1.5

Grandview Mine
Preliminary Assessment/Site Inspection
Metaline Falls, Washington
TDD: 01-01-0015

Contract: 68-S0-01-01
June 2001

Region 10

START-2

Superfund Technical Assessment and Response Team

Submitted To: Joanne LaBaw, Task Monitor
United States Environmental Protection Agency, Region 10
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1173351

GRANDVIEW MINE
PRELIMINARY ASSESSMENT/SITE INSPECTION

METALINE FALLS, WASHINGTON

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LIST OF ACRONYMS

Acronym	Definition
%R	percent recovery
American Zinc	American Zinc, Lead, and Smelting Company
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLP	Contract Laboratory Program
CLPAS	Contract Laboratory Program Analytical Services
COCs	contaminants of concern
CRDL	contract required detection limit
CRQL	contract required quantitation limit
D	duplicate
DLs	detection limits
DQOs	data quality objectives
E & E	Ecology and Environment, Inc.
EPA	United States Environmental Protection Agency
ft^2	square feet
GPS	Global Positioning System
IDW	investigation-derived waste
lb/ton	pounds per ton
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MS/MSD	matrix spike/matrix spike duplicate
PA/SI	preliminary assessment/site inspection
PCBs	polychlorinated biphenyls
pCi/g	picocuries per gram
pCi/L	picocuries per liter
PPE	probable point of entry
QA	quality assurance
QC	quality control
RPD	relative percent difference

LIST OF ACRONYMS (CONTINUED)

Acronym	Definition
SOPs	standard operating procedures
SQAP	sampling quality assurance plan
SQL	sample quantitation limit
START	Superfund Technical Assessment and Response Team
SVOCs	semivolatile organic compounds
TAL	Target Analyte List
TDL	target distance limit

GRANDVIEW MINE
PRELIMINARY ASSESSMENT/SITE INSPECTION
METALINE FALLS, WASHINGTON

1. INTRODUCTION

The United States Environmental Protection Agency (EPA) has tasked Ecology and Environment, Inc. (E & E) to provide technical support and conduct a combined preliminary assessment/site inspection (PA/SI) at the Grandview Mine site located in Metaline Falls, Washington. E & E completed PA/SI activities under Technical Direction Document Nos. 00-06-0001 and 01-01-0015 issued under EPA, Region 10, Superfund Technical Assessment and Response Team (START) Contract Nos. 68-W6-0008 and 68-S0-01-01, respectively. The primary goals for this PA/SI were intended to address site assessment objectives and are presented below:

- Collect and analyze samples to characterize the potential sources discussed in Subsection 2.5;
- Determine off-site migration of contaminants;
- Provide the EPA with adequate information to determine whether the site is eligible for placement on the National Priorities List; and
- Document any threat or potential threat to public health or the environment posed by the site.

Completion of this PA/SI included reviewing site information, determining regional characteristics, collecting receptor information within the site's range of influence, conducting a site visit, executing a site-specific sampling plan, and producing this report.

This document includes site background information (Section 2), field sampling activities and analytical protocols (Section 3), quality assurance (QA)/quality control (QC) criteria (Section 4), analytical results reporting and background sampling (Section 5), potential sources (Section 6), migration/exposure pathways and targets (Section 7), summary and conclusions (Section 8), and references (Section 9).

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2. SITE BACKGROUND

This section describes the site location (Subsection 2.1), site description/ownership history (Subsection 2.2), site operations and waste characteristics (Subsection 2.3), site characterization (Subsection 2.4), and summary of investigation locations (Subsection 2.5).

2.1 SITE LOCATION

Site Name:	Grandview Mine
CERCLIS ID No.:	WASFN1002165
Location:	Metaline Falls, Washington
Latitude:	48°52'22.04" N
Longitude:	117°21'26.16" W
Legal Description:	Sections 14, 15, 22, and 30, Township 39N, Range 43E
County:	Pend Oreille
Site Owners:	Mr. Arlen Looney Washington Resources P.O. Box 69 Greenacres, WA 99016 (509) 534-0266
Site Contact:	Ms. Gretchen Hoy Hoy Environmental 4000 East Boone #205 Spokane, WA 99202 (509) 532-9595

2.2 SITE DESCRIPTION/OWNERSHIP HISTORY

The inactive Grandview lead-zinc mine is located in the lower Pend Oreille River Valley approximately 0.75 mile from the east bank of the Pend Oreille River, approximately 90 miles northwest of Spokane, Washington, and 2 miles northeast of Metaline Falls, Washington (Figure 2-1). Metaline Falls is a community of approximately 230 individuals in a rural setting.

Grandview Mine is located in the Metaline lead-zinc mining district which is approximately 6.5 miles wide and 25 miles long, extending along Pend Oreille River. The original Grandview Mine

claim date is unknown, but is estimated to have been made prior to 1928 and to have included 400 acres (Hays 1940). The current size of the site is estimated to be around 200 acres (Hoy 2000). Grandview Mines, Inc. constructed the mine, and it was in operation from 1928 to 1930, milling 15,000 tons of ore (Lasmanis 1995). During 1935, the American Zinc, Lead, and Smelting Company (American Zinc) leased the Grandview Mine and Mill. Arrangements were made to have American Zinc, in exchange for stock, provide the financing for Metaline Mining to develop the nearby Bella May Mine and to process the ore in the expanded Grandview Mill. The increased need for metals during World War II provided the impetus to develop Grandview and Bella May mines. Bella May Mine became known as Metaline Mine when its adit was used to produce ore for the Grandview Mill. Ore from Grandview Mine and from other mines operated by American Zinc was treated at the Grandview Mill. Metaline Mine last produced in 1950, and the Grandview Mine and Mill shut down on September 5, 1964 (Lambly 1941; Lasmanis 1995).

The site currently is owned by Washington Resources, a co-op of individuals and estates. The contact person is Mr. Arlen Looney. Previous owners include American Zinc and Grandview Mines, Inc. Additional information regarding previous ownership history is not available.

2.3 SITE OPERATIONS AND WASTE CHARACTERISTICS

Grandview Mine contained the earliest claims in the Metaline Mine District. The Metaline Mine District is one of the oldest in the State of Washington. Initial development in the district began in 1904 in the Metaline Falls area. Prior to 1928, little information is available regarding production at Grandview Mine. By 1928, however, large-scale production was begun, and a mill was constructed at the site by Grandview Mines, Inc. of Spokane, Washington. The mill operated until 1930, milling 15,000 tons of ore. In 1935, American Zinc of St. Louis, Missouri, leased the mine and mill and began further exploration, with underground development beginning in 1940. Under the lease, American Zinc used the mill to process ore from Bella May Mine located approximately 3 miles southwest of Grandview Mine (Lasmanis 1995).

In addition to mining of underground tunnels, open stope mining occurred at Grandview Mine. Both surface mining and subsurface driving involved blasting and gasoline-powered drilling. Buildings at the mine included a changing room with showers, a combination blacksmith and machine shop, a powder magazine, and a powder preparation shack (Figures 2-2 and 2-3; Zeigler 1943). Grandview Mine produced 3,995,745 tons of ore through 1956, including 46,179 tons of lead and 120,411 tons of zinc (Lasmanis 1995).

Geologically, zinc usually occurs in association with copper or lead or both. Other minor by-products may include gold, silver, and cadmium. Ore bodies near the surface are most often mined by open-stope and pillar methods. Holes are drilled into the ore bodies and are charged with explosives. The ore is then transported to a crusher and the waste rock to a waste pile. Underground mining is required when ore bodies are present at greater depths. The ore underground is broken in the stope (work area of the mine) by drilling and blasting. It is then transported to the surface for further crushing.

After further crushing on the surface, ore is transported to a concentrator where it is milled to a specified sieve size, and the lead and zinc are concentrated by floatation. In floatation, the milled ore is fed into floatation cells filled with water; air is forced in at the bottom of the cell; and the lead and zinc float on top of the water. When needed, various additives are used to coat the lead and zinc particles that rise to the surface. The surface, which contains the lead and zinc, is then skimmed off, and the water is removed. Additives include frothers (e.g., pine oil) to enhance floatation, promoters (e.g., Aerofloat petroleum distillates) to alter the water repellence of the minerals to be floated, and other reagents to control alkalinity or assist in floatation.

The Grandview Mill, when operated by American Zinc, discharged tailings from the floatation process to Pend Oreille River via a wooden flume passing over a flat area about 1 acre in size (Figure 2-4; Neale 1962). Acreage for storing the tailings was limited by the rough terrain. Tailings discharged from the mill contained an average of 0.3% zinc and 0.1% lead (based on the percentage of solid matter), as well as the residuals from reagents which were added to the process in the following amounts in pounds per ton (lb/ton): copper sulfate (1 lb/ton), Aerofloat (0.1 lb/ton), frother (0.01 lb/ton), zinc sulfate (0.26 lb/ton), potassium ethyl xanthate (0.12 lb/ton), pine oil (0.03 lb/ton), and cresylic acid (0.01 lb/ton; USFWS 1950).

Water usage at the mill was estimated at approximately 700 gallons per ton of ore processed. The mill processed approximately 700 tons of ore per day while it was in operation. This is a fairly standard figure for similar floatation mills because floatation was accomplished most successfully at the consistency of 25 percent solids by weight. (USFWS 1950)

Studies conducted on the waste rock at the adjacent Pend Oreille Mine in 1993 found that the rock had elevated levels of naturally occurring radionuclides, including radium 226 and uranium, that were above levels allowed by the EPA. Washington state does not regulate radionuclides in waste rock because it has not been "processed" and is therefore considered "source material." However, the Washington State Department of Health regulates tailings and mine water discharge for radium 226 and uranium. There exists the potential for the waste rock and tailings at Grandview Mine to contain these

naturally occurring radioactive materials, which are found in a concentrated 0.1-foot-thick vein in the Ledbetter slate. The ore body which was mined during operation, the Josephine, is located above the Ledbetter slate. It is unknown whether a portion of the radioactive vein in the Ledbetter slate was removed along with the waste rock and ores that were taken from the Josephine horizon. (Ecology 2000b)

2.4 SITE CHARACTERIZATION

This subsection describes previous investigations and the START site visit.

2.4.1 START Site Visit

The START performed a site visit on May 17, 2000. The START was accompanied by a Colville Confederated Tribes representative, Ms. Patti Stone, and the current owner's consultant, Ms. Gretchen Hoy of Hoy Environmental. The mine and mill site consisted of two main levels (Figures 2-2 and 2-3). A suspected tailings pile (the flat area described previously) made up a third part of the site (Figure 2-4). The lower level (Figure 2-2) appeared to be the mill operational area. The upper level (Figure 2-3) appeared to be the mine operational area. (E & E 2000a)

Located on the upper level was a former blacksmith/machine shop just south of a suspected collapsed adit. The building was in good condition and was fully intact minus an entrance door and window panes. The START documented a disconnected furnace unit, pits with standing water, a large piece of possible rock crushing equipment labeled "Bing Ingersoll-Rand," junction boxes, and miscellaneous tools and equipment parts in this building. An open-top tank, suspected to be used for water storage, approximately 15 feet in height by 8 feet in diameter, also was observed adjacent to the west side of the building. The tank was inaccessible, and the START was unable to determine if water was present in the tank.

To the west and uphill from the blacksmith/machine shop, the START observed the remnants of a collapsed power substation. Historically, power was transferred to the substation from a dam located off site through cables lined with insulators. From the substation the power was stepped down to a lower voltage through transformers. The transformers then distributed power to the mine and mill buildings at the proper voltage. The START identified no transformers or evidence of their existence on site.

Northeast of the blacksmith/machine shop were two concrete foundations where office buildings once stood. One foundation was approximately 75 feet in length by 50 feet in width, while the other foundation was estimated to be 50 feet in length by 50 feet in width.

Southeast of the shop was a powder preparation and diamond core sample storage shack of metal sheeting construction approximately 10 feet in length by 8 feet in width by 10 feet in height. Inside the shack the START noted several shelves which contained thousands of core samples collected from diamond drilling during mining operations. The unsecured shack was intact and in good condition.

North of the concrete foundations, a powder magazine building of log and wood construction, approximately 30 feet in width by 10 feet in height, was built partially into the hillside. The building was in an unstable condition because the sole support beam was at a dangerous angle, barely holding up the roof. Inside, thousands of pieces of paper, including record books and operational manuals, were strewn about the floor. The paperwork appeared to be old administrative records.

At the lower level (Figure 2-2), buildings and equipment, in varying conditions, remained on site and included a crusher, a grinder, a coal storage tank, a water storage tank, likely floatation tank system foundations, and a pump house. Located farther east was a log home with three residents. Surrounding the house were several abandoned cars and debris, such as appliances and tires. West of the house was a fenced area possibly used for a dog kennel. Adjacent to the fenced area, on the north side, was a two-story garage/metal shop approximately 30 feet in width by 45 feet in height. At the time of the site visit, the building housed the residents' discarded items, containers, and various tools. The containers' contents were not ascertained since the START did not enter the building, but only documented their presence from the front entrance due to safety concerns.

To the north, an unnamed spring flowing down from the middle portion of the access road (to the upper level of the site) flowed underneath a fallen tree toward the former mill area where the foundation blocks for what were likely the floatation tanks once existed. The spring continued to flow south both above and below ground through a concrete culvert system toward the head of a former wastewater drainage ditch, exiting the culvert system through a grating where the START observed ponded water. Abandoned containers and drums also were found in this area. Northeast of the former wastewater drainage ditch was a building with rooms labeled "change room" and "test lab sample room." During operation, the change room was equipped with showers, toilets, and sinks supplied with running water from the pump house located southeast of the building. Water pipes were noted by the START outside the change room and test lab sample room, most likely originating from the pump house. The test lab sample room contained a work bench and remnants of empty explosive packages and mine gel containers strewn about with various wooden debris and paper covered in rat droppings.

Northwest of the change room and test lab sample room was a suspected ore storage and off-loading building, approximately 30 feet in length by 15 feet in width by 20 feet in height. It is

presumed that once the ore was processed and was collected from the floatation vats it was staged, prior to shipment off site, in this building.

The START also documented the presence of insulated pipes protruding from the ground which suggest that water or chemicals or both were piped in to aid in mill processes. The pipes' origin could be the suspected water storage tank located directly northwest. The tank is approximately 20 feet in diameter and 50 feet in height.

Continuing north, a grinder, a coal storage tank, a burner, a crusher, and a concrete foundation were present surrounded by waste rock piles. The grinder was approximately 3 feet in diameter by 6 feet in height. The coal storage tank was estimated to be 10 feet in diameter by 10 feet in height. The burner was adjacent to the coal storage tank, and its stack was approximately 17 feet high. The crusher was dated 1900, inscribed with "Gates Breaker No. 7324, Allis-Chalmers Mill-Wisconsin IC220008K," and was sold by Eastern Iron and Metal, Salt Lake City, Utah.

Additionally, located on the hillside north of the concrete foundation and crusher were concrete slabs where a possible conveyor system had been present to transport the ore from the upper level mine area to the lower level mill area for processing.

Tailings from the milling process were released to the drainage ditch which empties into a rugged, well-vegetated canyon (Figure 2-4). The canyon leads to Pend Oreille River. Approximately 0.5 mile down the canyon the flume would have released the tailings to the ground. During the site visit tailings appeared to cover about 1 acre of land. It is believed that most of the tailings were washed from this area, through a gully and then over a bluff (Riverside Bluff), to Pend Oreille River where they likely were carried downstream.

No other previous environmental investigations are known to have occurred at the site. No other environmental concerns were noted by the START during the site visit.

