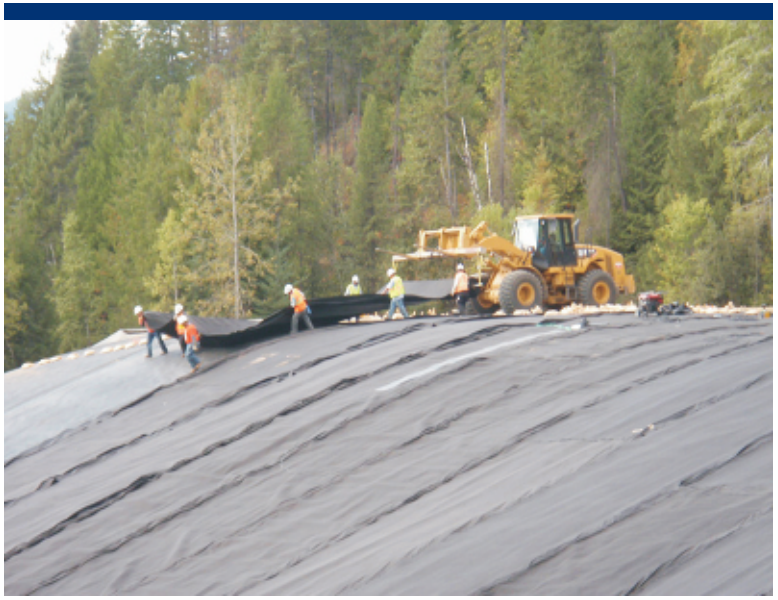

Photo 45 Unrolling geocomposite material.

Direction: Southwest *Date: 9/16/11* *Time: 11:30* *Taken by: VR*

Photo 46 Borrow material placed in excavated north waste rock area in Historic Homesite Area.

Direction: East *Date: 9/17/11* *Time: 08:30* *Taken by: VR*

Photo 47 View of lined repository from above.

Direction: South *Date: 9/17/11* *Time: 14:27* *Taken by: VR*

Photo 48 View of repository from top of bluff.

Direction: Southeast *Date: 9/17/11* *Time: 14:49* *Taken by: VR*

Photo 49 Installing French drain on east side of repository.

Direction: Northeast *Date: 9/17/11* *Time: 15:02* *Taken by: VR*

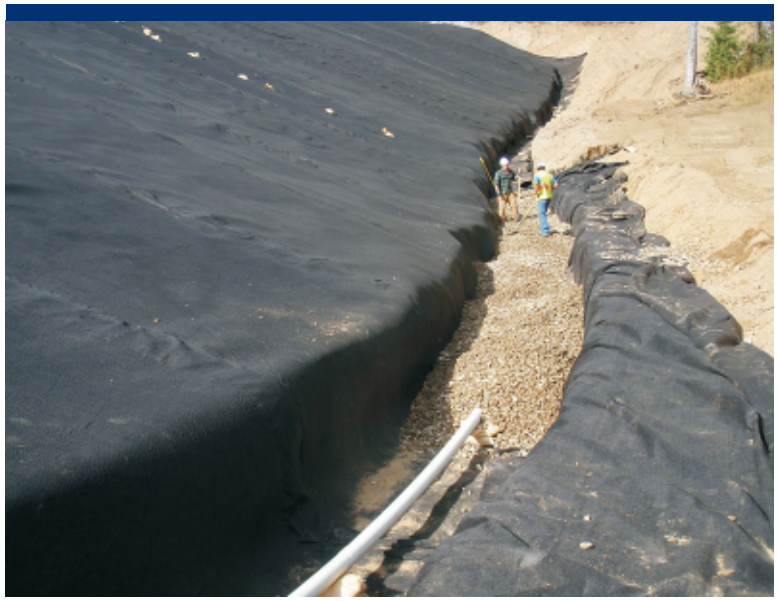

Photo 50 Installing French drain on east side of repository.

Direction: North *Date: 9/17/11* *Time: 15:18* *Taken by: VR*

Photo 51 Slash spread across excavated TA.

Direction: West *Date: 9/19/11* *Time: 11:45* *Taken by: VR*

Photo 52 Slash spread across excavated TA and into Downgradient Ditch.

Direction: West *Date: 9/19/11* *Time: 11:50* *Taken by: VR*

Photo 53 Slash spread across excavated TA.

Direction: Northeast *Date: 9/19/11* *Time: 11:51* *Taken by: VR*

Photo 54 Building road over to top of repository to place cover material.

Direction: Southwest *Date: 9/19/11* *Time: 14:32* *Taken by: VR*

Photo 55 French drain discharge to Drainage Ditch.

Direction: Southwest *Date: 9/19/11* *Time: 14:40* *Taken by: VR*

Photo 57 Installing French drain out to Drainage Ditch.

Direction: Southeast *Date: 9/19/11* *Time: 14:46* *Taken by: VR*

Photo 56 French drain discharge to Drainage Ditch.

Direction: Northeast *Date: 9/19/11* *Time: 14:40* *Taken by: VR*

Photo 58 Borrow area development.

Direction: Northeast Date: 9/20/11 Time: 08:52 Taken by: VR

Photo 59 Repository cover material placement.

Direction: Northwest Date: 9/21/11 Time: 08:10 Taken by: VR

Photo 60 Drain rock placed at French drain discharge.

Direction: Northeast Date: 9/21/11 Time: 14:53 Taken by: VR

Photo 61 Borrow area development.

Direction: East Date: 9/21/11 Time: 14:58 Taken by: VR

Photo 62 Close-up of v-ditch with rock.

Direction: North *Date: 9/23/11* *Time: 14:40* *Taken by: SH*

Photo 63 ERRS continues to work on the v-ditch around repository.

Direction: South *Date: 9/23/11* *Time: 18:42* *Taken by: SH*

Photo 64 ERRS placing slash on the repository.

Direction: West *Date: 9/24/11* *Time: 12:13* *Taken by: SH*

Photo 65 ERRS regrading the borrow area.

Direction: Northeast *Date: 9/24/11* *Time: 12:14* *Taken by: SH*

Photo 66 ERRS continues to place slash on the repository.

Direction: North *Date: 9/24/11* *Time: 16:22* *Taken by: SH*

Photo 67 Regraded borrow area with slash and seed spread across area.

Direction: North *Date: 10/4/11* *Time: 09:31* *Taken by: JC*

Photo 68 Regraded borrow area with slash and seed spread across area.

Direction: Northeast *Date: 10/4/11* *Time: 09:31* *Taken by: JC*

B Analytical Data Reports

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MEMORANDUM

DATE: December 13, 2011

TO: Steve Hall, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-3 Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Quality Assurance Review, Grandview Mine and Mill Site, Pend Oreille County, Washington**

REF: TDD: 11-05-0007 PAN: 002233.0692.01RA

The data quality assurance review of 8 air filter samples collected from the Grandview Mine and Mill site in Pend Oreille County, Washington, has been completed. Selected Target Analyte List (TAL) metals analyses (NIOSH Method 7300) were performed by Test America, Inc., Phoenix, Arizona. All sample analyses were evaluated following EPA's Stage 2 and 4 Data Validation Electronic/Manual Process (S4VEM).

The samples were numbered:

11081601	11081602	11081603	11081604	11081605	11081606
11081607	11081608				

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were received at 20°C. The samples were collected between August 20 and 24, 2011, and were analyzed by August 29, 2011, therefore meeting QC criteria of less than 6 months between collection, extraction, and analysis.