2.5 SUMMARY OF PA/SI INVESTIGATION LOCATIONS

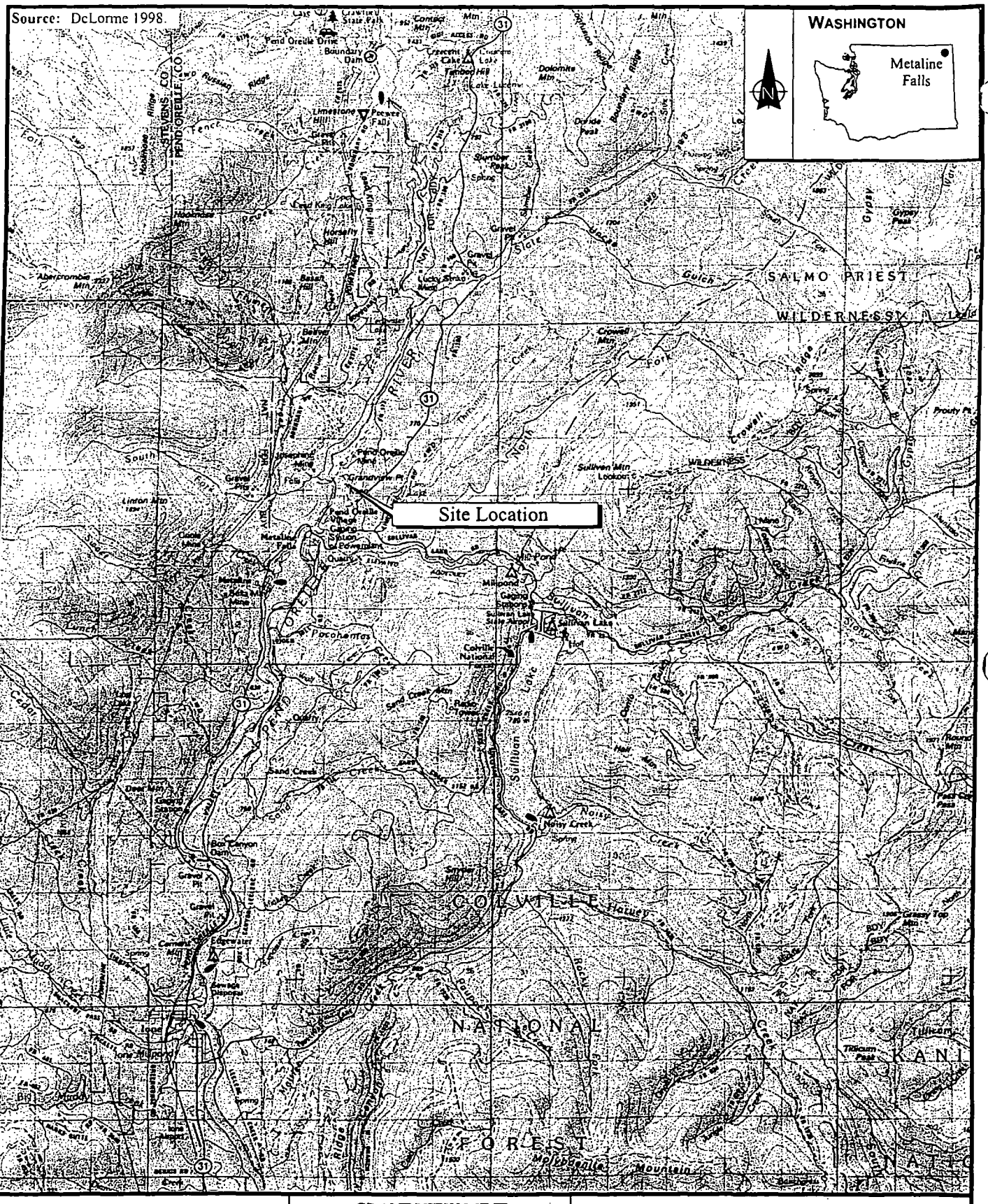
Based on a review of historical and background information which was supplemented by the site reconnaissance, areas and features within the site were identified for investigation during the PA/SI as potential Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substance sources. In addition, on- and off-site locations were identified as possible receptors of contamination originating from these sources. Those potential sources and receptors are listed below.

Potential Sources:

- **Suspected Tailings Pile.** Approximately 50,953 square feet (ft^2) of suspected tailings were deposited in a large pile 0.5 mile south of the mill area from the former wastewater drainage ditch. Contaminants of concern (COCs) include Target Analyte List (TAL) metals, including mercury, and radionuclides (uranium 234, uranium 235, uranium 238, radium 226, and radium 228) from mill operations.
- **Waste Rock Piles.** The on-site waste rock piles are estimated to measure 20,717 ft^2. COCs include TAL metals, including mercury, and radionuclides (uranium 234, uranium 235, uranium 238, radium 226, and radium 228).
- **Abandoned Container and Drum Area.** Approximately 100 to 200 abandoned drums were noted in the former wastewater drainage ditch during the START site visit. Prior to the PA/SI, the drums and waste were removed and shipped to Pend Oreille County Public Works, Solid Waste Division, Washington, by Washington Resources. COCs include TAL metals, including mercury; radionuclides (uranium 234, uranium 235, uranium 238, radium 226, and radium 228); semivolatile organic compounds (SVOCs); and polychlorinated biphenyls (PCBs). Soil contamination potentially may be migrating into the former wastewater drainage ditch and Pend Oreille River by way of overland runoff, flooding, and groundwater migration.

Potential Receptors:

- **Former Wastewater Drainage Ditch.** During the mine's operational period, tailings were dumped into a ditch which contained water and traveled down the ditch approximately 0.5 mile to a flume and to the suspected tailings pile area. From this area, the tailings continued to migrate downgradient to Pend Oreille River. COCs include TAL metals, including mercury, and radionuclides (uranium 234, uranium 235, uranium 238, radium 226, and radium 228) from mill operations.
- **Pend Oreille River.** Past discharge from the mill and potential ongoing discharge from the suspected tailings pile area may be impacting the surface water and sediments in Pend Oreille River in which several Federal listed threatened species are known to be present. COCs include TAL metals, including mercury, and radionuclides (uranium 234, uranium 235, uranium 238, radium 226, and radium 228).
- **Groundwater Within a 4-Mile Radius.** Contamination from potential sources at the site may be migrating into the local groundwater. There are nearby drinking wells downgradient from the site; however, to date they are not on-line. COCs include TAL metals, including mercury, and radionuclides (uranium 234, uranium 235, uranium 238, radium 226, and radium 228).
- **Unnamed Spring.** Surface water may be impacted from the waste rock piles. COCs include TAL metals, including mercury, and radionuclides (uranium 234, uranium 235, uranium 238, radium 226, and radium 228).



ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

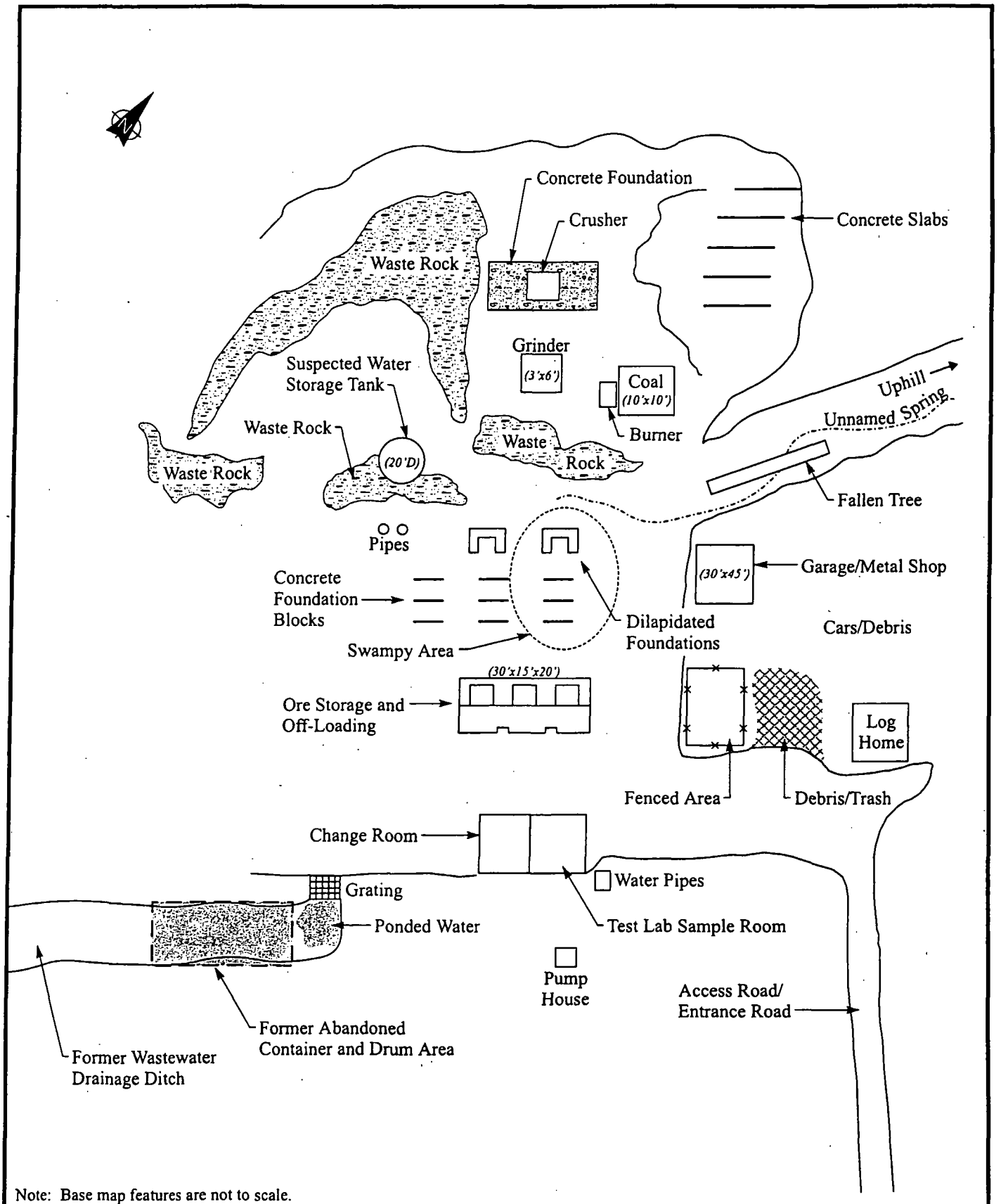
GRANDVIEW MINE
PRELIMINARY ASSESSMENT/
SITE INSPECTION
Metaline Falls, Washington

0 2 4
Approximate Scale in Miles

Figure 2-1

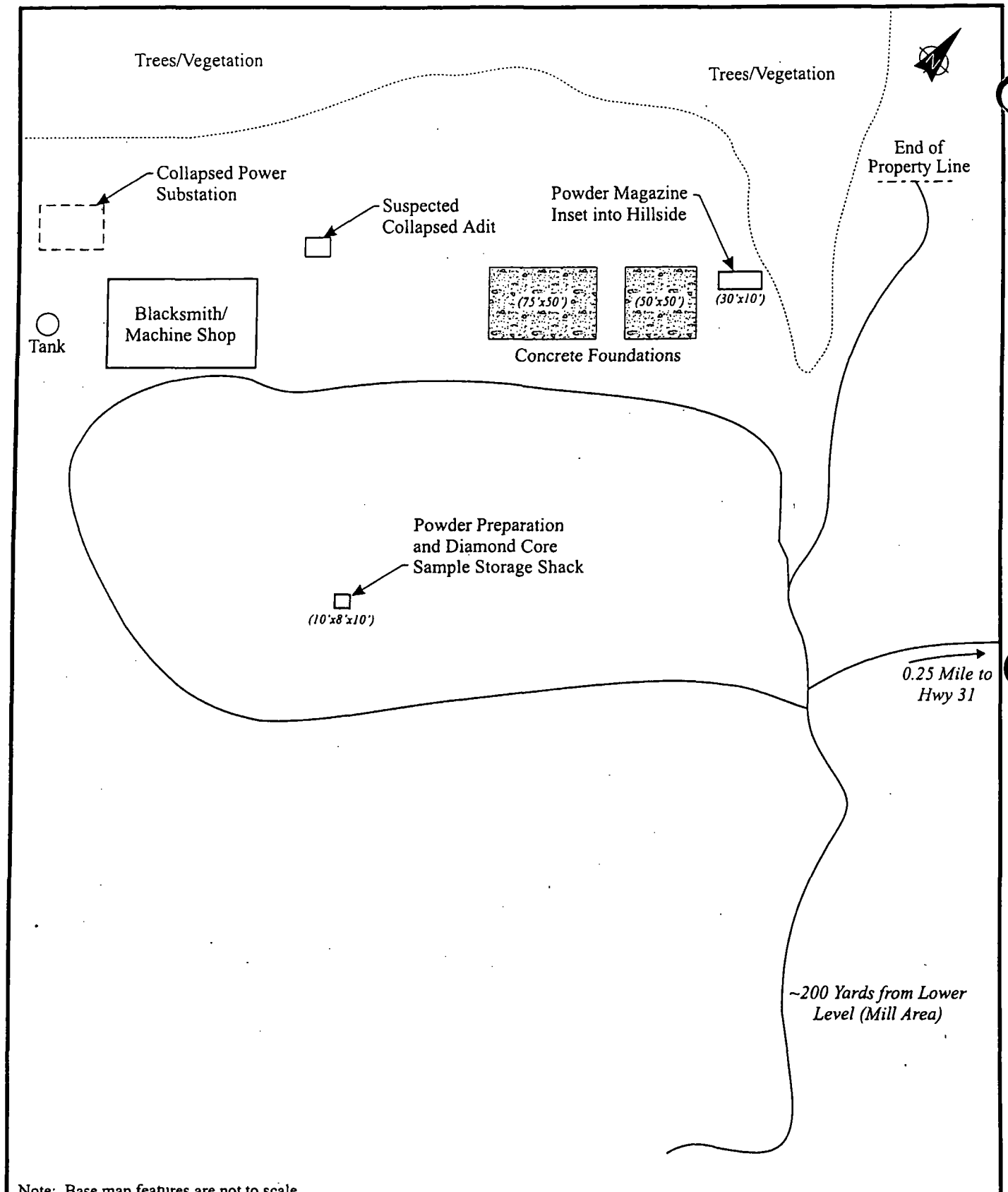
SITE VICINITY MAP

Date:	Drawn by:	
02-18-01	AES	10:START-2\01010015\S627\fig 2-1



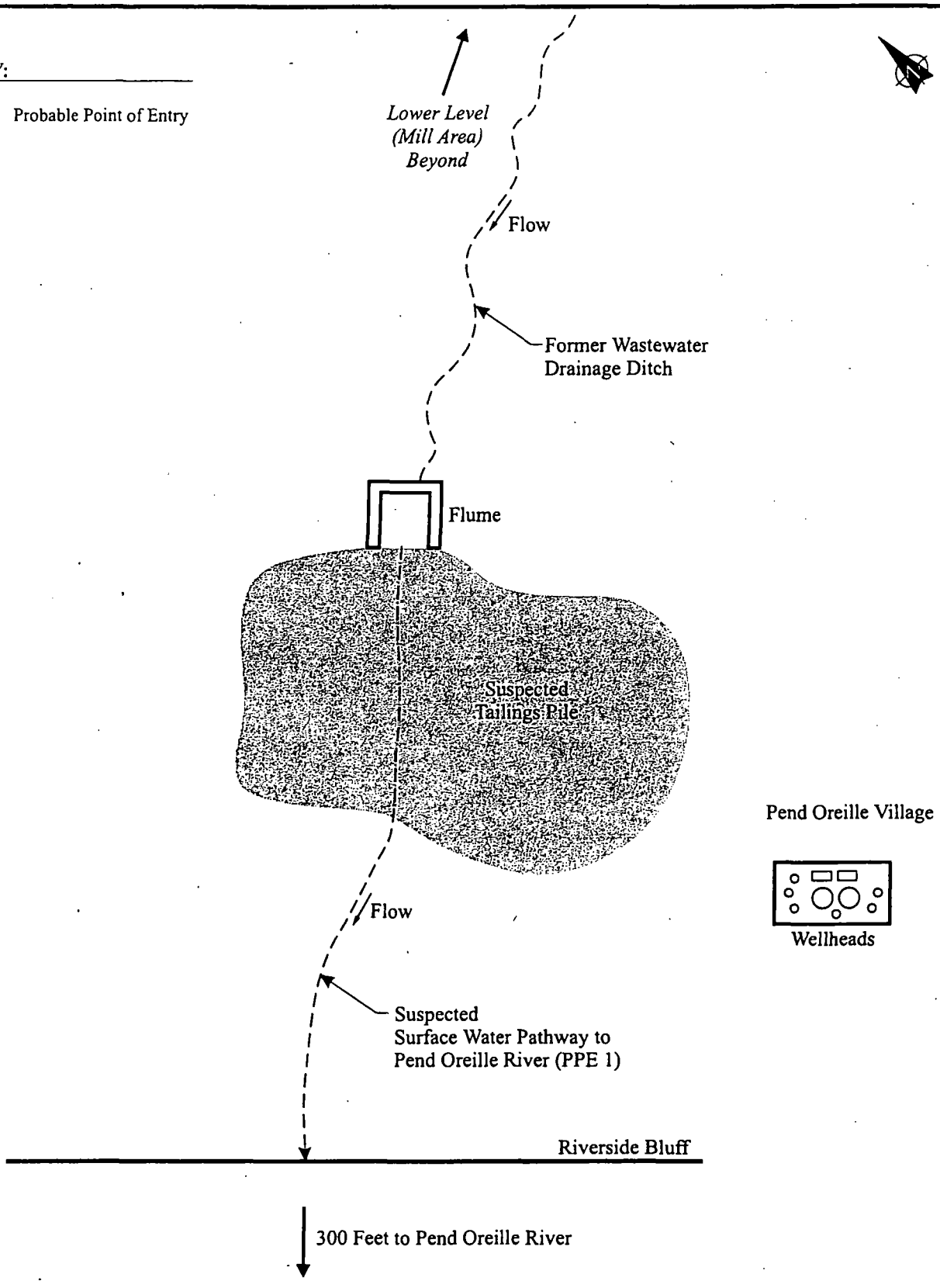
Note: Base map features are not to scale.

ecology and environment, inc. International Specialists in the Environment Seattle, Washington	GRANDVIEW MINE PRELIMINARY ASSESSMENT/ SITE INSPECTION Metaline Falls, Washington	Figure 2-2 SITE LOCATION MAP LOWER LEVEL-MILL AREA		
	Not to Scale	Date: 02-20-01	Drawn by: AES	10:START-2\01010015\S627\fig 2-2



Note: Base map features are not to scale.

ecology and environment, inc. International Specialists in the Environment Seattle, Washington	GRANDVIEW MINE PRELIMINARY ASSESSMENT/ SITE INSPECTION Metaline Falls, Washington	Figure 2-3 SITE LOCATION MAP UPPER LEVEL-MINE AREA		
	Not to Scale	Date: 02-20-01	Drawn by: AES	10:START-2\01010015\S627\fig 2-3



Note: Base map features are not to scale.

ecology and environment, inc. International Specialists in the Environment Seattle, Washington	GRANDVIEW MINE PRELIMINARY ASSESSMENT/ SITE INSPECTION Metaline Falls, Washington	Figure 2-4 SITE LOCATION MAP PPE TO PEND OREILLE RIVER		
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3. FIELD ACTIVITIES AND ANALYTICAL PROTOCOL

A sampling and quality assurance plan (SQAP) was developed by the START prior to field sampling (E & E 2000b). The SQAP was based upon a review of background information, interviews with site representatives, and a site reconnaissance by the START in May 2000. The SQAP describes the sampling strategy, sampling methodology, and analytical program used to investigate potential hazardous substance sources and potential targets. With few exceptions, PA/SI field activities were conducted in accordance with the approved SQAP. Deviations from the SQAP were approved by the EPA and are described, when applicable, in the sampling location discussions in Section 6 (source areas) and Section 7 (target areas).

The PA/SI field sampling event was conducted from October 23 through October 26, 2000. Forty samples, including background samples but excluding the QA (rinsate) sample, were collected from on- and off-site locations. Sample types and methods of collection are described below. A list of all samples collected for laboratory analysis under the PA/SI is contained in Table 3-1. Photographic documentation of PA/SI field activities is included as Appendix A.

Alphanumeric identification numbers applied by the START to each sample location (e.g., SS01SS) are used in the report as the sample location identifiers. Table 3-2 summarizes the field sample codes. Sample locations are provided in Figures 3-1 through 3-4.

This section describes the sampling methodology (Subsection 3.1), the analytical protocol (Subsection 3.2), the Global Positioning System (GPS; Subsection 3.3), and investigation-derived waste (IDW; Subsection 3.4).

3.1 SAMPLING METHODOLOGY

This subsection describes soil, surface water, sediment, and groundwater sampling conducted during the PA/SI. Samples were collected in accordance with the standard operating procedures (SOPs) provided in the SQAP, except as noted. Grass, leaves, and other vegetative material; rocks; and other debris unsuitable for analysis were removed from the samples before the samples were placed into sample containers. In general, soil and sediment sample materials for all analyses were homogenized in dedicated plastic bowls prior to containerization. Dedicated plastic scoops were used to extract,

homogenize, and place sampled material into sample containers. Decontamination of the shovels and hand auger used was conducted at the start of the PA/SI and after each sample collection. Samples were stored on ice in coolers continuously maintained under the custody of START personnel.

3.1.1 Surface Soil Samples

Eighteen surface soil samples (DA01SS through DA06SS, FD01SS through FD09SS, TP01SS, TP02SS, and BK01SS), including one background surface soil sample, were collected from the Grandview Mine site. Sample BK01SS was collected near the Circle Motel, located east of the site (Figure 3-1). The soil samples were discrete-located grab samples collected from the potential on-site source areas. Surface soil samples were collected from 0 to 6 inches below ground surface (bgs) using dedicated plastic scoops and bowls. Following homogenization, the samples were transferred into prelabeled sample containers with dedicated plastic scoops.

3.1.2 Subsurface Soil Samples

Seven subsurface soil samples (WP01SB through WP05SB, TP01SB, and TP02SB) were collected from the Grandview Mine site. The soil samples were discrete-located grab samples collected from the suspected tailings pile and the waste rock piles. Tailings and waste rock are not considered naturally occurring media; thus, the samples collected from these potential sources were compared to the background surface soil sample as the necessary depth required for a subsurface background sample was not achievable by the START.

3.1.3 Surface Water Samples

Six surface water samples (US01SW through US03SW, PR01SW, PR02SW, and BK02SW), including one background sample, were collected from the unnamed spring and Pend Oreille River. These samples were co-located with their respective sediment samples. The most downstream locations were sampled first to avoid the potential for cross-contamination. Water samples were collected by hand-dipping a 1-liter polyethylene sample container at least 6 inches below the surface of the water. The START obtained physical parameters for each surface water sample at each location with a water quality meter that measures pH, conductivity, dissolved oxygen, salinity, and temperature. Parameters were noted in the sampling logbook. All surface water samples requiring preservation were preserved immediately after sample collection according to the SOP.

3.1.4 Sediment Samples

Six sediment samples (US01SD through US03SD, PR01SD, PR02SD, and BK02SD), including one background sample, were collected from the unnamed spring and Pend Oreille River. These samples were co-located with their respective surface water samples. The sediment samples were collected from 0 to 6 inches bgs with dedicated plastic scoops. All sediment samples were homogenized in dedicated plastic bowls. Excess water was decanted off before the samples were placed into prelabeled sample containers with dedicated plastic scoops. The sediment samples were collected following the collection of co-located surface water samples to minimize the potential impact of sediments in the surface water samples. Downstream sediment samples were collected before upstream samples to minimize potential cross-contamination of the downstream surface water and sediment samples by disturbed sediment. The river samples were collected from a small jet-powered boat. During sample collection the boat engine was turned off.

3.1.5 Groundwater Samples

Three groundwater samples (PO01GW, PO02GW, and BK03GW) were collected, including one background residential sample. Two groundwater samples were collected from Pend Oreille Village, located downgradient and south of the suspected tailings pile (Figure 2-4). The groundwater samples were collected from the sample port in the pump house. The wells were purged for at least 10 minutes prior to sampling. All samples were collected directly into sample containers and preserved as appropriate.

3.2 ANALYTICAL PROTOCOL

The analytical methods applied to PA/SI samples include the Contract Laboratory Program Analytical Services (CLPAS) TAL metals analysis (CLPAS ILM04.1 and/or EPA SW-846 Methods 6010/6020/7000 Series). This analytical suite was applied to all samples based on the sample locations and the expected contaminants at those locations. Analyses of samples collected during the PA/SI for SVOCs (CLPAS OLM04.2 and/or EPA SW-846 Method 8270) and PCBs (CLPAS OLM04.2 and/or EPA SW-846 Methods 8082) were performed by the EPA, Region 10, laboratory located in Manchester, Washington. These analytical suites were applied to samples collected from the abandoned container and drum area based on the sample location and the expected contaminants at the location. For the purposes of this report, any detection of SVOCs or PCBs will be considered significant. The results will not be compared to background, as these compounds are not expected to be present in naturally occurring

soil in the area. Gamma spectroscopy analyses were performed for all collected samples by the National Air and Radiation Environmental Laboratory, in Montgomery, Alabama, which was subcontracted by the EPA.

3.3 GPS

A Trimble Pathfinder Professional GPS survey unit was used by the START personnel to approximate the sample location coordinates of the PA/SI surface and subsurface soil samples, co-located surface water and sediment samples, and groundwater samples. Recorded GPS coordinates by sample point, including horizontal precision in meters and position dilution of precision, are listed in Appendix B.

3.4 IDW

IDW generated during the PA/SI sampling effort consisted of solid disposable sampling equipment. IDW was disposed of as nonhazardous waste at a municipal landfill by the START. No IDW generated by the START remains at the site.

Ta[illegible]-1

SAMPLE COLLECTION AND ANALYTICAL SUMMARY
GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION
METALINE FALLS, WASHINGTON

EPA Sample ID	Inorganic CLP ID	Station Location	Sample		Matrix	Depth (inches)	Sampler	Analysis				Description
			Date	Time				TAL Metals	SVOCs	PCBs	Gamma Spectroscopy	
00434201	MJCG08	US01	10/23/00	1140	SW	NA	DB	X			X	Sample collected from the unnamed spring. Leaves, grass, and a little sediment present in the clear water. No odor noted.
00434202	MJCG09	US01	10/23/00	1150	SD	0-6	DB	X			X	Sample collected in the unnamed spring. Sediment consists of gritty silt and sand. Dark brown.
00434203	MJCG10	US02	10/23/00	1215	SW	NA	DB	X			X	No odor noted in clear water collected from the unnamed spring.
00434204	MJCG11	US02	10/23/00	1230	SD	0-6	DB	X			X	Sample collected from the unnamed spring. Sediment consists of coarse sand and gravel.
00434205	MJCG12	US03	10/23/00	1240	SW	NA	DB	X			X	No odor noted in clear, turbid water collected from the unnamed spring.
00434206	MJCG13	US03	10/23/00	1300	SD	0-6	DB	X			X	Sample collected from the unnamed spring. Sediment consists of clayey silt with sand. Some gravel present.
00434207	MJCG14	WP01	10/23/00	1410	SB	24-36	DB	X			X	Waste rock sample consists of gravelly sand with sparse cobbles.
00434208	MJCG15	WP02	10/23/00	1422	SB	24-36	DB	X			X	Waste rock sample consists of gravelly sand with sparse cobbles.
00434209	MJCG16	WP03	10/23/00	1435	SB	24-36	DB	X			X	Waste rock sample consists of cobbley sand with small boulders. The START noted a nail, strip metal, and wood buried in this area.
00434210	MJCG17	WP04	10/23/00	1450	SB	24-36	DB	X			X	Waste rock sample consists of gravelly sand with sparse cobbles.
00434211	MJCG18	WP05	10/23/00	1505	SB	24-36	DB	X			X	Waste rock sample consists of sandy gravel with no cobbles.
00434212	MJCG19	DA01	10/23/00	1520	SS	0-6	DB	X	X	X	X	Drum area sample with 2 inches of leaves, roots, needles, and organic content covering the sample location. Soil consists of fine-grained sand and silt with some clay.
00434213	MJCG20	DA02	10/23/00	1535	SS	0-6	DB	X	X	X	X	Drum area sample with 2 inches of leaves, roots, needles, and organic content covering the sample location. Soil consists of sandy silt.
00434214	MJCG21	DA03	10/23/00	1600	SS	0-6	DB	X	X	X	X	Drum area sample with 2 inches of leaves, roots, needles, and organic content covering the sample location. Soil consists of gray-brown clay.
00434215	MJCG22	DA04	10/23/00	1620	SS	0-6	DB	X	X	X	X	Drum area sample with 2 inches of leaves, roots, needles, and organic content covering the sample location. Soil consists of gray-brown clay.
00434216	MJCG23	DA05	10/23/00	1632	SS	0-6	DB	X	X	X	X	Drum area sample consists of homogenized gray silt.
00434217	MJCG24	DA06	10/23/00	1640	SS	0-6	DB	X	X	X	X	Drum area sample consists of sand and clay with sparse, angular gravel. The START noted the presence of metal debris, vegetation, and snails in the sample area.
00434218	MJCG25	FD01	10/24/00	1408	SS	0-6	DB	X			X	Former wastewater drainage ditch area. Soil consists of gray to brown sand with 5 to 10% reddish gravel. One-half inch of organic duff present.

Key is at the end of the table.