2. **Initial and Continuing Calibration: Acceptable.**

A minimum of one calibration standard and a blank were analyzed at the beginning of the ICP analysis sequence and after every 10 samples. No results were greater than 110% of the highest calibration standard. All ICP recoveries were within the QC limits of 90% to 110%.

3. **Blanks: Acceptable.**

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. There were no detections in any blanks that affected sample results.

4. ICP Interference Check Sample: Acceptable.

An Interference Check Sample (ICS) was analyzed at the beginning and end of each sequence or at least twice every 8 hours, whichever was more frequent. All ICS (solution AB) results were within QC limits of 80% - 120% recovery.

5. Precision and Bias Determination: Not Performed.

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

6. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

7. Blank Spike (BS)/BS Duplicate (BSD) Analysis: Acceptable.

BS and BSD analyses were performed per SDG or per matrix per concentration level, whichever was more frequent. BS and BSD recoveries were within the QC limits.

8. Duplicate Analysis: Acceptable.

A laboratory spike duplicate analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. All spike duplicate results were within QC limits.

9. Overall Assessment of Data for Use

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical method, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
4625 East Cotton Center Blvd, Ste 189 Phoenix, AZ 85040 * (602) 437-3340 * Fax (602) 454-9303

TestAmerica Seattle 5755 8th Street East Tacoma, WA 98424 Terri Torres	Work Order: PUH1855 Project: Ecology and Env. 10DY-102511-03 Project Number: Ecology and Env. / 10DY-102511-03	Received: 08/27/11 Reported: 08/30/11 10:30	

ANALYTICAL REPORT

Analyte	Result			Qual	Date Analyzed	Analyst	Rpt Limit ug, Total	Method
Metals using ICP-AES by NIOSH 7300 (Modified)								
Sample ID: PUH1855-01 (11081601)		**Filter**		**Sample Air Volume: 1048L**			**Sampled: 08/20/11**	
	ug, Total	mg/m3	ppm				**Prepared: 08/29/11 09:27**	
Arsenic	<2.50	<0.00239	<0.000778		8/29/2011	bb	2.50	NIOSH 7300
Cadmium	<0.0250	<0.0000239	<0.00000519		8/29/2011	bb	0.0250	NIOSH 7300
Lead	<0.312	<0.000298	<0.0000351		8/29/2011	bb	0.312	NIOSH 7300
Zinc	4.80	0.00458	0.00171		8/29/2011	bb	2.50	NIOSH 7300
Sample ID: PUH1855-02 (11081602)		**Filter**		**Sample Air Volume: 1092L**			**Sampled: 08/20/11**	
	ug, Total	mg/m3	ppm				**Prepared: 08/29/11 09:27**	
Arsenic	<2.50	<0.00229	<0.000747		8/29/2011	bb	2.50	NIOSH 7300
Cadmium	<0.0250	<0.0000229	<0.00000498		8/29/2011	bb	0.0250	NIOSH 7300
Lead	<0.312	<0.000286	<0.0000337		8/29/2011	bb	0.312	NIOSH 7300
Zinc	<2.50	<0.00229	<0.000856		8/29/2011	bb	2.50	NIOSH 7300
Sample ID: PUH1855-03 (11081603)		**Filter**		**Sample Air Volume: 660.94L**			**Sampled: 08/20/11**	
	ug, Total	mg/m3	ppm				**Prepared: 08/29/11 09:27**	
Arsenic	<2.50	<0.00378	<0.00123		8/29/2011	bb	2.50	NIOSH 7300
Cadmium	<0.0250	<0.0000378	<0.00000823		8/29/2011	bb	0.0250	NIOSH 7300
Lead	<0.312	<0.000472	<0.0000557		8/29/2011	bb	0.312	NIOSH 7300
Zinc	<2.50	<0.00378	<0.00141		8/29/2011	bb	2.50	NIOSH 7300
Sample ID: PUH1855-04 (11081604)		**Filter**		**Sample Air Volume: 960.61L**			**Sampled: 08/20/11**	
	ug, Total	mg/m3	ppm				**Prepared: 08/29/11 09:27**	
Arsenic	<2.50	<0.00260	<0.000849		8/29/2011	bb	2.50	NIOSH 7300
Cadmium	<0.0250	<0.0000260	<0.00000566		8/29/2011	bb	0.0250	NIOSH 7300
Lead	<0.312	<0.000325	<0.0000383		8/29/2011	bb	0.312	NIOSH 7300
Zinc	<2.50	<0.00260	<0.000973		8/29/2011	bb	2.50	NIOSH 7300
Sample ID: PUH1855-05 (11081605)		**Filter**		**Sample Air Volume: 673.53L**			**Sampled: 08/22/11**	
	ug, Total	mg/m3	ppm				**Prepared: 08/29/11 09:27**	
Arsenic	<2.50	<0.00371	<0.00121		8/29/2011	bb	2.50	NIOSH 7300
Cadmium	<0.0250	<0.0000371	<0.00000807		8/29/2011	bb	0.0250	NIOSH 7300
Lead	<0.312	<0.000463	<0.0000547		8/29/2011	bb	0.312	NIOSH 7300
Zinc	<2.50	<0.00371	<0.00139		8/29/2011	bb	2.50	NIOSH 7300
Sample ID: PUH1855-06 (11081606)		**Filter**		**Sample Air Volume: 1120L**			**Sampled: 08/24/11**	
	ug, Total	mg/m3	ppm				**Prepared: 08/29/11 09:27**	
Arsenic	<2.50	<0.00223	<0.000728		8/29/2011	bb	2.50	NIOSH 7300
Cadmium	<0.0250	<0.0000223	<0.00000486		8/29/2011	bb	0.0250	NIOSH 7300
Lead	<0.312	<0.000279	<0.0000329		8/29/2011	bb	0.312	NIOSH 7300
Zinc	<2.50	<0.00223	<0.000835		8/29/2011	bb	2.50	NIOSH 7300
Sample ID: PUH1855-07 (11081607)		**Filter**		**Sample Air Volume: 1156L**			**Sampled: 08/24/11**	
	ug, Total	mg/m3	ppm				**Prepared: 08/29/11 09:27**	
Arsenic	<2.50	<0.00216	<0.000706		8/29/2011	bb	2.50	

MW 12-13-11

TestAmerica Seattle 5755 8th Street East Tacoma, WA 98424 Terri Torres	Work Order: PUH1855 Project: Ecology and Env. 10DY-102511-03 Project Number: Ecology and Env. / 10DY-102511-03	Received: 08/27/11 Reported: 08/30/11 10:30	

Analyte	Result			Qual	Date Analyzed	Analyst	Rpt Limit ug, Total	Method
Metals using ICP-AES by NIOSH 7300 (Modified) - cont.								
Sample ID: PUH1855-07 (11081607) - cont.		**Filter**		**Sample Air Volume: 1156L**			**Sampled: 08/24/11**	
	ug, Total	mg/m3	ppm				**Prepared: 08/29/11 09:27**	
Cadmium	<0.0250	<0.0000216	<0.00000470		8/29/2011	bb	0.0250	NIOSH 7300
Lead	<0.312	<0.000270	<0.0000318		8/29/2011	bb	0.312	NIOSH 7300
Zinc	15.1	0.0131	0.00488		8/29/2011	bb	2.50	NIOSH 7300
Sample ID: PUH1855-08 (11081608)		**Filter**		**Sample Air Volume: 980.68L**			**Sampled: 08/24/11**	
	ug, Total	mg/m3	ppm				**Prepared: 08/29/11 09:27**	
Arsenic	<2.50	<0.00255	<0.000832		8/29/2011	bb	2.50	NIOSH 7300
Cadmium	<0.0250	<0.0000255	<0.00000554		8/29/2011	bb	0.0250	NIOSH 7300
Lead	<0.312	<0.000318	<0.0000375		8/29/2011	bb	0.312	NIOSH 7300
Zinc	14.1	0.0144	0.00538		8/29/2011	bb	2.50	NIOSH 7300

MW 12-13-11

ecology and environment, inc.
Global Environmental Specialists
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MEMORANDUM

DATE: September 12, 2011

TO: Steve Hall, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-3 Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Quality Assurance Review, Grandview Mine and Mill, Metaline Falls, Washington**

REF: TDD: 11-05-0007 PAN: 002233.0692.01RA

The data quality assurance review of 10 soil samples collected from the Grandview Mine and Mill site in Metaline Falls, Washington, has been completed. Selected Target Analyte List (TAL) metals analyses (EPA Methods 6020 and 7470A) were performed by GEL Laboratories, LLC, Charleston, South Carolina.

The samples were numbered:

11081701	11081702	11081703	11081704	11081705
11081706	11081707	11081708	11081709	11081710

Data Qualifications:

1. Sample Holding Times: Acceptable.

The samples were maintained at < 6°C. The samples were collected between August 20 and 24, 2011, and were analyzed by August 31, 2011, therefore meeting QC criteria of less than 6 months between collection, extraction, and analysis (28 days for mercury).

2. Initial and Continuing Calibration: Acceptable.

A minimum of one calibration standard and a blank were analyzed at the beginning of the ICP analysis sequence and after every 10 samples. No results were greater than 110% of the highest calibration standard. All ICP recoveries were within the QC limits of 90% to 110%. All AA recoveries were within QC limits of 80% to 120%.

3. Blanks: Satisfactory.

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. The following elements were detected in the applicable calibration and/or preparation blanks and affected sample results:

Blank	Element	Concentration (*u*g/kg)

Blank	Element	Concentration (*u*g/kg)
Preparation Blank	Mercury	3.89

Associated sample results were qualified as not detected (U) if the sample result was less than five times the positive blank concentration.

4. ICP Interference Check Sample: Acceptable.

An Interference Check Sample (ICS) was analyzed at the beginning of each sequence. All ICS (solution AB) results were within QC limits of 80% - 120% recovery.

5. Precision and Bias Determination: Not Performed.

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

6. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

7. ICP Serial Dilution: Satisfactory.

A serial dilution analysis was performed per matrix per concentration or per sample delivery group, whichever was more frequent. All serial dilution results were within QC limits except lead and zinc. Associated sample results were qualified as estimated quantities with a likely unknown bias (JK).

8. Matrix Spike Analysis: Acceptable.

A matrix spike analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. Spike and spike duplicate recoveries were within the QC limits.

9. Duplicate Analysis: Acceptable.

A laboratory duplicate analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. All duplicate results were within QC limits.

10. Laboratory Control Sample Analysis: Acceptable.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

11. Overall Assessment of Data for Use

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

J - The associated numerical value is an estimated quantity because the reported concentrations were less than the sample quantitation limits or because quality control criteria limits were not met.

H - The associated estimated sample result has a likely high bias.

K - The associated estimated sample result has a likely unknown bias.

L - The associated estimated sample result has a likely low bias.

Q - The associated estimated sample result is greater than the method detection limit/instrument detection limit and less than the practical quantitation limit/method reporting limit.

R - The sample results are rejected (analyte may or may not be present) due to gross deficiencies in quality control criteria. Any reported value is unusable. Resampling and/or reanalysis is necessary for verification.

U - The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.

UJ - The material was analyzed for, but not detected. The reported detection limit is estimated because quality control criteria were not met.

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 284903 **METHOD TYPE:** SW846

SAMPLE ID: 284903001 **CLIENT ID:** 11081701/UM-01-SS

CONTRACT: ECOL00811

MATRIX: Soil **DATE RECEIVED** 29-AUG-11 **LEVEL:** Low **%SOLIDS:** 97.8

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439-97-6	Mercury	13.7 U	ug/Kg			AV	4.17	1	HG3	083011S1-5
7440-38-2	Arsenic	3540	ug/kg			MS	179	2	ICPMS4	110831-1
7440-43-9	Cadmium	736	ug/kg			MS	17.9	2	ICPMS4	110831-1
7439-92-1	Lead	39100 JK	ug/kg		*E	MS	89.4	2	ICPMS4	110831-1
7440-66-6	Zinc	160000 JK	ug/kg		E	MS	357	2	ICPMS4	110831-4

***Analytical Methods:**

P	SW846 6010B
MS	SW846 6020
AV	SW846 7470A/7471A
AF	EPA 1631E

MMQ-12-11

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 284903 **METHOD TYPE:** SW846

SAMPLE ID: 284903002 **CLIENT ID:** 11081702/UM-02-SS

CONTRACT: ECOL00811

MATRIX: Soil **DATE RECEIVED** 29-AUG-11 **LEVEL:** Low **%SOLIDS:** 99.58

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439-97-6	Mercury	383	ug/Kg			AV	4.03	1	HG3	083011S1-5
7440-38-2	Arsenic	8260	ug/kg			MS	191	2	ICPMS4	110831-1
7440-43-9	Cadmium	35400	ug/kg			MS	19.1	2	ICPMS4	110831-1
7439-92-1	Lead	1560000 JK	ug/kg		*E	MS	476	10	ICPMS4	110831-1
7440-66-6	Zinc	9580000 JK	ug/kg		E Mn	MS	9530	50	ICPMS4	110831-4

***Analytical Methods:**

P	SW846 6010B
MS	SW846 6020
AV	SW846 7470A/7471A
AF	EPA 1631E

MW 9-12-11

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 284903 **METHOD TYPE:** SW846

SAMPLE ID: 284903003 **CLIENT ID:** 11081703/UM-03-SS

CONTRACT: ECOL00811

MATRIX: Soil **DATE RECEIVED** 29-AUG-11 **LEVEL:** Low **%SOLIDS:** 98.8

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439-97-6	Mercury	203	ug/Kg			AV	3.89	1	HG3	083011S1-5
7440-38-2	Arsenic	6810	ug/kg			MS	185	2	ICPMS4	110831-1
7440-43-9	Cadmium	4470	ug/kg			MS	18.5	2	ICPMS4	110831-1
7439-92-1	Lead	493000 JK	ug/kg		*E	MS	92.7	2	ICPMS4	110831-1
7440-66-6	Zinc	1020000 JK	ug/kg		E	MS	1850	10	ICPMS4	110831-4

***Analytical Methods:**

P	SW846 6010B
MS	SW846 6020
AV	SW846 7470A/7471A
AF	EPA 1631E

MW 9/12/11

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 284903 **METHOD TYPE:** SW846