Table 3-1

SAMPLE COLLECTION AND ANALYTICAL SUMMARY
GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION
METALINE FALLS, WASHINGTON

EPA Sample ID	Inorganic CLP ID	Station Location	Sample		Matrix	Depth (inches)	Sampler	Analysis				Description
			Date	Time				TAL Metals	SVOCs	PCBs	Gamma Spectroscopy	
00434219	MJCG26	FD02	10/24/00	1353	SS	0-6	DB	X			X	Former wastewater drainage ditch area. Soil consists of approximately 2 inches of brown sand over gray silt.
00434220	MJCG27	FD03	10/24/00	1344	SS	0-6	DB	X			X	Former wastewater drainage ditch area. Soil consists of light gray to brown well-sorted silt covered by 0.5 inch organic duff.
00434221	MJCG28	FD04	10/24/00	1330	SS	0-6	DB	X			X	Former wastewater drainage ditch area. Soil consists of gray silt with some brown clay patches.
00434222	MJCG29	FD05	10/24/00	1321	SS	0-6	DB	X			X	Former wastewater drainage ditch area. Soil consists of gray silt with some organic debris.
00434223	MJCG30	FD06	10/24/00	1309	SS	0-6	DB	X			X	Former wastewater drainage ditch area. Soil consists of gray to brown sandy silt with organic matter.
00434224	MJCG31	TP01	10/24/00	1005	SS	0-6	DB	X			X	Tailings pile area. Five-point composite soil sample is uniform and consists of gray sandy silt. Samples were collected approximately 25 feet apart from each other from 0 to 6 inches bgs.
00434225	MJ00BC	TP01	10/24/00	1017	SB	24-36	DB	X			X	Tailings pile area. Five-point composite soil sample is uniform and consists of gray sandy silt. Samples were collected approximately 25 feet apart from each other at 24 to 36 inches bgs.
00434226	MJ00BD	TP02	10/24/00	1131	SS	0-6	DB	X			X	Tailings pile area. Five-point composite soil sample is uniform and consists of gray sandy silt. Samples were collected approximately 25 feet apart from each other from 0 to 6 inches bgs.
00434227	MJ00BE	TP02	10/24/00	1215	SB	24-36	DB	X			X	Tailings pile area. Five-point composite soil sample is uniform and consists of gray sandy silt. Samples were collected approximately 25 feet apart from each other at 24 to 36 inches bgs.
00434228	MJ00BF	FD07	10/24/00	0909	SS	0-6	DB	X			X	Former wastewater drainage ditch area. Soil consists of gray, sandy silt with no organic material present.
00434229	MJ00BG	FD08	10/24/00	0854	SS	0-6	DB	X			X	Former wastewater drainage ditch area. Soil consists of organic-rich sandy silt with underlying gray silt. One-inch organic duff present.
00434230	MJ00BH	FD09	10/24/00	0833	SS	0-6	DB	X			X	Former wastewater drainage ditch area. Soil consists of dark brown, organic sandy silt with some gray clay. Four inches of organic duff present.
00434231	MJ00BJ	PO01	10/24/00	1050	GW	NA	AJ	X			X	Pend Oreille Village groundwater well sample (AAJ805 test well No. 1) was clear. No odor was noted. (MS/D)
00434232	MJ00BK	PO02	10/24/00	1115	GW	NA	AJ	X			X	Pend Oreille Village groundwater well sample (AAJ808 test well No. 3) was clear. No odor was noted.
00434233	MJ00BL	RS01	10/24/00	1450	RS	NA	DB	X			X	Rinsate sample of hand auger and shovel (both were used at each soil sample location).

Key is at the end of the table.

Ta[illegible]3-1

SAMPLE COLLECTION AND ANALYTICAL SUMMARY
GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION
METALINE FALLS, WASHINGTON

EPA Sample ID	Inorganic CLP ID	Station Location	Sample		Matrix	Depth (inches)	Sampler	Analysis				Description
			Date	Time				TAL Metals	SVOCs	PCBs	Gamma Spectroscopy	
00434234	MJ00BN	PR01	10/25/00	1145	SW	NA	DB	X			X	Pend Oreille River co-located surface water sample collected 250 yards downstream from Grandview Mine. The surface water was clear. No odor was noted.
00434235	MJ00BP	PR01	10/25/00	1230	SD	0-6	DB	X			X	Pend Oreille River co-located sediment sample collected 250 yards downstream from Grandview Mine. The sediment consists of well-graded sand with little silt.
00434236	MJ00BQ	PR02	10/25/00	1245	SW	NA	DB	X			X	Pend Oreille River co-located surface water sample collected directly downstream from the former wastewater drainage ditch samples. Surface water was clear. No odor was noted.
00434237	MJ00BR	PR02	10/25/00	1255	SD	0-6	DB	X			X	Pend Oreille River co-located sediment sample collected directly downstream from the former wastewater drainage ditch samples. Sediment sample consists of fine sand with some silt.
00434238	MJ00BM	BK01	10/25/00	0905	SS	0-6	DB	X			X	Background soil sample collected on the bank behind the Circle Motel. Soil sample consists of dark brown, organic-rich sand and silt with some gravel (less than 5%). (MS/D)
00434239	MJ00BS	BK02	10/25/00	1330	SW	NA	DB	X			X	Background surface water sample collected approximately 200 yards south of Riverside Bluff downstream from the power plant, 150 yards north of the Falls and 300 yards south of sample location PR02. Surface water was clear with no noted odor. (MS/D)
00434240	MJ00BT	BK02	10/25/00	1340	SD	0-6	DB	X			X	Background sediment sample collected approximately 200 yards south of the Riverside Bluff downstream from the power plant, 150 yards north of the Falls and 300 yards south of sample location PR02. Sediment sample consists of small gravel and fine to coarse sand. (MS/D)
00434241	MJ00BW	BK03	10/26/00	0921	GW	NA	DB	X			X	Background groundwater sample collected from a private well upgradient from Grandview Mine.

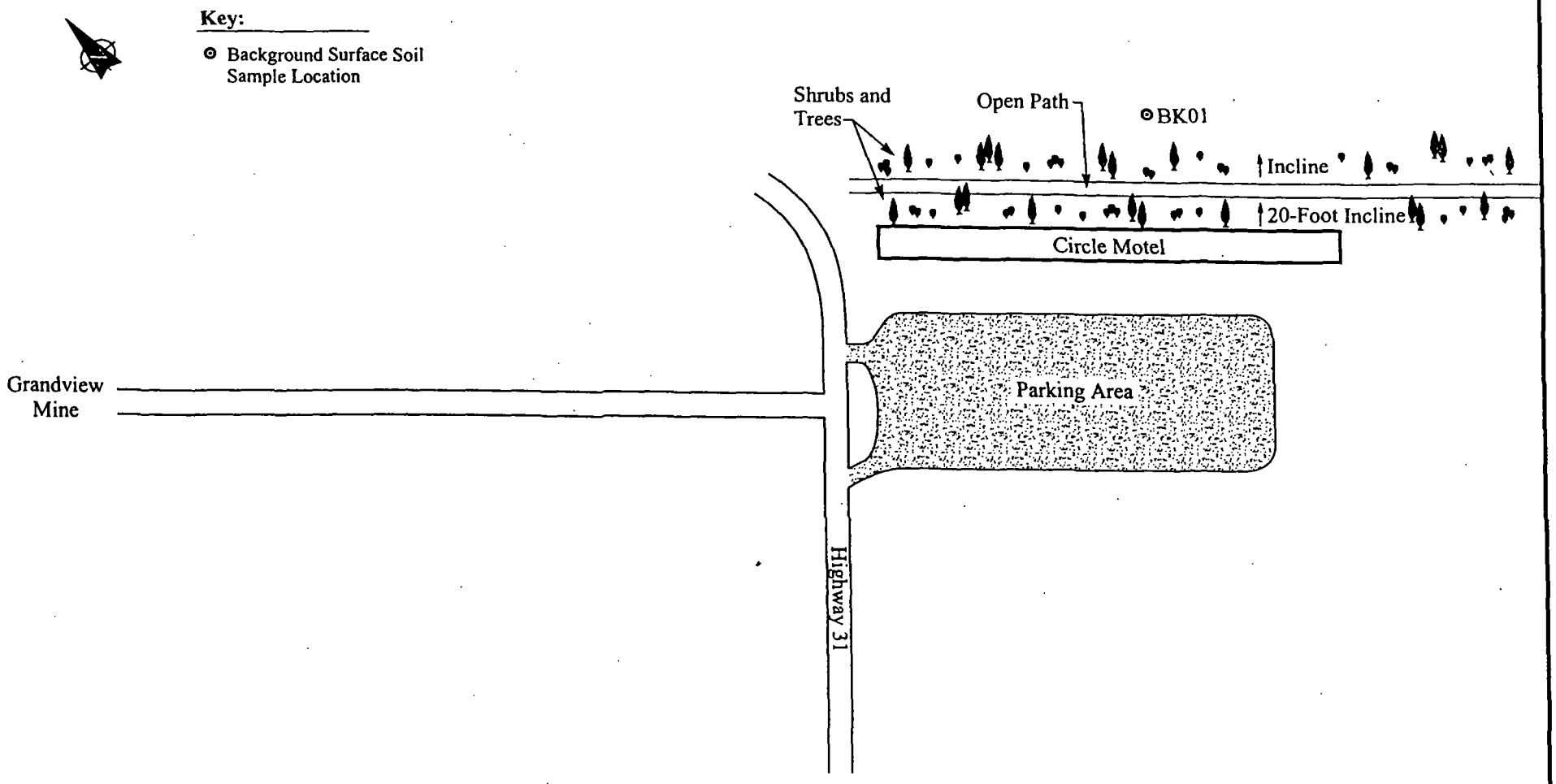
Key:

AJ	= Alan Jensen.	PCBs	= Polychlorinated biphenyls.
bgs	= Below ground surface.	RS	= Rinsate.
CLP	= Contract Laboratory Program.	SB	= Subsurface soil.
DB	= Dave Byers.	SD	= Sediment.
EPA	= United States Environmental Protection Agency.	SS	= Surface soil.
GW	= Groundwater.	SVOCs	= Semivolatile organic compounds.
ID	= Identification.	SW	= Surface water.
MS/D	= Matrix spike/duplicate.	TAL	= Target Analyte List.
NA	= Not applicable.		

Table 3-2

FIELD SAMPLE CODING
GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION
METALINE FALLS, WASHINGTON

Digits	Descriptions	Code Example
1,2	Source Code	BK (Background) DA (Abandoned Container & Drum Area) FD (Former Wastewater Drainage Ditch) PO (Pend Oreille Village) PR (Pend Oreille River) TP (Suspected Tailings Pile) US (Unnamed Spring) WP (Waste Rock Pile)
3,4	Consecutive Sample Number	01 (First Sample of Source Code)
5,6	Matrix Code	GW (Groundwater) SB (Subsurface Soil) SD (Sediment) SS (Surface Soil) SW (Surface Water)



Note: Base map features are not to scale.

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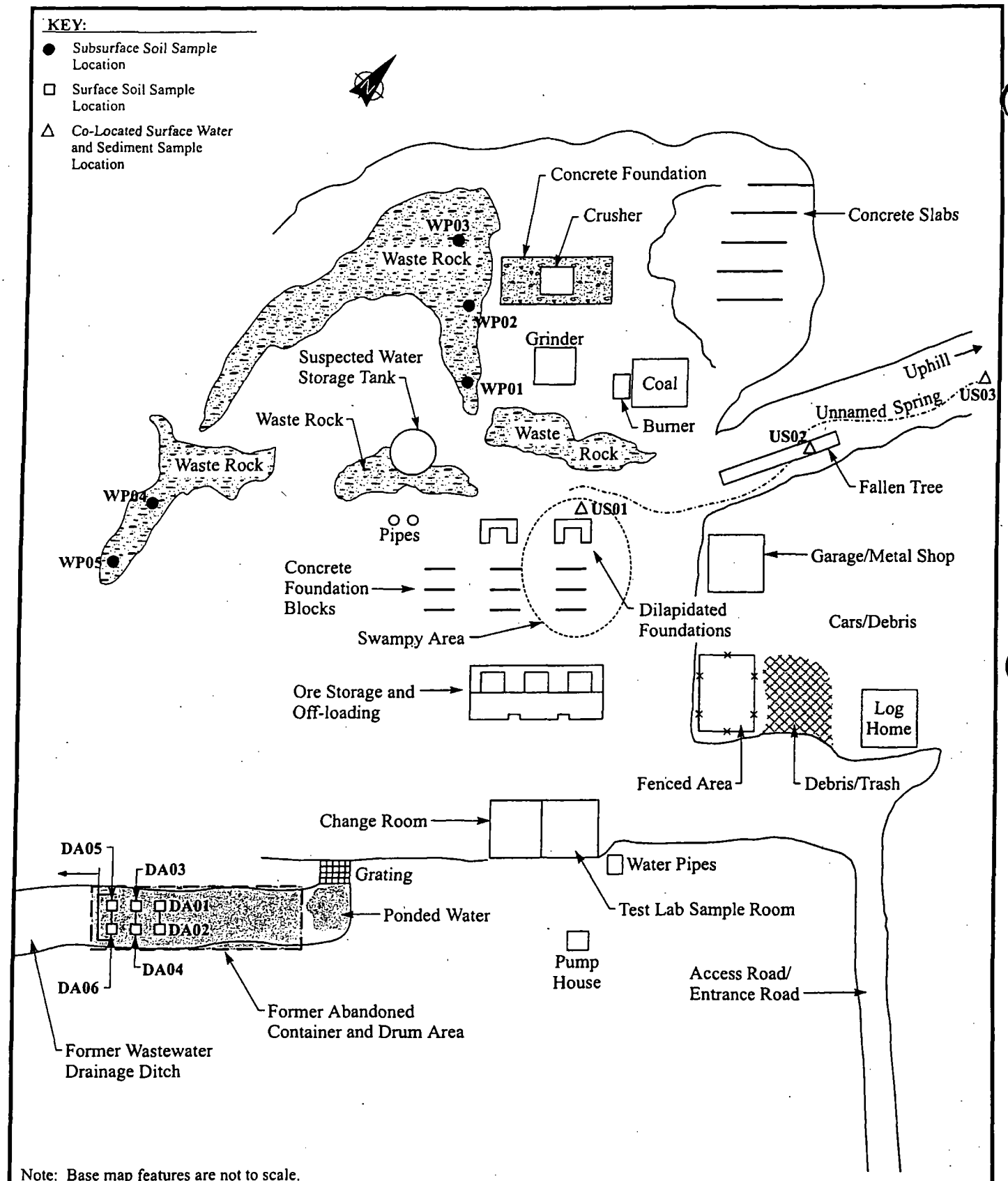
International Specialists in the Environment
Seattle, Washington