SAMPLE ID: 284903004 **CLIENT ID:** 11081704/UM-04-SS

CONTRACT: ECOL00811

MATRIX: Soil **DATE RECEIVED** 29-AUG-11 **LEVEL:** Low **%SOLIDS:** 99.74

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439-97-6	Mercury	900	ug/Kg			AV	40.3	10	HG3	083011S1-5
7440-38-2	Arsenic	25000	ug/kg			MS	183	2	ICPMS4	110831-1
7440-43-9	Cadmium	17000	ug/kg			MS	18.3	2	ICPMS4	110831-1
7439-92-1	Lead	3150000 JK	ug/kg		*E	MS	1830	40	ICPMS4	110831-1
7440-66-6	Zinc	5060000 JK	ug/kg		E	MS	7310	40	ICPMS4	110831-4

***Analytical Methods:**

P	SW846 6010B
MS	SW846 6020
AV	SW846 7470A/7471A
AF	EPA 1631E

MW 9-12-11

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 284903 **METHOD TYPE:** SW846

SAMPLE ID: 284903005 **CLIENT ID:** 11081705/LL-01-SS

CONTRACT: ECOL00811

MATRIX: Soil **DATE RECEIVED** 29-AUG-11 **LEVEL:** Low **%SOLIDS:** 86

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439-97-6	Mercury	24	ug/Kg			AV	4.71	1	HG3	083011S1-5
7440-38-2	Arsenic	4940	ug/kg			MS	231	2	ICPMS4	110831-1
7440-43-9	Cadmium	14500	ug/kg			MS	23.1	2	ICPMS4	110831-1
7439-92-1	Lead	1470000 JK	ug/kg		*E	MS	578	10	ICPMS4	110831-1
7440-66-6	Zinc	4130000 JK	ug/kg		E	MS	4620	20	ICPMS4	110831-4

***Analytical Methods:**

P	SW846 6010B
MS	SW846 6020
AV	SW846 7470A/7471A
AF	EPA 1631E

MW 9/12/11

METALS
–1–
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 284903 **METHOD TYPE:** SW846

SAMPLE ID: 284903006 **CLIENT ID:** 11081706/LL–02–SS

CONTRACT: ECOL00811

MATRIX: Soil **DATE RECEIVED** 29–AUG–11 **LEVEL:** Low **%SOLIDS:** 80

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439–97–6	Mercury	20.9	ug/Kg			AV	4.9	1	HG3	083011S1–5
7440–38–2	Arsenic	4070	ug/kg			MS	243	2	ICPMS4	110831–1
7440–43–9	Cadmium	10600	ug/kg			MS	24.3	2	ICPMS4	110831–1
7439–92–1	Lead	13000 JK	ug/kg		*E	MS	122	2	ICPMS4	110831–1
7440–66–6	Zinc	3420000 JK	ug/kg		E	MS	4870	20	ICPMS4	110831–4

***Analytical Methods:**

P	SW846 6010B
MS	SW846 6020
AV	SW846 7470A/7471A
AF	EPA 1631E

MW 9/12/11

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 284903 **METHOD TYPE:** SW846

SAMPLE ID: 284903007 **CLIENT ID:** 11081707/LL-03-SS

CONTRACT: ECOL00811

MATRIX: Soil **DATE RECEIVED** 29-AUG-11 **LEVEL:** Low **%SOLIDS:** 84

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439-97-6	Mercury	9490	ug/Kg			AV	479	100	HG3	083011S1-5
7440-38-2	Arsenic	23800	ug/kg			MS	237	2	ICPMS4	110831-1
7440-43-9	Cadmium	371000	ug/kg			MS	118	10	ICPMS4	110831-1
7439-92-1	Lead	2230000 JK	ug/kg		*E	MS	592	10	ICPMS4	110831-1
7440-66-6	Zinc	146000000 JK	ug/kg		E MW	MS	237000	1000	ICPMS4	110831-4

***Analytical Methods:**

P	SW846 6010B
MS	SW846 6020
AV	SW846 7470A/7471A
AF	EPA 1631E

MW 9-12-11

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 284903 **METHOD TYPE:** SW846

SAMPLE ID: 284903008 **CLIENT ID:** 11081708/TA-01-SS

CONTRACT: ECOL00811

MATRIX: Soil **DATE RECEIVED** 29-AUG-11 **LEVEL:** Low **%SOLIDS:** 80

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439-97-6	Mercury	51.5	ug/Kg			AV	4.77	1	HG3	083011S1-5
7440-38-2	Arsenic	6690	ug/kg			MS	249	2	ICPMS4	110831-1
7440-43-9	Cadmium	1500	ug/kg			MS	24.9	2	ICPMS4	110831-1
7439-92-1	Lead	58600 JK	ug/kg		*E	MS	125	2	ICPMS4	110831-1
7440-66-6	Zinc	391000 JK	ug/kg		E MW	MS	499	2	ICPMS4	110831-4

***Analytical Methods:**

P	SW846 6010B
MS	SW846 6020
AV	SW846 7470A/7471A
AF	EPA 1631E

MW 9-12-11

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 284903 **METHOD TYPE:** SW846

SAMPLE ID: 284903009 **CLIENT ID:** 11081709/TA-02-SS

CONTRACT: ECOL00811

MATRIX: Soil **DATE RECEIVED** 29-AUG-11 **LEVEL:** Low **%SOLIDS:** 90.9

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439-97-6	Mercury	969	ug/Kg			AV	43.9	10	HG3	083011S1-5
7440-38-2	Arsenic	4640	ug/kg			MS	220	2	ICPMS4	110831-1
7440-43-9	Cadmium	42900	ug/kg			MS	22	2	ICPMS4	110831-1
7439-92-1	Lead	884000 JK	ug/kg		*E	MS	110	2	ICPMS4	110831-1
7440-66-6	Zinc	15100000 JK	ug/kg		E	MS	22000	100	ICPMS4	110831-4

***Analytical Methods:**

P	SW846 6010B
MS	SW846 6020
AV	SW846 7470A/7471A
AF	EPA 1631E

MW 9-12-11

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 284903 **METHOD TYPE:** SW846

SAMPLE ID: 284903010 **CLIENT ID:** 11081710/TA-03-SS

CONTRACT: ECOL00811

MATRIX: Soil **DATE RECEIVED** 29-AUG-11 **LEVEL:** Low **%SOLIDS:** 98.3

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439-97-6	Mercury	1190	ug/Kg			AV	77.6	20	HG3	083011S1-5
7440-38-2	Arsenic	22800	ug/kg			MS	182	2	ICPMS4	110831-1
7440-43-9	Cadmium	88600	ug/kg			MS	18.2	2	ICPMS4	110831-1
7439-92-1	Lead	4160000 JK	ug/kg		*E	MS	909	20	ICPMS4	110831-1
7440-66-6	Zinc	29400000 JK	ug/kg		E	MS	36300	200	ICPMS4	110831-4

Mu

***Analytical Methods:**

P	SW846 6010B
MS	SW846 6020
AV	SW846 7470A/7471A
AF	EPA 1631E

MW
9-12-11

ecology and environment, inc.
Global Environmental Specialists
720 Third Avenue, Suite 1700
Seattle, Washington 98104
Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: October 21, 2011

TO: Steve Hall, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-3 Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Quality Assurance Review, Grandview Mine and Mill, Metaline Falls, Washington**

REF: TDD: 11-05-0007 PAN: 002233.0692.01RA

The data quality assurance review of 6 soil samples collected from the Grandview Mine and Mill site in Metaline Falls, Washington, has been completed. Selected Target Analyte List (TAL) metals analyses (EPA Methods 6020 and 7470A) were performed by GEL Laboratories, LLC, Charleston, South Carolina.