GRANDVIEW MINE
PRELIMINARY ASSESSMENT/SITE INSPECTION
Metaline Falls, Washington

0 100 200
Approximate Scale in Feet

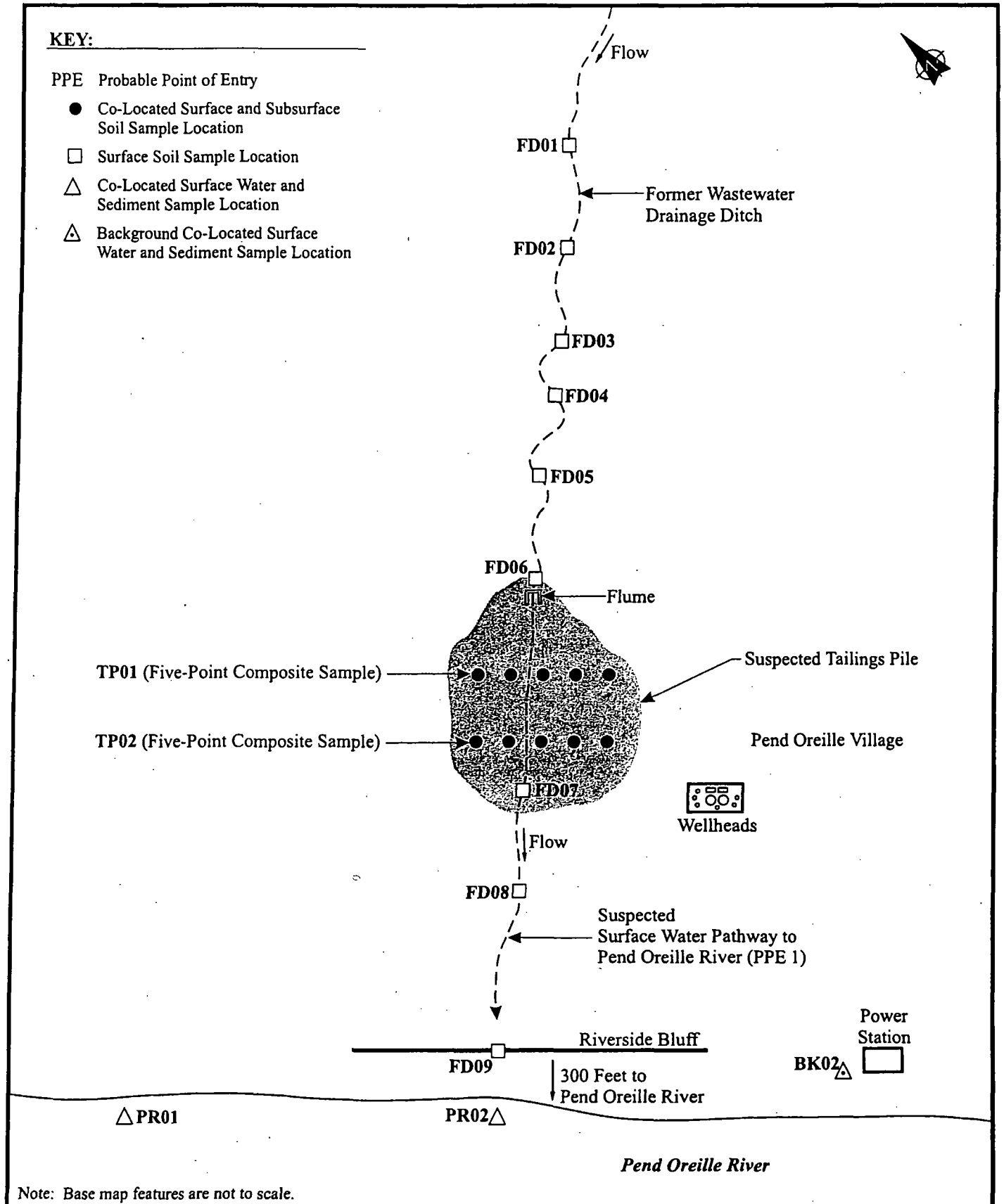
Figure 3-1
SAMPLE LOCATION MAP
BACKGROUND SOIL

Date:	Drawn by:	
02-20-01	AES	10:START-2\01010015\S627\fig 3-1



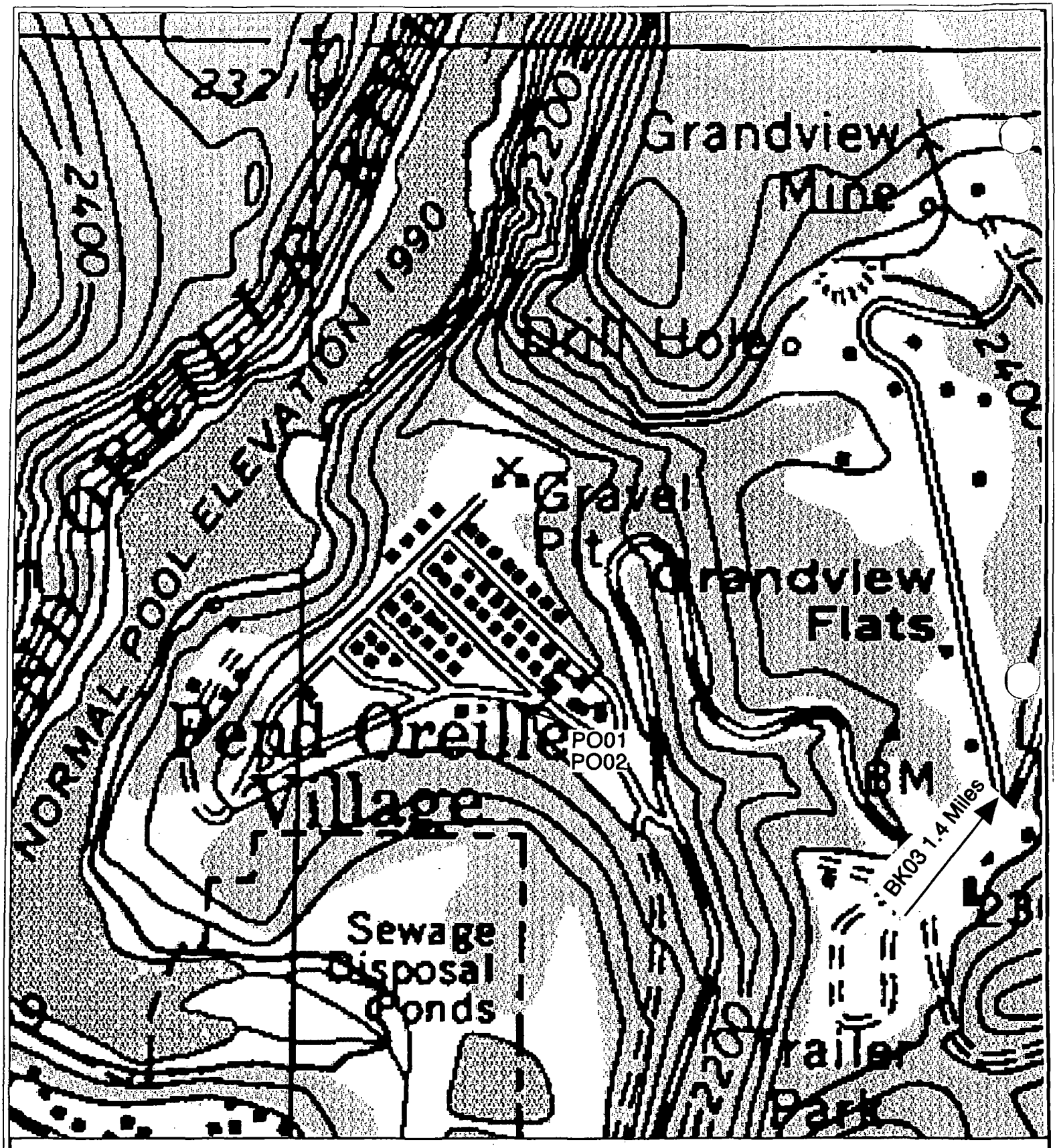
Note: Base map features are not to scale.

ecology and environment, inc. International Specialists in the Environment Seattle, Washington	GRANDVIEW MINE PRELIMINARY ASSESSMENT/ SITE INSPECTION Metaline Falls, Washington	Figure 3-2 SAMPLE LOCATION MAP LOWER LEVEL-MILL AREA		
	Not to Scale	Date: 02-20-01	Drawn by: AES	10:START-2\01010015\S627\fig 3-2



Note: Base map features are not to scale.

ecology and environment, inc. International Specialists in the Environment Seattle, Washington	GRANDVIEW MINE PRELIMINARY ASSESSMENT/ SITE INSPECTION Metaline Falls, Washington	Figure 3-3 SAMPLE LOCATION MAP PPE TO PEND OREILLE RIVER		
	0 100 200 Approximate Scale in Feet	Date: 02-20-01	Drawn by: AES	10:START-2\01010015\S627\fig 3-3



Legend

● Sample Location

0 500 1000

Feet

Figure 3-4

GRANDVIEW MINE

GROUNDWATER SAMPLE LOCATION MAP

Metaline Falls, Washington

4. QA/QC

QA/QC data are necessary to determine precision and accuracy and to demonstrate the absence of interferences or contamination or both of sampling equipment, glassware, and reagents. Specific QC requirements for laboratory analyses are incorporated in the *USEPA Contract Laboratory Program Statement of Work for Organic Analysis* (EPA 1999a) and in the *USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis* (EPA 2000a). These QC requirements or equivalent requirements were followed for analytical work for the Grandview Mine PA/SI. This section describes the QA/QC measures taken for the PA/SI and provides an evaluation of the usability of data presented in this report.

All samples were collected following the guidance of the SQAP (E & E 2000b) for the field activities. All data from analyses performed at the EPA Manchester Environmental Laboratory (SVOC and PCB analyses) were reviewed and validated by EPA chemists; all data from analyses performed at the Contract Laboratory Program (CLP) laboratory (TAL metals) were reviewed and validated by EPA chemists; and data from analyses performed at the National Air and Radiation Environmental Laboratory (Gamma spectroscopy) were reviewed by a START chemist. Data qualifiers were applied as necessary according to the following guidance:

- *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA 1999b); and
- *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 1994).

In the absence of other QC guidance, laboratory- and/or method-specific QC limits also were utilized to apply qualifiers to the data. Copies of the data QA memoranda are included in Appendix C.

4.1 SATISFACTION OF DATA QUALITY OBJECTIVES (DQOs)

The following EPA (1993) guidance document was used to establish DQOs for this PA/SI:

- *Data Quality Objectives Process for Superfund, Interim Final Guidance,* EPA 540/R-93/071.

The EPA task monitor 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 meet the data objectives stated in the SQAP (E & E 2000b).

A detailed discussion of the PA/SI objectives that were accomplished is presented in the following subsections.

4.2 QA/QC SAMPLES

QA samples included one rinsate blank sample. The rinsate sample was prepared by collecting rinse water from the freshly decontaminated hand auger and shovel. QC samples included matrix spike/ matrix spike duplicate (MS/MSD) samples at a rate of one MS/MSD per 20 samples for CLP organic analysis and MS/duplicate (D) samples at a rate of one MS/D per 20 samples for CLP inorganic analysis.

4.3 PROJECT-SPECIFIC DQOs

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.

4.3.1 Precision

Precision measures the reproducibility of the sampling and analytical methodology. Laboratory and field precision are defined as the relative percent difference (RPD) between duplicate sample analyses. The laboratory duplicate samples or MS/MSD samples measure the precision of the analytical method.

The RPD values were reviewed for all laboratory duplicate samples. None of the data were qualified based on duplicate QC outliers. The DQOs for precision were met.

4.3.2 Accuracy

Accuracy measures the reproducibility of the sampling and analytical methodology. Laboratory accuracy is defined as the surrogate spike percent recovery (%R) for each SVOC or PCB analysis or as

the matrix spike %R. The surrogate and matrix spike %R values were reviewed for all appropriate sample analyses. Approximately 0.8% of the data were qualified as estimated quantities and approximately 0.2% of the data were rejected based on MS/MSD or surrogate recovery outliers. Overall, the project DQOs for accuracy were met.

4.3.3 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. Approximately 99.2% of the data were usable; therefore, the project DQO for completeness of 90% was met.

4.3.4 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 DQOs for representativeness were met.

4.3.5 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 DQOs for comparability were met.

4.4 LABORATORY QA/QC PARAMETERS

The laboratory data also were reviewed for holding times, laboratory blank samples, rinsate blank samples, and serial dilution analysis. These QA/QC parameters are summarized below. In general, the laboratory and field QA/QC parameters were considered acceptable.

4.4.1 Holding Times

All sample analyses met EPA, Region 10, and method-specific holding time criteria.

4.4.2 Laboratory Blanks

All laboratory blanks met the frequency criteria. The following contaminants of concern were detected in the laboratory blanks:

- TAL metals: aluminum, antimony, barium, beryllium, calcium, cobalt, copper, mercury, magnesium, manganese, nickel, potassium, silver, sodium, and vanadium.

Any associated sample result less than five times the blank contamination (10 times for common laboratory contaminants) was qualified as not detected (U). See the data QA memoranda (Appendix C) for sample results that were qualified based on blank contamination.

4.4.3 Rinsate Blank

The rinsate blank met the frequency criteria. Potassium 40, thallium 208, aluminum, calcium, copper, iron, lead, magnesium, manganese, nickel, and zinc were detected in the rinsate blank. Inorganic sample results less than five times the rinsate blank contamination were qualified as "U"; the only associated result was copper in sample 00434208. As a conservative measure, the potassium 40 and thallium 208 results in samples 00434207, 00434208, 00434209, 00434210, 00434211, 00434225, and 00434227 were qualified as "U."

4.4.4 Serial Dilution

The serial dilution analyses met the frequency criteria. Approximately 2.9% of the results were qualified based on serial dilution QC outliers.

5. ANALYTICAL RESULTS REPORTING AND BACKGROUND SAMPLES

This section describes the reporting and methods applied to analytical results presented in Sections 6 and 7 of this report and discusses background locations and sample results. Table 3-1 lists all samples collected for laboratory analysis.

5.1 ANALYTICAL RESULTS EVALUATION CRITERIA

Analytical results presented in the summary tables in Sections 6 and 7 show all analytes detected above laboratory detection limits (DLs) in bold type. Analytical results indicating significant concentrations of contaminants in source samples (Section 6) with respect to background concentrations are shown underlined and in bold type. Similarly, analytical results indicating elevated concentrations of contaminants in target samples (Section 7) with respect to background concentrations also are shown underlined and in bold type. For the purposes of this investigation, significant/elevated concentrations are defined, using Table 2-3 of the EPA Hazard Ranking System model criteria for observed release (significant or elevated concentrations) as follows:

- Equal to or greater than the sample's contract required detection limit (CRDL)/contract required quantitation limit (CRQL) or the sample quantitation limit (SQL) when a non-CLP laboratory was used; and
- Equal to or greater than the background sample's CRDL/CRQL or SQL when the background concentration is below DLs; or
- At least three times greater than the background concentration when the background concentration equals or exceeds the DLs for TAL metals.

For radionuclide data, results normally are considered elevated or significant when the sample concentration exceeds the value of two standard deviations above the mean site-specific background concentration for that radionuclide.

The analytical summary tables present all detected compounds, but only those detected analytes at potential sources or in targets meeting the significant/elevated concentration criteria are discussed in the report text except for radionuclides, SVOCs, and PCBs. Because both tailings and waste rock are

unique waste matrices placed in piles on top of surface soil, analytical results of the tailings and waste rock subsurface samples collected were compared to the results for background surface soil. The background surface soil sample consisted of native soil, for reporting purposes. All detected concentrations are discussed for background samples, including those concentrations which were qualified as estimated because they were detected below the SQL (JB).

The purpose of radionuclide sampling was not for Hazard Ranking System scoring; rather the DQOs were to determine if mining and related activities have resulted in a release of radionuclides to soil, groundwater, surface water, or sediment. For the purposes of this report, any detection of radionuclides will be not be considered significant or elevated and will only be reported as detected.

For the purposes of this report, any detection of SVOCs or PCBs will be considered significant or elevated. The results will not be compared to background, as these compounds are not expected to be present in naturally occurring soil, groundwater, surface water, or sediment in the area. The site area has not undertaken industrial activities, therefore, the presence of SVOCs and PCBs is not expected to be present in background.

For analytical results that are qualified as estimated, the sample concentrations were adjusted as described in *Using Qualified Data to Document an Observed Release and Observed Contamination* (EPA 1996) before determining whether the concentration was significant or elevated. Analytical results are qualified as estimated (flagged "J") when the analyte is positively identified as either present or absent and based on the quality control data provided by the laboratory. The associated numerical value is the approximate concentration of the analyte in the sample. Additional qualifiers were applied when necessary to indicate potential bias of estimated quantities including low, unknown, high, or the result was estimated because it was below the sample quantitation limit:

- B = The detected concentration is below the method reporting limit/contract-required detection limit, but is above the instrument detection limit;
- H = The numerical result is likely biased high, above the actual concentration;
- L = The numerical result is likely biased low, below the actual concentration;
- K = The bias of the numerical value is unknown; and
- Q = The detected concentration is below the method reporting limit/contract-required quantitation limit, but is above the method detection limit.