The samples were numbered:

11081712 11081759 11081761 11081763 11081764
11081765

Data Qualifications:

1. Sample Holding Times: Acceptable.

The samples were maintained at ≤ 6°C. The samples were collected between September 2 and 24, 2011, and were analyzed by September 29, 2011 for mercury and October 5, 2011, for the other metals, therefore meeting QC criteria of less than 6 months between collection, extraction, and analysis (28 days for mercury).

2. Initial and Continuing Calibration: Acceptable.

A minimum of one calibration standard and a blank were analyzed at the beginning of the ICP analysis sequence and after every 10 samples. No results were greater than 110% of the highest calibration standard. All ICP recoveries were within the QC limits of 90% to 110%. All AA recoveries were within QC limits of 80% to 120%.

3. Blanks: Satisfactory.

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. The following element was detected in the applicable calibration and/or preparation blanks and affected sample results:

Blank	Element	Concentration (*u*g/kg)

Blank	Element	Concentration (ug/kg)
Preparation Blank	Mercury	-4.88

Associated sample results (less than five times the absolute value of the blank concentration) were qualified as estimated quantities with a low bias (JL or UJL).

4. ICP Interference Check Sample: Acceptable.

An Interference Check Sample (ICS) was analyzed at the beginning of each sequence. All ICS (solution AB) results were within QC limits of 80% - 120% recovery.

5. Precision and Bias Determination: Not Performed.

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

6. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

7. ICP Serial Dilution: Acceptable.

A serial dilution analysis was performed per matrix per concentration or per sample delivery group, whichever was more frequent. All serial dilution results were within QC limits.

8. Matrix Spike Analysis: Acceptable.

A matrix spike analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. Spike and spike duplicate recoveries were within the QC limits.

9. Duplicate Analysis: Acceptable.

A laboratory duplicate analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. All duplicate results were within QC limits.

10. Laboratory Control Sample Analysis: Acceptable.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

11. Overall Assessment of Data for Use

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

J - The associated numerical value is an estimated quantity because the reported concentrations were less than the sample quantitation limits or because quality control criteria limits were not met.

H - The associated estimated sample result has a likely high bias.

K - The associated estimated sample result has a likely unknown bias.

L - The associated estimated sample result has a likely low bias.

Q - The associated estimated sample result is greater than the method detection limit/instrument detection limit and less than the practical quantitation limit/method reporting limit.

R - The sample results are rejected (analyte may or may not be present) due to gross deficiencies in quality control criteria. Any reported value is unusable. Resampling and/or reanalysis is necessary for verification.

U - The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.

UJ - The material was analyzed for, but not detected. The reported detection limit is estimated because quality control criteria were not met.

METALS
–1–
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 286646 **METHOD TYPE:** SW846

SAMPLE ID: 286646001 **CLIENT ID:** 11081712

CONTRACT: ECOL00811

MATRIX: Soil **DATE RECEIVED** 27–SEP–11 **LEVEL:** Low **%SOLIDS:** 71

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439–97–6	Mercury	53.2	ug/Kg			AV	5.61	1	MER536	092911S1–4
7440–38–2	Arsenic	3360	ug/kg			MS	272	2	ICPMS6	110930–1
7440–43–9	Cadmium	1690	ug/kg			MS	27.2	2	ICPMS6	110930–1
7439–92–1	Lead	42700	ug/kg		*MW	MS	136	2	ICPMS6	110930–1
7440–66–6	Zinc	1410000	ug/kg			MS	2720	10	ICPMS6	111003–2

***Analytical Methods:**

P	SW846 6010B
MS	SW846 6020
AV	SW846 7470A/7471A
AF	EPA 1631E

MW 10-24-11

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 286646 **METHOD TYPE:** SW846

SAMPLE ID: 286646002 **CLIENT ID:** 11081759

CONTRACT: BCOL00811

MATRIX: Soil **DATE RECEIVED** 27-SEP-11 **LEVEL:** Low **%SOLIDS:** 93.5

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439-97-6	Mercury	3.94	ug/Kg	U	JL	AV	3.94	1	MER536	092911S1-4
7440-38-2	Arsenic	4810	ug/kg			MS	212	2	ICPMS6	110930-1
7440-43-9	Cadmium	564	ug/kg			MS	21.2	2	ICPMS6	110930-1
7439-92-1	Lead	11000	ug/kg		*	MS	106	2	ICPMS6	110930-1
7440-66-6	Zinc	75000	ug/kg			MS	424	2	ICPMS6	111003-2

***Analytical Methods:**

P	SW846 6010B
MS	SW846 6020
AV	SW846 7470A/7471A
AF	EPA 1631E

MW 10/21/11

METALS
–1–
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 286646 **METHOD TYPE:** SW846

SAMPLE ID: 286646003 **CLIENT ID:** 11081761

CONTRACT: ECOL00811

MATRIX: Soil **DATE RECEIVED** 27–SEP–11 **LEVEL:** Low **%SOLIDS:** 88

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439–97–6	Mercury	52.9	ug/Kg			AV	4.61	1	MER536	092911S1–4
7440–38–2	Arsenic	5410	ug/kg			MS	222	2	ICPMS6	110930–1
7440–43–9	Cadmium	14300	ug/kg			MS	22.2	2	ICPMS6	110930–1
7439–92–1	Lead	21500	ug/kg			MS	111	2	ICPMS6	110930–1
7440–66–6	Zinc	2140000	ug/kg			MS	2220	10	ICPMS6	111004–3

***Analytical Methods:**
P SW846 6010B
MS SW846 6020
AV SW846 7470A/7471A
AF EPA 1631E

MW 10-24-11

METALS
–1–
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 286646 **METHOD TYPE:** SW846

SAMPLE ID: 286646004 **CLIENT ID:** 11081763

CONTRACT: ECOL00811

MATRIX: Soil **DATE RECEIVED** 27–SEP–11 **LEVEL:** Low **%SOLIDS:** 90

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439–97–6	Mercury	28.5	ug/Kg			AV	4.36	1	MER536	092911S1–4
7440–38–2	Arsenic	5460	ug/kg			MS	215	2	ICPMS6	110930–1
7440–43–9	Cadmium	6870	ug/kg			MS	21.5	2	ICPMS6	110930–1
7439–92–1	Lead	47500	ug/kg		*MU	MS	108	2	ICPMS6	110930–1
7440–66–6	Zinc	2100000	ug/kg			MS	2150	10	ICPMS6	111003–2

*Analytical Methods:
P SW846 6010B
MS SW846 6020
AV SW846 7470A/7471A
AF EPA 1631E

MW 10-2-11

METALS
–1–
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 286646 **METHOD TYPE:** SW846

SAMPLE ID: 286646005 **CLIENT ID:** 11081764

CONTRACT: ECOL00811

MATRIX: Soil **DATE RECEIVED** 27–SEP–11 **LEVEL:** Low **%SOLIDS:** 92.2

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439–97–6	Mercury	31.9	ug/Kg			AV	4.08	1	MER536	092911S1–4
7440–38–2	Arsenic	5710	ug/kg			MS	211	2	ICPMS6	110930–1
7440–43–9	Cadmium	1570	ug/kg			MS	21.1	2	ICPMS6	110930–1
7439–92–1	Lead	112000	ug/kg			MS	106	2	ICPMS6	110930–1
7440–66–6	Zinc	466000	ug/kg			MS	423	2	ICPMS6	111003–2

***Analytical Methods:**
P SW846 6010B
MS SW846 6020
AV SW846 7470A/7471A
AF EPA 1631E

MW 10-24-11

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 286646 **METHOD TYPE:** SW846

SAMPLE ID: 286646006 **CLIENT ID:** 11081765

CONTRACT: ECOL00811

MATRIX: Soil **DATE RECEIVED** 27-SEP-11 **LEVEL:** Low **%SOLIDS:** 84

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439-97-6	Mercury	32.7	ug/Kg			AV	4.51	1	MER536	092911S1-4
7440-38-2	Arsenic	5840	ug/kg			MS	236	2	ICPMS6	110930-1
7440-43-9	Cadmium	3470	ug/kg			MS	23.6	2	ICPMS6	110930-1
7439-92-1	Lead	37200	ug/kg			MS	118	2	ICPMS6	110930-1
7440-66-6	Zinc	1800000	ug/kg			MS	2360	10	ICPMS6	111003-2

***Analytical Methods:**

P	SW846 6010B
MS	SW846 6020
AV	SW846 7470A/7471A
AF	EPA 1631E

MW 10-24-11

ecology and environment, inc.
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720 Third Avenue, Suite 1700, Seattle, WA 98104
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MEMORANDUM

DATE: August 20, 2011

TO: Steve Hall, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-3 Chemist, E & E, Seattle, Washington MW

SUBJ: **Asbestos Data Quality Assurance Review, Grandview Mine and Mill Site, Pend Oreille County, Washington**

REF: TDD: 11-05-0007 PAN: 002233.0692.01RA

The data quality assurance review of 20 bulk samples collected from the Grandview Mine and Mill site in Pend Oreille County, Washington, has been completed. Asbestos analyses (EPA Method 600/R-93-116 and NESHAP Final Rule 40 CFR Part 61 Point Count) were performed by Forensic Analytical Laboratories, Hayward, California. All sample analyses were evaluated following EPA's Stage 2 Data Validation Manual Process (S2VM).

The samples were numbered:

11081501	11081502	11081503	11081504	11081505	11081506
11081507	11081508	11081509	11081510	11081511	11081512
11081513	11081514	11081515	11081516	11081517	11081518
11081519	11081520				

The samples were collected between August 16 and 18, 2011, and were analyzed by August 19, 2011. No issues were noted in the sample results forms.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), and the analytical methods. Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

recycled paper

Forensic Analytical Laboratories

Final Report

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Ecology & Environment, Inc.		**Client ID:**	L1227
Steve Hall		**Report Number:**	B153172
720 3rd Ave., Suite 1700		**Date Received:**	08/19/11
		Date Analyzed:	08/19/11
Seattle, WA 98104		**Date Printed:**	08/19/11
		First Reported:	08/19/11

Job ID/Site: 10DY

FALI Job ID: L1227-9

Date(s) Collected: 08/16/2011

Total Samples Submitted: 16

Total Samples Analyzed: 16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
11081501	11157028						
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (70 %) Synthetic (5 %)							
11081502	11157029						
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (75 %) Synthetic (5 %)							
11081503	11157030						
Layer: Grey Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (99 %)							
11081504	11157031						
Layer: Brown Fibrous Material			**ND**				
Layer: Black Tar			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (80 %)							
11081505	11157032						
Layer: Grey Non-Fibrous Material		Chrysotile	**Trace**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (Trace)							
11081506	11157033						
Layer: Grey/Tan Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (99 %)							
11081507	11157034						
Layer: Green Sheet Flooring			**ND**				
Layer: Fibrous Backing			**ND**				
Layer: Red Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (80 %) Synthetic (5 %)							

3777 Depot Road, Suite 409, Hayward, CA 94545 / Telephone: (510) 887-8828 (800) 827-FASI / Fax: (510) 887-4218

8-20-11

Client Name: Ecology & Environment, Inc.

Report Number: B153172
Date Printed: 08/19/11

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
11081508	11157035						
Layer: Green Sheet Flooring			ND				
Layer: Fibrous Backing			ND				
Layer: Red Non-Fibrous Material			ND				
Layer: Brown Mastic			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (80 %) Synthetic (5 %)							
11081509	11157036						
Layer: Pink/Off-White Fibrous Material			ND				
Layer: Tan Fibrous Material			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (7 %) Fibrous Glass (90 %)							
11081510	11157037						
Layer: Orange/Off-White Fibrous Material			ND				
Layer: Tan Fibrous Material			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (5 %) Fibrous Glass (90 %)							
11081511	11157038						
Layer: Black Tar			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (Trace)							
11081512	11157039						
Layer: Black Tar			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (Trace)							
11081513	11157040						
Layer: Dark Brown Fibrous Material			ND				
Layer: Black Tar			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (60 %)							
11081514	11157041						
Layer: Black Semi-Fibrous Tar		Chrysotile	3 %				
Total Composite Values of Fibrous Components:		Asbestos (3%)					
Cellulose (Trace)							
11081515	11157042						
Layer: Black Tar			ND				
Layer: Off-White Woven Material			ND				
Layer: Black Tar			ND				
Layer: Off-White Woven Material			ND				
Layer: Black Tar			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (70 %)							

MW 8-2011

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Report Number: B153172
Client Name: Ecology & Environment, Inc. **Date Printed:** 08/19/11

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
11081516	11157043					11157043	
Layer: Beige Woven Material			**ND**				
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (85 %)							

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

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MW 8-20-11

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Forensic Analytical Laboratories

Final Report

Bulk Asbestos Point Count Analysis

(NESHAP Final Rule, 40 CFR, Part 61)

Ecology & Environment, Inc.		**Client ID:**	L1227
Steve Hall		**Report Number:**	N003898
720 3rd Ave., Suite 1700		**Date Received:**	08/19/11
		Date Analyzed:	08/19/11
Seattle, WA 98104		**Date Printed:**	08/19/11
Job ID/Site: 10DY		**FALI Job ID:**	L1227-9
		Total Samples Submitted:	1
		Total Samples Analyzed:	1

Sample Preparation and Analysis:

The NESHAP Final Rule does not define the preparation method for multi-layered samples. In order to determine the composite quantity of asbestos, the volume percent of each layer is determined, the asbestos containing layers are analyzed by point counting and the composite quantity of asbestos is calculated. The NESHAP Final Rule can not be applied to matrices that dissolve in refractive index liquid. This includes tar, mastic or adhesive typically found on the back of floor tiles. According to the NESHAP Final Rule, point count data is only necessary when the visual estimate of asbestos is below 10%.

Sample ID	Lab Number	Layer Description
11081505	11157032	**Grey Non-Fibrous Material**

Point Count Results:

Number of asbestos points counted:	1
Number of non-empty points:	400
Layer percentage of entire sample:	100
Percent asbestos in layer:	< 1

Asbestos type(s) detected: Chrysotile

Composite percentage of asbestos in entire sample: **<1.0**

Comment:

Note: Point count results are reported to the nearest percent per EPA method.

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification (LOQ) = 1%. Trace denotes the presence of asbestos below the LOQ. ND = None Detected.