The tables in Sections 6 and 7 provide adjusted concentrations in parentheses. For target locations, only those analytes that also were detected in a source at the site were evaluated to determine whether their concentrations were elevated. All hazardous substances detected at target locations and meeting evaluation criteria can be used to document an observed release from the site to the target. When samples were diluted for reanalysis at a laboratory, the dilution results were considered for evaluation and are provided in the tables.

5.1.1 Sample Results Reporting

This subsection describes the criteria used to report analytical results in Sections 6 and 7. When a given analyte was detected at significant/elevated concentrations in four or more samples, the number of samples and the concentration ranges are reported. When an analyte was detected at significant/elevated concentrations in three or fewer samples, the concentration of the analyte in each sample is reported. Analytical results summary tables in each section list the detected analytes and their concentrations. Based on EPA, Region 10, policy, evaluation of aluminum, calcium, iron, magnesium, potassium, and sodium (common earth crust elements) generally is employed only in water mass tracing, which is beyond the scope of this report. For this reason, these elements will not be discussed in this report.

5.2 BACKGROUND SAMPLES

Background samples were collected for each of the naturally occurring media from which PA/SI samples were collected. The background media collected were surface soil, Pend Oreille River surface water and sediment, and groundwater. Results for the appropriate background sample are shown in the first column of the analytical results summary tables in Sections 6 and 7 for comparison against source or target results.

5.2.1 Background Surface Soil

5.2.1.1 Sample Location

One off-site background surface soil sample (BK01SS) was collected, with the residents' permission, from native soil approximately 750 feet south of the entrance road to the site on the hillside behind the Circle Motel (Figure 3-1). The background soil type matched those of samples collected on site. The background sample was collected from a location believed to be outside the influence of known potential source areas. The background surface soil sample will be used as a comparison to all

subsurface soil samples collected as they are of the same composition and no subsurface soil sample could be collected as the depth required could not be reached by the START.

5.2.1.2 Sample Results

Eleven inorganics were detected in background sample BK01SS, ranging in concentration from 2.6 milligrams per kilogram (mg/kg; thallium) to 616 mg/kg (manganese). Ten radionuclides were detected in background sample BK01SS ranging in concentration from 0.289 picocurie per gram (pCi/g; thallium 208) to 15.2 pCi/g (potassium 40).

5.2.2 Background Surface Water

5.2.2.1 Sample Location

One surface water sample (BK02SW) was collected (Figure 3-3). Sample BK02SW was collected from a location co-located with BK02SD, approximately 200 yards south of Riverside Bluff downstream from the power plant. In addition, the sample location was 150 yards north of the Falls and 300 yards south of sample location PR02.

5.2.2.2 Sample Results

Six inorganics were detected in background sample B02SW, ranging from an estimated concentration of 2.2 micrograms per liter (μg/L; nickel; JB) to an estimated concentration of 62.4 μg/L (barium; JB). Two radionuclides were detected in background sample BK02SW, thallium 208 at 1.28 picocuries per liter (pCi/L) and bismuth 214 at an estimated concentration of 7.66 pCi/L, J.

5.2.3 Background Sediment

5.2.3.1 Sample Location

One sediment sample (BK02SD) was collected (Figure 3-3). Sample BK02SD was collected from a location co-located with BK02SW, approximately 200 yards south of Riverside Bluff downstream from the power plant. In addition, the sample location was 150 yards north of the Falls and 300 yards south of sample location PR02. The sample was collected from below the low water line from 0 to 6 inches bgs. The background sample matrix matched the samples collected near and downstream from the site.

5.2.3.2 Sample Results

Eleven inorganics were detected in the background sediment sample BK02SD ranging from an estimated concentration of 0.24 mg/kg (silver; JB) to 217 mg/kg (manganese). Twelve radionuclides were detected in the background sediment sample BK02SD ranging from 0.00897 pCi/g cesium 137 to 7.21 pCi/g potassium 40.

5.2.4 Background Groundwater

5.2.4.1 Sample Location

One background groundwater sample (BK03GW) was collected from a private well upgradient from Grandview Mine approximately 1.4 miles north on Hwy 31 (Figure 3-4).

5.2.4.2 Sample Results

Six inorganics were detected in the background groundwater sample BK03GW ranging from an estimated concentration of 3.0 μg/L (nickel; JB) to an estimated concentration of 52.8 μg/L (barium; JB). Two radionuclides were detected in the background groundwater sample BK03GW; bismuth 214 at an estimated concentration of 28.2 pCi/L J, and lead 214 at an estimated concentration of 28.4 pCi/L J.

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6. POTENTIAL SOURCES

This section describes sample locations and analytical results for PA/SI samples obtained from potential sources. The sampling locations, sampling rationale, and analytical results are summarized in the following subsections; Tables 6-1 through 6-3 summarize analytes detected at each potential source location investigated. Laboratory data sheets with analytical results for all samples are provided in Appendix C.

6.1 SUSPECTED TAILINGS PILE

6.1.1 Surface Soil

6.1.1.1 Sample Locations

Two 5-point composite surface soil samples (sample locations TP01SS and TP02SS) were collected from the suspected tailings pile to determine potential contaminants associated with this source. Each of the five samples comprising each composite was collected north to south from 0 to 6 inches bgs, approximately 25 feet apart from each other. TP01SS and TP02SS were collected approximately 99 feet apart from each other (Figure 3-3). The soil from the five composite locations was uniform and appeared to consist of gray sandy silt. No soil odor or staining was noted during sample collection.

6.1.1.2 Sample Results

Sample results are summarized in Table 6-1. Five inorganic elements were detected at significant concentrations in the suspected tailings pile surface soil samples. Cadmium was detected at significant concentrations in TP01SS and TP02SS at 58.4 mg/kg and 44.5 mg/kg, respectively. Lead was detected at significant concentrations in TP01SS and TP02SS at 1,670 mg/kg and 929 mg/kg, respectively. Mercury was detected at significant concentrations in TP01SS and TP02SS at estimated low concentrations of 1.5 mg/kg JL and 1.3 mg/kg JL, respectively. Selenium was detected at a significant concentration in TP01SS at 1.1 mg/kg. Zinc was detected at significant concentrations in TP01SS and TP02SS at 19,100 mg/kg and 14,600 mg/kg, respectively.

Twelve radionuclides were detected in the suspected tailings pile surface soil samples. Bismuth 214 was detected in TP01SS and TP02SS at 1.20 pCi/g and 2.47 pCi/g, respectively. Cesium 137 was

detected in TP01SS and TP02SS at 0.0239 pCi/g and 0.0213 pCi/g, respectively. Potassium 40 was detected in TP01SS and TP02SS at 0.876 pCi/g and 1.14 pCi/g, respectively. Protactinium 234m was detected in TP01SS and TP02SS at estimated concentrations of 2.70 pCi/g J and 6.20 pCi/g J, respectively. Lead 212 was detected in TP01SS and TP02SS at 0.0945 pCi/g and 0.0525 pCi/g, respectively. Lead 214 was detected in TP01SS and TP02SS at 1.39 pCi/g and 2.78 pCi/g, respectively. Radium 223 was detected in TP02SS at 0.386 pCi/g. Radium 226 was detected in TP01SS and TP02SS at estimated concentrations of 3.46 pCi/g J and 3.25 pCi/g J, respectively. Radium 228 was detected in TP01SS at 0.0692 pCi/g. Thorium 234 was detected in TP01SS and TP02SS at estimated concentrations of 1.76 pCi/g J and 3.73 pCi/g J, respectively. Uranium 235 was detected in TP01SS and TP02SS at estimated concentrations of 0.208 pCi/g J and 0.268 pCi/g J, respectively. Thallium 208 was detected in TP01SS and TP02SS at 0.0161 pCi/g and 0.0178 pCi/g, respectively.

6.1.2 Subsurface Soil

6.1.2.1 Sample Locations

Two 5-point composite subsurface soil samples (sample locations TP01SB and TP02SB) were collected from the suspected tailings pile to determine potential contaminants associated with this source. These sample locations were co-located with the surface soil tailings samples. Each of the five samples comprising each composite was collected north to south from 24 to 36 inches bgs, approximately 25 feet apart from each other. TP01SB and TP02SB were collected approximately 99 feet apart from each other (Figure 3-3). The soil from the five composite locations was uniform and appeared to consist of gray sandy silt. No soil odor or staining was noted during sample collection.

6.1.2.2 Sample Results

Sample results are summarized in Table 6-1. Six inorganic elements were detected in the suspected tailings pile subsurface soil samples. Cadmium was detected at significant concentrations in TP01SB and TP02SB at 42.2 mg/kg and 49.6 mg/kg, respectively. Copper was detected at a significant concentration in TP02SB at 91.5 mg/kg. Lead was detected at significant concentrations in TP01SB and TP02SB at 2,260 mg/kg and 2,130 mg/kg, respectively. Mercury was detected at significant concentrations in TP01SB and TP02SB at estimated low concentrations of 0.95 mg/kg JL and 1.7 mg/kg JL, respectively. Selenium was detected at a significant concentration in TP02SB at 1.1 mg/kg. Zinc was detected at significant concentrations in TP01SB and TP02SB at 11,700 mg/kg and 15,900 mg/kg, respectively.

Nine radionuclides were detected in the suspected tailings pile subsurface soil samples. Bismuth 214 was detected in TP01SB and TP02SB at 0.956 pCi/g and 1.67 pCi/g, respectively. Protactinium 234m was detected in TP01SB and TP02SB at estimated concentrations of 1.46 pCi/g J and 3.30 pCi/g J, respectively. Lead 212 was detected in TP01SS and TP02SS at 0.0561 pCi/g and 0.0666 pCi/g, respectively. Lead 214 was detected in TP01SB and TP02SB at 1.06 pCi/g and 1.86 pCi/g, respectively. Radium 226 was detected in TP01SB and TP02SB at estimated concentrations of 2.81 pCi/g J and 1.54 pCi/g J, respectively. Radium 228 was detected in TP02SB at 0.0556 pCi/g. Thorium 234 was detected in TP01SB and TP02SB at estimated concentrations of 2.04 pCi/g J and 2.50 pCi/g J, respectively. Uranium 235 was detected in TP01SB and TP02SB at estimated concentrations of 0.169 pCi/g J and 0.176 pCi/g J, respectively. Bismuth 212 was detected in TP01SB at 0.271 pCi/g.

6.2 WASTE ROCK PILES

6.2.1 Sample Locations

Five subsurface soil samples (WP01SB, WP02SB, WP03SB, WP04SB, and WP05SB) were collected from the waste rock pile area located on the lower level mill area (Figure 3-2). The samples were collected within the overland routes identified by the START. The samples were collected to determine potential contaminants associated with this source. The samples appeared to consist of gravelly sand with sparse cobbles. No odor or staining was noted during sample collection.

6.2.2 Sample Results

Sample results are summarized in Table 6-2. Arsenic, cadmium, lead, and mercury were detected at significant concentrations in all five waste rock samples. Arsenic was detected at significant concentrations in all samples at concentrations ranging from 16.4 mg/kg (WP02SB) to 44.0 mg/kg (WP03SB). Cadmium was detected at significant concentrations in all samples at concentrations ranging from 2.8 mg/kg (WP04SB) to 23.3 mg/kg (WP01SB). Lead was detected at significant concentrations in all samples at concentrations ranging from 351 mg/kg (WP04SB) to 4,930 mg/kg (WP02SB). Mercury was detected at significant concentrations in all samples at concentrations ranging from 0.34 mg/kg (WP04SB) to 1.5 mg/kg (WP05SB). Selenium was detected at significant concentrations in two out of five samples, 1.1 mg/kg in WP01SB and 1.5 mg/kg in WP03SB. Zinc was detected at significant concentrations in four out of five samples at concentrations ranging from 1,040 mg/kg (WP05SB) to 7,420 mg/kg (WP03SB).

Fourteen radionuclides were detected in the waste rock samples. Bismuth 214 was detected in all samples at concentrations ranging from 1.50 pCi/g (WP05SB) to 4.23 pCi/g (WP01SB). Cesium 137 was detected in WP01SB, WP02SB, and WP05SB at 0.0659 pCi/g, 0.0189 pCi/g, and 0.0733 pCi/g, respectively. Protactinium 234m was detected in all samples at concentrations ranging from an estimated 2.38 pCi/g J (WP04SB) to an estimated 5.12 pCi/g J (WP02SB). Lead 212 was detected in all samples at concentrations ranging from 0.0709 pCi/g (WP05SB) to 0.230 pCi/g (WP03SB). Lead 214 was detected in all samples at concentrations ranging from 1.71 pCi/g (WP05SB) to 4.90 pCi/g (WP01SB). Radium 223 was detected in all samples at concentrations ranging from 0.126 pCi/g (WP04SB) to 0.329 pCi/g (WP01SB). Radium 226 was detected in all samples at concentrations ranging from an estimated 1.17 pCi/g J (WP04SB) to an estimated 11.1 pCi/g J (WP01SB). Radium 228 was detected in four out of five at concentrations ranging from 0.0749 pCi/g (WP02SB) to an estimated 0.177 pCi/g J (WP03SB). Radon 219 was detected in three out of five samples at 0.132 pCi/g (WP04SB), 0.214 pCi/g (WP02SB), and 0.275 pCi/g (WP01SB). Thorium 227 was detected in WP01SB and WP02SB at 0.400 pCi/g and 0.278 pCi/g, respectively. Thorium 234 was detected in all samples at concentrations ranging from an estimated 1.67 pCi/g J (WP05SB) to an estimated 4.11 pCi/g J (WP01SB). Uranium 235 was detected in all samples at concentrations ranging from an estimated 0.161 pCi/g J (WP02SB) to an estimated 0.654 pCi/g J (WP01SB). Bismuth 212 was detected in WP04SB at 0.123 pCi/g. Radium 224 was detected in WP05SB at 0.243 pCi/g.

6.3 ABANDONED CONTAINER AND DRUM AREA

6.3.1 Sample Locations

Three transect surface soil samples (a total of six soil samples) were collected from the area where abandoned containers and drums had been prior to removal by Washington Resources before the START sampling event in October 2000 (Figure 3-2). The samples were collected from approximately 0 to 6 inches bgs. The soil was covered by approximately 2 inches of leaves, roots, needles, and other organic materials with sandy silt and gray-brown clay beneath.

6.3.2 Sample Results

Sample results are summarized in Table 6-3. Arsenic was detected at a significant concentration in DA06SS at 64.9 mg/kg. Cadmium was detected at significant concentrations in all samples at concentrations ranging from 5.9 mg/kg (DA01SS) to 99.5 mg/kg (DA06SS). Copper was detected at significant concentrations in five out of six samples at concentrations ranging from 65.8 mg/kg

(DA02SS) to 236 mg/kg (DA03SS). Lead was detected at significant concentrations in all samples at concentrations ranging from 264 mg/kg (DA05SS) to 14,600 mg/kg (DA04SS). Mercury was detected at significant concentrations in all samples at concentrations ranging from an adjusted concentration of 0.14 mg/kg (DA01SS and DA02SS) to 6.0 mg/kg (DA06SS). Selenium was detected at significant concentrations in two out of six samples, 2.1 mg/kg in DA06SS and 3.0 mg/kg in DA04SS. Zinc was detected at significant concentrations in all samples at concentrations ranging from 1,790 mg/kg (DA05SS) to 36,200 mg/kg (DA06SS).