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3777 Depot Road, Suite 409, Hayward, CA 94545 / Telephone: (510) 887-8828 (800) 827-FASI / Fax: (510) 887-421

MW 8-20-11

Forensic Analytical Laboratories

Final Report

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Ecology & Environment, Inc.
Steve Hall
720 3rd Ave., Suite 1700

Seattle, WA 98104

Client ID: L1227
Report Number: B153170
Date Received: 08/19/11
Date Analyzed: 08/19/11
Date Printed: 08/19/11
First Reported: 08/19/11

Job ID/Site: 10DY

Date(s) Collected: 08/18/2011

FALI Job ID: L1227-9
Total Samples Submitted: 4
Total Samples Analyzed: 4

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
11081517	11157024						
Layer: Grey Fibrous Material		Chrysotile	**70 %**				
Total Composite Values of Fibrous Components:		**Asbestos (70%)**					
Cellulose (5 %) Synthetic (5 %)							
11081518	11157025						
Layer: Grey Fibrous Material		Chrysotile	**70 %**				
Total Composite Values of Fibrous Components:		**Asbestos (70%)**					
Cellulose (5 %) Synthetic (5 %)							
11081519	11157026						
Layer: Brown Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (85 %) Synthetic (10 %)							
11081520	11157027						
Layer: Brown Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (85 %) Synthetic (10 %)							

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

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MW 8-20-11

C Community Relations Documentation

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U.S. ENVIRONMENTAL PROTECTION AGENCY
POLLUTION/SITUATION REPORT
Grandview Mine and Mill - Removal Polrep
Initial Removal Polrep

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region X

Subject: **POLREP #1**
Initial
Grandview Mine and Mill

Metaline Falls, ID
Latitude: 48.8691345 Longitude: -117.3579841

To:
From: Earl Liverman, On-Scene Coordinator
Date: 8/22/2011
Reporting Period: 08/15/2011

1. Introduction

1.1 Background

Site Number:	10DY	**Contract Number:**	
D.O. Number:		**Action Memo Date:**	5/5/2011
Response Authority:	CERCLA	**Response Type:**	Time-Critical
Response Lead:		**Incident Category:**	
NPL Status:	Non NPL	**Operable Unit:**	
Mobilization Date:	8/15/2011	**Start Date:**	8/15/2011
Demob Date:		**Completion Date:**	
CERCLIS ID:	WASFN 1002165	**RCRIS ID:**	
ERNS No.:		**State Notification:**	
FPN#:		**Reimbursable Account #:**	

1.1.1 Incident Category

Inactive mine and mill site.

1.1.2 Site Description

1.1.2.1 Location

The inactive lead-zinc Grandview Mine and Mill is located in the lower Pend Oreille River Valley, approximately 0.75 mile from the east bank of the Pend Oreille River, and approximately 2 miles northeast of Metaline Falls, Pend Oreille County, Washington (latitude 48°52'22.04"N; longitude 117°21 '26.16"W).

The entire Site is approximately 17.1 acres, and almost all of this area has been affected by the former mining and milling operations. The Site is the location of a former lead and zinc mine and mill operation. Production at the Grandview Mine and Mill is recorded as taking place from 1924 through 1964. It is reported that more than one million tons of ore were mined and milled during the 40 years of operations at the Site. At a time during the 1950s, it

is reported that up to 800 tons of ore was being milled per day and that these milling operations were occurring up to seven days a week.

The mine and mill areas are located in Government Lots 9 and 11 in Section 22. American Zinc, Lead, and Smelting Company conducted the mining and milling operations at the Site from some time in the 1950s until production ceased in 1964. On or about 17 November 1971, American Zinc Company (formerly known as American Zinc, Lead, and Smelting Company) sold all their mining claims to Washington Resources Inc., including Government Lots 9 and 11. These lots and mineral rights are currently owned by Washington Resources, LLC. Blue Tee. Corp. is the successor corporation to American Zinc Company. The tailings deposit area is located within Government Lot 10 and this property is currently owned by Teck Washington Incorporated. In 1967 the City of Seattle obtained an interest in real property located along the Pend Oreille River at the Site. The tailings deposit area extends to this property which is under the jurisdiction and control of Seattle City Light.

1.1.2.2 Description of Threat

Five metals – arsenic, cadmium, lead, mercury, and zinc – have been identified as the contaminants of concern (COCs) because of their concentrations and frequency of detections. Other metals and SVOCs identified as COPCs with media-specific concentrations exceeding screening criteria are co-located with the COCs and a removal action focused on the metal COCs will necessarily affect these contaminants. The elevated concentrations of arsenic, cadmium, lead, mercury, and zinc found in Site surface soils along with other metals, and widespread evidence of Site use indicate that the air and soil (inhalation and ingestion) human exposure pathways exist. Nearby residents, workers, recreationists, and/or trespassers could be exposed to the mine-waste contaminants found in soils. Although not open to the public, there is widespread evidence of Site use, including all-terrain vehicle tracks, motorcycle tracks, spent ammunition casings, and acts of vandalism. The potential for exposure is elevated further because of the attractiveness of visiting the remnants of historical aboveground mining structures.

The mine-waste contaminated soils are not vegetated, thus the soils are susceptible to migration within the Site and off-Site because of water- and wind-borne influences. Because the mine-waste contaminated materials and soils are not vegetated, spring time snow melt, rainfall or other forms of run-off inducing events will tend to spread the contaminated materials throughout and further from the Site. The warmer temperatures and dry weather typical in the summer and fall months in and near the Site contribute to wind-borne dispersal of mine-contaminants.

1.1.3 Preliminary Removal Assessment/Removal Site Inspection Results

EPA conducted a Preliminary Assessment/Site Investigation (PA/SI) at the Site in 2000. Surface and subsurface soil, sediment, surface water, and ground water samples were collected during this activity. The maximum metal concentrations for only the inorganic contaminants-of-concern for soil and sediment are shown below. Soil samples were collected from the Lower level, including the abandoned container and drum area, waste rock piles, tailing pile, and former wastewater ditch. The sediment samples were collected at a point below the escarpment where overland runoff from the Grandview tailings pile most likely entered the Pend Oreille River floodplain. The soil data is compared against the Washington Department of Ecology (Ecology) Model Toxics Control Act (MTCA) Method A cleanup levels, and the sediment data is compared against the Consensus-based Sediment Quality Guidelines.

MAXIMUM SOIL CONTAMINANT CONCENTRATIONS (milligrams per kilogram)			
Location	Contaminant		
	Arsenic	Cadmium	Lead
Abandoned Container & Drum Area	64.9	99.5	14,600
Waste Rock Piles	44.0	23.3	4,930
Suspected Tailings Pile	15.1	58.4	2,260
Former Wastewater Drainage Ditch	31.2	41.8	43,000
ECOLOGY METHOD A SOIL CLEANUP LEVELS			

(milligrams per kilogram)			
Unrestricted Land Uses	20	2	250
Industrial Properties	20	2	1,000

MAXIMUM SEDIMENT CONTAMINANT CONCENTRATIONS (milligrams per kilogram)			
Location	**Contaminant**		
	Arsenic	**Cadmium**	**Lead**
Point where overland runoff from the Grandview tailings pile most likely entered the Pend Oreille River floodplain	5.2	1.4	827
CONSENSUS-BASED SEDIMENT QUALITY GUIDELINES (milligrams per kilogram)			
Probable Effects Concentration	33	4.98	128

EPA and the Bureau of Land Management (BLM) visited the Grandview Mine and Mill Site to conduct a visual inspection of the property and surrounding area during July 2002. While EPA did not collect any environmental samples, BLM screened three locations at the mill operations area (Lower Level) using a field portable X-ray fluorescence (FPXRF) instrument. The screening results for lead were 2,320 parts per million (ppm), 2,720 ppm, and 36,582 ppm.