Sixteen radionuclides were detected in the abandoned container and drum area surface soil samples. Bismuth 214 was detected in all samples at concentrations ranging from 0.943 pCi/g (DA02SS) to 6.45 pCi/g (DA05SS). Cesium 137 was detected in all samples at concentrations ranging from 0.170 pCi/g (DA05SS) to 1.03 pCi/g (DA02SS). Potassium 40 was detected in all samples at concentrations ranging from 0.948 pCi/g (DA05SS) to 12.7 pCi/g (DA01SS). Protactinium 234m was detected in five out of six samples at concentrations ranging from an estimated 2.18 pCi/g J (DA01SS) to an estimated 10.7 pCi/g J (DA03SS). Lead 212 was detected in all samples at concentrations ranging from 0.0776 pCi/g (DA05SS) to 1.27 pCi/g (DA01SS). Lead 214 was detected in all samples at concentrations ranging from 1.05 pCi/g (DA02SS) to 7.04 pCi/g (DA05SS). Radium 223 was detected in four out of six samples at concentrations ranging from 0.221 pCi/g (DA01SS) to 0.554 pCi/g (DA05SS). Radium 226 was detected in all samples at concentrations ranging from an estimated 1.45 pCi/g J (DA02SS) to an estimated 9.98 pCi/g J (DA06SS). Radium 228 was detected in DA01SS, DA02SS, and DA04SS at 1.12 pCi/g, 1.03 pCi/g, and 0.278 pCi/g, respectively. Radon 219 was detected in DA03SS and DA05SS at 0.401 pCi/g and 0.652 pCi/g, respectively. Thorium 227 was detected in DA01SS, DA03SS, and DA05SS at 0.171 pCi/g, 0.466 pCi/g, and 0.561 pCi/g, respectively. Thorium 234 was detected in five out of six samples at concentrations ranging from an estimated 3.24 pCi/g J (DA01SS) to an estimated 7.36 pCi/g J (DA05SS). Uranium 235 was detected in five out of six samples at concentrations ranging from an estimated 0.289 pCi/g J (DA04SS) to an estimated 0.594 pCi/g J (DA06SS). Bismuth 212 was detected in four out of six samples at concentrations ranging from 0.335 pCi/g (DA03SS) to 1.27 pCi/g (DA02SS). Radium 224 was detected in DA01SS and DA02SS at 0.946 pCi/g and 0.842 pCi/g, respectively. Thallium 208 was detected in all samples at concentrations ranging from 0.0249 pCi/g (DA05SS) to 0.352 pCi/g (DA02SS).

Because of an error during field operations, the request for PCB and SVOC analyses on the background sample was inadvertently omitted. Holding time constraints precluded later analyses after the error was detected. However, since PCBs are not naturally occurring, their presence would be

attributable to the site if detected. Since no PCBs were detected in any samples, the lack of a background sample does not impact the PA/SI. For this report, SVOC data have been identified as significant if they met the criteria specified in Section 5.1, assuming the background result would have been non-detect. Thirteen SVOCs were detected at significant concentrations in the abandoned container and drum area surface soil samples, including 2,4-dimethylphenol, 4-methylphenol, benzaldehyde, benzo[b]fluoranthene, benzoic acid, chrysene, dibenzofuran, naphthalene, 2-methyl-naphthalene, phenanthrene, phenol, 2-methyl-phenol, and pyrene.

No PCBs were detected at significant concentrations.

Table 6-1

SUSPECTED TAILINGS PILE SOIL SAMPLES
ANALYTICAL RESULTS SUMMARY
GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION
METALINE FALLS, WASHINGTON

EPA Sample Number	00434238	00434224	00434225	00434226	00434227
CLP Sample Number	MJ00BM	MJCG27	MJ00BC	MJ00BD	MJ00BE
Location ID Number	BK01SS	TP01SS	TP01SB	TP02SS	TP02SB
Depth (inches bgs)	0-6	0-6	24-36	0-6	24-36
Description	Background	Source			
Gamma Spectroscopy (pCi/g)					
Bi214	0.799	1.20	0.956	2.47	1.67
Cs137	1.31	0.0239	0.025 UJ	0.0213	0.021 UJ
K40	15.2	0.876	1.40 U	1.14	1.04 U
Pa234m	NDL	2.70 J	1.46 J	6.20 J	3.30 J
Pb212	0.974	0.0945	0.0561	0.0525	0.0666
Pb214	0.878	1.39	1.06	2.78	1.86
Ra223	NDL	NDL	NDL	0.386	NDL
Ra226	1.41 J	3.46 J	2.81 J	3.25 J	1.54 J
Ra228	0.910	0.0692	0.077 UJ	0.099 UJ	0.0556
Th234	NDL	1.76 J	2.04 J	3.73 J	2.50 J
U235	NDL	0.208 J	0.169 J	0.268 J	0.176 J
Bi212	0.980	NDL	0.271	NDL	NDL
Ra224	0.605	NDL	NDL	NDL	NDL
Tl208	0.289	0.0161	0.0143 U	0.0178	0.0115 U
TAL Metals (mg/kg)					
Aluminum	12300	279	102	150	126
Arsenic	5.2	11.9	8.8	15.1	13.6
Barium	222	6.2 JB	4.9 JB	4.9 JB	6.2 JB
Cadmium	0.12 U	58.4	42.2	44.5	49.6
Calcium	25200	116000	127000	101000	113000
Chromium	20.7	3.4	2.4	5.8	5.8
Cobalt	8.7 JB SQL = 12.3 U	0.34 JB	0.26 U	0.30 JB	0.41 JB
Copper	17.8	46.8	35.6	42.1	91.5
Iron	16400	2670	2280	2760	3770
Lead	67.8	1670	2260	929	2130
Magnesium	3580	54900	55400	49500	60000
Manganese	616	260	251	240	299
Mercury	0.06 UJK	1.5 JL	0.95 JL	1.3 JL	1.7 JL
Nickel	18.4 JK	8.0 JB	4.7 JB	9.9	10.0
Potassium	2090	79.6 JB	64.4 JB	64.3 JB	64.3 JB
Selenium	0.96 U	1.1	0.83 U	0.83 U	1.1
Silver	0.36 U	0.58 JB	0.56 JB	0.5 JB	0.6 JB
Sodium	234 JB	150 JB	174 JB	124 JB	155 JB
Thallium	2.6	1.7 U	1.7 U	1.7 U	1.7 U
Vanadium	29.7	13.5	8.6 JB	17.3	15.9
Zinc	245	19100	11700	14600	15900

Key is on the next page.

Table 6-1

SUSPECTED TAILINGS PILE SOIL SAMPLES
ANALYTICAL RESULTS SUMMARY
GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION
METALINE FALLS, WASHINGTON

Note: Bold type indicates that the sample concentration is above the detection limit.
Underlined type indicates that the sample concentration is significant as defined in Section 5.

Key:

B	= The associated sample result is less than the method detection limit, but greater than or equal to the instrument detection limit.
bgs	= Below ground surface.
Bi212	= Bismuth 212.
Bi214	= Bismuth 214.
CLP	= Contract Laboratory Program.
Cs137	= Cesium 137.
EPA	= United States Environmental Protection Agency.
ID	= Identification.
J	= The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.
K	= Unknown bias.
K40	= Potassium 40.
L	= Low bias.
mg/kg	= Milligrams per kilogram.
NDL	= No detection limit.
Pa234m	= Protactinium 234m.
Pb212	= Lead 212.
Pb214	= Lead 214.
pCi/g	= Picocuries per gram.
Ra223	= Radium 223.
Ra224	= Radium 224.
Ra226	= Radium 226.
Ra228	= Radium 228.
SQL	= Sample quantitation limit.
TAL	= Target Analyte List.
Th234	= Thorium 234.
Tl208	= Thallium 208.
U	= The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
U235	= Uranium 235.
UJ	= The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

Table 6-2

WASTE ROCK PILE SUBSURFACE SOIL SAMPLES
ANALYTICAL RESULTS SUMMARY
GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION
METALINE FALLS, WASHINGTON

EPA Sample Number	00434238	00434207	00434208	00434209	00434210	00434211
CLP Sample Number	MJ00BM	MJCG14	MJCG15	MJCG16	MJCG17	MJCG18
Location ID Number	BK01SS	WP01SB	WP02SB	WP03SB	WP04SB	WP05SB
Depth (inches bgs)	0-6	24-36	24-36	24-36	24-36	24-36
Description	Background	Source				
Gamma Spectroscopy (pCi/g)						
Bi214	0.799	4.23	3.11	2.34	1.57	1.50
Cs137	1.31	0.0659	0.0189	0.028 UJ	0.021 UJ	0.0733
K40	15.2	2.09 U	1.33 U	3.45 U	1.72 U	1.25 U
Pa234m	NDL	4.80 J	5.12 J	4.78 J	2.38 J	2.51 J
Pb212	0.974	0.118	0.101	0.230	0.116	0.0709
Pb214	0.878	4.90	3.45	2.61	1.78	1.71
Ra223	NDL	0.329	0.218	0.194	0.126	0.184
Ra226	1.41 J	11.1 J	5.48 J	3.01 J	1.17 J	4.19 J
Ra228	0.910	0.0938	0.0749	0.177 J	0.083	0.069 UJ
Rn219	NDL	0.275	0.214	NDL	0.132	NDL
Th227	NDL	0.400	0.278	NDL	NDL	NDL
Th234	NDL	4.11 J	3.01 J	2.78 J	2.07 J	1.67 J
U235	NDL	0.654 J	0.161 J	0.234 J	0.180 J	0.248 J
Bi212	0.980	NDL	NDL	NDL	0.123	NDL
Ra224	0.605	NDL	NDL	NDL	NDL	0.243
Tl208	0.289	0.036 U	0.0254 U	0.0654 U	0.0250 U	0.0158 U
TAL Metals (mg/kg)						
Aluminum	12300	518	236	1500	501	458
Arsenic	5.2	18.4	16.4	44.0	17.2	25.5
Barium	222	20.8 JB	16.5 JB	28.8 JB	12.7 JB	21.0 JB
Cadmium	0.12 U	23.3	13.0	16.0	2.8	3.2
Calcium	25200	151000	151000	150000	185000	194000
Chromium	20.7	1.8 JB	1.1 JB	4.7	2.2	1.3 JB
Cobalt	8.7 JB SQL = 12.3 U	0.50 JB	0.28 JB	2.0 JB	0.56 JB	0.49 JB
Copper	17.8	13.6	6.0 U	14.5	8.7	11.2
Iron	16400	2960	2360	5780	2140	2090
Lead	67.8	3850	4930	810	351	575
Magnesium	3580	47900	62900	53900	48300	24400
Manganese	616	245	210	262	197	116
Mercury	0.06 UJK (0.1 U AC)	1.1	1.0	0.71	0.34	1.5
Nickel	18.4 JK	15.1 JK (11.2 AC)	11.9 JK (8.81 AC)	35.7 JK (26.4 AC)	20.4 JK (15.1 AC)	14.9 JK (11.0 AC)
Potassium	2090	152 JB	137 JB	494 JB	267 JB	126 JB
Selenium	0.96 U	1.1	0.80 U	1.5	0.80 U	0.82 U
Sodium	234 JB	142 JB	155 JB	178 JB	168 JB	126 JB
Thallium	2.6	1.8 JB	2.2	3.2	1.6 U	1.7 U
Vanadium	29.7	11.4	8.9 JB	24.6	20.2	13.9
Zinc	245	7310	3830	7420	729	1040

Key is on the next page.

Table 6-2

WASTE ROCK PILE SUBSURFACE SOIL SAMPLES
ANALYTICAL RESULTS SUMMARY
GRANDVIEW MINE PA/SI
METALINE FALLS, WASHINGTON

Note: Bold type indicates that the sample concentration is above the detection limit.
Underlined type indicates that the sample concentration is significant as defined in Section 5.

Key:

AC	= Adjusted concentration.
B	= The associated sample result is less than the method detection limit, but greater than or equal to the instrument detection limit.
bgs	= Below ground surface.
Bi212	= Bismuth 212.
Bi214	= Bismuth 214.
CLP	= Contract Laboratory Program.
Cs137	= Cesium 137.
EPA	= United States Environmental Protection Agency.
ID	= Identification.
J	= The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.
K	= Unknown bias.
K40	= Potassium 40.
mg/kg	= Milligrams per kilogram.
NDL	= No detection limit.
Pa234m	= Protactinium 234m.
Pb212	= Lead 212.
Pb214	= Lead 214.
pCi/g	= Picocuries per gram.
Ra223	= Radium 223.
Ra224	= Radium 224.
Ra226	= Radium 226.
Ra228	= Radium 228.
Rn219	= Radon 219.
SQL	= Sample quantitation limit.
TAL	= Target Analyte List.
Th227	= Thorium 227.
Th234	= Thorium 234.
Tl208	= Thallium 208.
U	= The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
U235	= Uranium 235.
UJ	= The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

Table 6-3

ABANDONED CONTAINER AND DRUM AREA SURFACE SOIL SAMPLES
ANALYTICAL RESULTS SUMMARY
GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION
METALINE FALLS, WASHINGTON

EPA Sample Number	00434238	00434212	00434213	00434214	00434215	00434216	00434217
CLP Sample Number	MJ00BM	MJCG19	MJCG20	MJCG21	MJCG22	MJCG23	MJCG24
Location ID Number	BK01SS	DA01SS	DA02SS	DA03SS	DA04SS	DA05SS	DA06SS
Depth (inches bgs)	0-6	0-6	0-6	0-6	0-6	0-6	0-6
Description	Background	Source					
Gamma Spectroscopy (pCi/g)							
Bi214	0.799	2.28	0.943	3.45	2.48	6.45	3.70
Cs137	1.31	1.01	1.03	0.317	0.907	0.170	0.599
K40	15.2	12.7	13.3	1.61	4.05	0.948	9.23
Pa234m	NDL	2.18 J	NDL	10.7 J	4.39 J	6.00 J	8.25 J
Pb212	0.974	1.27	1.11	0.160	0.332	0.0776	0.595
Pb214	0.878	2.54	1.05	3.86	2.77	7.04	4.04
Ra223	NDL	0.221	NDL	0.519	NDL	0.554	0.366
Ra226	1.41 J	7.11 J	1.45 J	6.11 J	2.56 J	9.06 J	9.98 J
Ra228	0.910	1.12	1.03	0.18 UJ	0.278	0.24 UJ	0.606
Rn219	NDL	NDL	NDL	0.401	NDL	0.652	NDL
Th227	NDL	0.171	NDL	0.466	NDL	0.561	NDL
Th234	NDL	3.24 J	NDL	4.96 J	3.46 J	7.36 J	3.30 J
U235	NDL	0.425 J	NDL	0.348 J	0.289 J	0.431 J	0.594 J
Bi212	0.980	1.01	1.27	0.335	NDL	NDL	0.907
Ra224	0.605	0.946	0.842	NDL	NDL	NDL	NDL
Tl208	0.289	0.349	0.352	0.0607	0.0903	0.0249	0.187
TAL Metals (mg/kg)							
Aluminum	12300	11400	11800	1570	5570	307	6470
Arsenic	5.2	6.9	6.2	13.3	15.3	7.9	64.9
Barium	222	99.8	107	26.4 JB	189	5.2 JB	57.4
Cadmium	0.12 U	5.9	9.3	11.5	67.5	8.4	99.5
Calcium	25200	31400	16600	82200	76900	90300	30700
Chromium	20.7	19.4	17.5	48.8	10.1	5.5	16.3
Cobalt	8.7 JB SQL = 12.3 U	10.2 JB	9.8 JB	3.3 JB	5.4 JB	0.33 JB	9.4 JB
Copper	17.8	74.8	65.8	236	212	35.1	216
Iron	16400	16900	17200	26300	10900	2790	31900
Lead	67.8	705	1490	5110	14600	264	3640
Magnesium	3580	15700	4410	42000	34000	48900	16900
Manganese	616	519	450	342	338	219	300
Mercury	0.06 UJK (0.1 U AC)	0.26 JK (0.14 AC)	0.25 JK (0.14 AC)	0.97	1.9	0.35 JK (0.19 AC)	6.0
Nickel	18.4 JK (24.8 AC)	22.2 JK (16.4 AC)	19.7 JK (14.6 AC)	25.1 JK (18.6 AC)	20.2 JK (15.0 AC)	5.7 JB	37.2 JK (27.6 AC)
Potassium	2090	631 JB	909 JB	265 JB	813 JB	150 JB	902 JB
Selenium	0.96 U	1.4 JB	1.2 U	1.1 U	3.0	0.94 U	2.1
Sodium	234 JB	143 JB	158 JB	281 JB	723 JB	136 JB	198 JB
Thallium	2.6	3.4	3.1	2.3 U	2.8	1.9 U	4.1
Vanadium	29.7	18.5	18.3	18.5	22.4	21.2	19.5
Zinc	245	1860	3400	2900	21800	1790	36200

Key is at the end of the table.