In September 2006, URS Corporation (URS) conducted field work to better define the nature and extent of tailings in the Tailings Accumulation Area including volume, metals concentrations, and waste characteristics. Concentrations of lead and cadmium in all tailings samples exceeded the MTCA Method A Soil Cleanup Levels for Unrestricted Land Use. Arsenic exceeded the MTCA Method A Soil Cleanup Level for Unrestricted Land Use in 10 of 16 samples. Five tailings samples and five native soils samples were analyzed for waste characteristics (soluble metals) using the Toxicity Characteristic Leaching Procedure (TCLP). All five tailings samples analyzed by the TCLP exceeded the toxicity criterion for lead; none of the five native soil samples, which were collected from areas underlying the tailings, analyzed by the TCLP exceeded any toxicity criteria. URS also identified an additional channel (the Man-Made Ditch), which was observed to contain residual tailings and extends from the lower portion of the Drainage Ditch to the bluff above the Pend Oreille River floodplain, bypassing the Tailings Accumulation Area. Additionally, URS concluded that the Tailings Accumulation Area contains approximately 20,700 cubic yards (yd^3) of tailings, at a maximum thickness of 11 to 19 feet).

EPA conducted a removal evaluation of the nearby Pend Oreille Village and the Upper Level of the Grandview Mine and Mill in 2007. Surface soils near the following four mine operations (Upper Level) were screened and sampled: blacksmith/machine shop, diamond core storage shack, electric cars, and powder magazine. FPXRF screening data showed the following elevated lead concentrations: 1,645 ppm, 1,801 ppm, 2,288 ppm, 2,588 ppm, 3,059 ppm, and 5,114 ppm. The laboratory data showed lead at 176 mg/kg, 5,060 mg/kg, 5,510 mg/kg, 6,180 mg/kg, and 8,990 mg/kg.

ENTACT, LLC (ENTACT) conducted supplemental investigations at the Site on behalf of the PRPs in 2008. The field work included screening for metals using FPXRF equipment and screening for volatile organic compounds using a photoionization detector. Laboratory analyses of selected samples were conducted to confirm the field screening results. Field surveys were made to better delineate the extent and volume of development rock and tailings in the Upper Level Mine Area, the Lower Level Mill Area, the Drainage Ditch, the Tailings Accumulation Area, the Downgradient Ditch, and the Man-Made Ditch. The volume estimates were 18,000 yd^3 and 915 yd^3 for the Tailings Accumulation Area and the Downgradient Ditch, respectively. The supplemental investigation confirmed the presence of several contaminants above soil cleanup criteria, identified additional areas impacted by the former mining and milling operations, and developed volume estimates for all of the areas impacted by development rock and tailings.

URS conducted supplemental investigations at the Site on behalf of the PRPs in 2010. The field work included collection of 13 mine tailing and waste rock samples for analysis using the Synthetic Leachate Procedure Testing (SPLP) and installation of four groundwater monitoring wells. Analytical results for SPLP metals concentrations indicate that the contaminants of concern were not detected in samples at concentrations exceeding SPLP decision criteria. Analytical results indicate that the contaminants of concern were not detected in groundwater samples during two sampling events at concentrations exceeding groundwater decision criteria.

2. Current Activities

2.1 Operations Section

2.1.1 Narrative

EPA, along with START and ERRS contractors, mobilized to the Site on Monday 15 August 2011. Initially, cleanup activities focused on delivery of equipment and materials and construction of Site infrastructure such as construction of temporary on-Site access, setup of office and storage trailers, and setup of fuel containment cells. Soon thereafter, ERRS began development of the footprint of the respository to be constructed on-Site, including clearing and grubbing of vegetation, demolishing the existing concrete silo and appurtenant concrete structures, and staging other ancillary debris, as well as clearing vegetation from the drainage ditch. At the same time, START began monitoring air quality and sampling for asbestos-containing materials in structures to be demolished and to delineate the extent of contamination at various areas found throughout the Site. Additionally, the excavation of mine tailings from the Tailings Accumulation Area and transport of the tailings to the repository was started. Project-wide Best Management Practices (BMPs), including "Greener" BMPs, were implemented to protect workers, the community, and the environment from short-term construction impacts.

2.1.2 Response Actions to Date

Refer to Section 2.1.1.1.

2.1.3 Enforcement Activities, Identity of Potentially Responsible Parties (PRPs)

EPA entered into an Administrative Settlement Agreement and Order on Consent with the PRPs for response costs, access, institutional controls, and long-term maintenance, monitoring, and repair in June 2011.

2.1.4 Progress Metrics

To date, approximately 2300 cubic yards of mine-waste contaminated material and other debris has been placed in the repository. At the end of the removal action, it is estimated that approximately 50,000 cubic yards will have been placed into the repository.

Waste Stream	*Medium*	*Quantity*	*Manifest #*	*Treatment*	*Disposal*

2.2 Planning Section

2.2.1 Anticipated Activities

2.2.1.1 Planned Response Activities

Continued excavation of mine-waste material from subareas found throughout the Site, including the Upper Level Mine, Lower Level Mill, and Drainage Ditch Subarea, Tailings Accumulation Subarea, and Man-Made Ditch and Downgradient Ditch Subarea. All excavated materials and other concrete, metal, and other wood debris will be consolidated at the repository located in the Lower Level Mill subarea.

Continued air quality monitoring and delineation of the extent of contamination, along with continued implementation of BMPs to protect workers, the community, and the environment from short-term construction impacts.

2.2.1.2 Next Steps

Refer to Section 2.2.1.1.

2.2.2 Issues

None.

2.3 Logistics Section

Sufficient personnel, equipment, and material are available to support cleanup activities.

2.4 Finance Section

2.4.1 Narrative

Sufficient funding is available to support cleanup activities.

2.5 Other Command Staff

2.5.1 Safety Officer

On 15 August 2011, the site health and safety plan was finalized and signed by all Site personnel. Safety briefings are conducted daily. On 17 August 2011, START initiated daily routine and specific air monitoring at select locations throughout the Site.

2.6 Liaison Officer

The EPA OSC notified local community and law enforcement officials about the cleanup activity and duration. Keeping local residents informed about the cleanup activity is ongoing.

2.7 Information Officer

2.7.1 Public Information Officer

Refer to Section 2.6.

2.7.2 Community Involvement Coordinator

Refer to Section 2.6.

3. Participating Entities

3.1 Unified Command

Not applicable.

3.2 Cooperating Agencies

Not applicable.

4. Personnel On Site

Personnel On-Site

1 - EPA OSC

1 – START (E&E)

15 – ERRS (EQM, Global Diving & Salvage, McGilivary Environmental)

5. Definition of Terms

Niot applicable.

6. Additional sources of information

6.1 Internet location of additional information/report

Not applicable.

6.2 Reporting Schedule

The next POLREP will be submitted on or about 16 September 2011.

7. Situational Reference Materials

None.