Table 6-3

ABANDONED CONTAINER AND DRUM AREA SURFACE SOIL SAMPLES ANALYTICAL RESULTS SUMMARY GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION METALINE FALLS, WASHINGTON

EPA Sample Number	00434238	00434212	00434213	00434214	00434215	00434216	00434217
CLP Sample Number	MJ00BM	MJCG19	MJCG20	MJCG21	MJCG22	MJCG23	MJCG24
Location ID Number	BK01SS	DA01SS	DA02SS	DA03SS	DA04SS	DA05SS	DA06SS
Depth (inches bgs)	0-6	0-6	0-6	0-6	0-6	0-6	0-6
Description	Background	Source					
SVOCs (µg/kg)							
2,4-Dimethylphenol	NA	59.3 U	89.5	166	778	161	278
4-Methylphenol	NA	80.8 JQ	101 JQ	158	277	124	138
9H-Fluorene	NA	12.8 JQ	72.3 U	53.2 U	29.8 U	36.7 U	38.1 U
Acenaphthene	NA	59.3 U	72.3 U	53.2 U	29.8 U	36.7 U	30.3 JQ
Anthracene	NA	5.8 JQ	72.3 U	53.2 U	7.5 JQ	36.7 U	38.1 U
Benzaldehyde	NA	126 JL	135 JL	37.4 JL	52.9 JQ	5.3 JQ	26.2 JQ
Benzo[b]Fluoranthene	NA	119 U	145 U	106 U	76.7	73.4 U	76.1 U
Benzoic Acid	NA	614	794	539	256 JQ	367 U	381 UJK
Chrysene	NA	59.3 U	72.3 U	53.2 U	70.6	36.7 U	38.1 U
Dibenzofuran	NA	59.3 U	72.3 U	10.9 JQ	18.6 JQ	36.7 U	41.8
Ethanone, 1-phenyl-	NA	28.2 JQ	34.5 JQ	10.1 JQ	16.3 JQ	36.7 U	10.9 JQ
Fluoranthene	NA	22.4 JQ	72.3 U	21.3 JQ	24.3 JQ	36.7 U	11.2 JQ
Indeno(1,2,3-cd)pyrene	NA	296 U	361 U	186 JQ	149 U	184 U	190 U
Naphthalene	NA	59.3 U	72.3 U	53.2 U	31	36.7 U	38.1 U
Naphthalene, 2-methyl-	NA	14.8 JQ	21 JQ	22.8 JQ	51.1	36.7 U	139
Phenanthrene	NA	59.3 U	72.3 U	53.2 U	33.3	36.7 U	19.2 JQ
Phenol	NA	101	130	70.1	41.1	43.3	46.3
Phenol, 2-methyl-	NA	59.3 U	66.1 JQ	51.1 JQ	196	25.6 JQ	56.5
Pyrene	NA	59.3 U	38.6 JQ	19.2 JQ	43.8	36.7 U	11.1 JQ

Key is on the next page.

Table 6-3

ABANDONED CONTAINER AND DRUM AREA SURFACE SOIL SAMPLES ANALYTICAL RESULTS SUMMARY GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION METALINE FALLS, WASHINGTON

Note: Bold type indicates that the sample concentration is above the detection limit.
Underlined type indicates that the sample concentration is significant as defined in Section 5.

Key:

AC	= Adjusted concentration.
B	= The associated sample result is less than the method detection limit, but greater than or equal to the instrument detection limit.
bgs	= Below ground surface.
Bi212	= Bismuth 212.
Bi214	= Bismuth 214.
CLP	= Contract Laboratory Program.
Cs137	= Cesium 137.
EPA	= United States Environmental Protection Agency.
ID	= Identification.
J	= The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.
K	= Unknown bias.
K40	= Potassium 40.
L	= Low bias.
mg/kg	= Milligrams per kilogram.
µg/kg	= Micrograms per kilogram.
NA	= Not analyzed.
NDL	= No detection limit.
Pa234m	= Protactinium 234m.
Pb212	= Lead 212.
Pb214	= Lead 214.
pCi/g	= Picocuries per gram.
Q	= The associated sample result is less than the sample quantitation limit.
Ra223	= Radium 223.
Ra224	= Radium 224.
Ra226	= Radium 226.
Ra228	= Radium 228.
Rn219	= Radon 219.
SQL	= Sample quantitation limit.
SVOCs	= Semivolatile organic compounds.
TAL	= Target Analyte List.
Th227	= Thorium 227.
Th234	= Thorium 234.
Tl208	= Thallium 208.
U	= The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
U235	= Uranium 235.
UJ	= The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

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7. MIGRATION/EXPOSURE PATHWAYS AND TARGETS

The following sections describe migration/exposure pathways and potential targets within the site's range of influence (Figures 7-1 and 7-2). Analytical results are summarized in Tables 7-2, 7-3, 7-4, 7-5, 7-6, and 7-8. Analytical data QA forms from laboratory analyses are provided in Appendix C. This section discusses the groundwater migration pathway (Subsection 7.1), surface water migration pathway (Subsection 7.2), soil exposure pathway (Subsection 7.3), and air migration pathway (Subsection 7.4).

7.1 GROUNDWATER MIGRATION PATHWAY

7.1.1 Pathway Description

Grandview Mine lies in an area where the surface soil includes the Hartill silt loam, the Threemile silt loam, the Kanisku sandy loam, and the Dufort silt loam. Generally, these soils are deep, up to 60 inches thick, and were formed in glacial drift, including till, outwash, and lacustrine sediments. Typically, the surface soil is well drained with an overlying mat of organic material approximately 1 inch thick. The upper portions of these soils have thin mantles of volcanic ash and loess (Morton 1992). The annual net precipitation for Metaline Falls is 27.38 inches (WRCC 2000b).

Ore at Grandview Mine occurs in a carbonaceous and locally siliceous breccia called the Josephine horizon of the Metaline formation. The horizon occurs within about 35 to 300 feet of the top of the Middle Cambrian to Middle Ordovician Metaline formation. Three types of mineralization are recognized in the Mississippi-Valley-type deposits such as the Grandview Mine deposit: open space, replacement, and vein-veinlet. Ore bodies are pods and lenses that range from a few feet to a few tens of feet wide and long to masses 100 feet thick, 3,000 feet long, and 300 feet wide. Mineralization occurs as flat-lying, irregular, massive replacements and as dissemination of zinc-lead ore in dolomite. Noncommercial uranium mineralization occurs in black carbonaceous seams about 0.1 feet thick, in thin fault gouge zones, and as yellow secondary uranium minerals deposited from descending groundwater. Ore at Grandview Mine consists of irregular bodies of sphalerite and galena within a zone 35 to 150 feet below the upper contact of the Metaline formation with the Ledbetter slate. Ore minerals, with sphalerite generally dominant, are most commonly in a faintly to strongly brecciated dolomite gangue. The

thickness and the estimated hydraulic conductivity of the least conductive layer between the surface and groundwater has yet to be determined. (Morton 1992)

7.1.2 Targets

Well log reports document the presence of 35 wells within the 4-mile target distance limit (TDL). Driller logs indicate that groundwater is present between 18 and 180 feet bgs (Ecology 2000a). Whether these are separate aquifers is unknown.

Although it is not expected that groundwater is used to irrigate more than 5 acres of commercial food or forage crops, the START assumes groundwater is used for watering commercial livestock within 4 miles of the site. Groundwater is not expected to be used for commercial aquaculture or as a supply for a major or designated water recreation area.

The nearest wells are located approximately 900 feet southeast of the suspected tailings pile. These two wells currently are not on-line, but the Pend Oreille Public Utility Department is anticipating on-line status in the near future to supply the town of Metaline Falls. The average number of residents per household is 1.94 for Metaline Falls (EPA 2000b; USCB 1990). To obtain the total number of people drinking groundwater with a 4-mile radius of the site the START multiplied the reported number of wells by the average number of people per household, resulting in a total of 67.9 people. The population served within each distance ring is provided in Table 7-1.

7.1.3 Sample Locations

Two groundwater well samples (PO01GW and PO02GW) were collected at the Pend Oreille Village pump house (Figure 3-4). The wells are located approximately 900 feet southeast from the suspected tailings pile source and currently are not in use. The samples were collected from an sample output spigot located in the pump house. No odor was detected during sample collection.

7.1.4 Groundwater Well Sample Results

Sample results are summarized in Table 7-2. Arsenic was detected at elevated concentrations in both samples at 22.4 μg/L (PO02GW) and 23.4 μg/L (PO01GW). Manganese was detected at elevated concentrations in both samples at 241 μg/L (PO02GW) and 245 μg/L (PO01GW). Selenium was detected at an elevated concentration in PO01GW at 5.1 μg/L. Zinc was detected at an elevated concentration in PO01GW at 125 μg/L.

The following radionuclides were detected at estimated concentrations in PO01GW: bismuth 214 (1,340 pCi/L; J) and lead 214 (1,400 pCi/L; J). The following radionuclides were detected at estimated concentrations in PO02GW: bismuth 214 (1,160 pCi/L; J) and lead 214 (1,200 pCi/L; J).

7.2 SURFACE WATER MIGRATION PATHWAY

This subsection presents the pathway description, targets, sample locations, and sample results for the surface water migration pathway.

7.2.1 Pathway Description

The site is located approximately 0.75 mile east of Pend Oreille River (Figure 7-2). Site topography slopes gently toward Pend Oreille River. The two main levels are relatively flat with a slope between them. There is another slope between the lower level and the suspected tailings pile, which slopes gently toward Pend Oreille River. The nearest potential source area at the site to the river is the suspected tailings pile. From this source area, it is approximately 300 feet overland to Pend Oreille River. From this probable point of entry (PPE) in Pend Oreille River, it is approximately 8 miles to the Boundary Dam and the end of the surface water pathway TDL.

No source at the site is a surface impound or land treatment area. No containment such as a liner, dikes, or runoff controls exists at the site.

The average annual flow rate recorded for Pend Oreille River near Metaline Falls is 24,580 cubic feet per second (USGS 1992). Approximately 3.78 upgradient acres of land are expected to drain through a source area at the site (USGS 1992). Surficial soils in the vicinity of the site are composed of Aits stony loam, which is very deep and well drained. Typically, the surface is covered with a mat of organic material about 1 inch thick. To a depth of about 6 inches, the surface layer is brown stony loam. The upper 6 inches of the subsoil are light brown stony loam. The lower 18 inches are very pale brown gravelly loam. Permeability is moderately low in the Aits soil. Available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is severe (USDA 1992).

The two-year, 24-hour rainfall event for the Metaline Falls area is 20 inches (WRCC 2000a). The drainage area of sources is approximately 13.57 acres (USGS 1992). The site is not expected to lie within a floodplain due to its elevation above Pend Oreille River. No source area at the site has any flood containment mechanisms.

7.2.2 Targets

Thirty surface water intakes are reported to lie within the surface water TDL. The average number of persons per household in the Metaline Falls area is 1.94; therefore, the START estimates there are 58.2 persons using surface water for drinking water. The distance to the nearest downgradient intake is 0.75 mile. It is unknown if any intakes are municipal intakes. The START expects that surface water will be used within the TDL for irrigation of commercial food or forage crops or for watering of commercial livestock.

No known commercial or subsistence fisheries exist within Pend Oreille River within the 15-mile TDL (Walen 1999). There is sport fishing on Pend Oreille River (Walen 1999); however, fish catch data are not available.

The following presents all Federal listed terrestrial threatened or endangered species known or expected to occur adjacent to or within the TDL: the bull trout (*Salvelinus confluentus*), the bald eagle (*Haliaeetus leucocephalus*), and the Pacific fisher (*Martes pennanti pacifica*). Additionally, the Washington state listed American peregrine falcon (*Falco peregrinus anatum*) potentially is present within the site's TDL. (USFWS 2000)

It is estimated from National Wetland Inventory maps that 0.0430 linear mile of wetland frontage occurs within the site's surface water TDL (between the PPE and the 15-mile TDL; USFWS 1992).

7.2.3 Sample Locations

Two co-located surface water and sediment samples were collected on Pend Oreille River (PR01SW, PR01SD, PR02SW, and PR02SD), excluding background samples (Figure 3-3). The co-located surface water and sediment samples were collected downstream from, and adjacent to, the site.

Three co-located surface water and sediments samples were collected on the unnamed spring (US01SW, US01SD, US02SW, US02SD, US03SW, and US03SD) flowing from the upper level mine area to the lower level mill area (Figure 3-2).

7.2.4 Pend Oreille River Surface Water Sample Results

Sample results are summarized in Table 7-3. No TAL metals were detected at elevated concentrations and no radionuclides were detected.

7.2.5 Pend Oreille River Sediment Sample Results

Sample results are summarized in Table 7-4. Cadmium was detected at an elevated concentration in PR02SD at 1.4 mg/kg. Copper was detected at an elevated concentration in PR02SD at 28.2 mg/kg. Lead was detected at elevated concentrations in both samples, 349 mg/kg in PR01SD and 827 mg/kg in PR02SD. Zinc was detected at an elevated concentration in PR02SD at 1,090 mg/kg.

The following radionuclides were detected in sample PR01SD: bismuth 214 (0.381 pCi/g), potassium 40 (4.27 pCi/g), protactinium 234m (1.97 pCi/g; J), lead 212 (0.255 pCi/g), lead 214 (0.431 pCi/g), radium 226 (0.934 pCi/g; J), radium 228 (0.273 pCi/g), bismuth 212 (0.192 pCi/g), and thallium 208 (0.0812 pCi/g). The following radionuclides were detected in sample PR02SD: bismuth 214 (1.46 pCi/g), cesium 137 (0.0948 pCi/g), potassuim 40 (13.5 pCi/g), lead 212 (0.984 pCi/g), lead 214 (1.60 pCi/g), radium 226 (3.69 pCi/g; J), radium 228 (0.900 pCi/g), thorium 234 (1.25 pCi/g; J), uranium 235 (0.223 pCi/g; J), bismuth 212 (1.23 pCi/g), and thallium 208 (0.308 pCi/g).

7.2.6 Unnamed Spring Surface Water Sample Results

Sample results are summarized in Table 7-5. Arsenic was detected at elevated concentrations in samples US01SW and US03SW at 10.3 μg/L and 10.4 μg/L, respectively. Lead was detected at elevated concentrations in all samples at concentrations of 37.7 μg/L (US03SW), 105 μg/L (US01SW), and 1,340 μg/L (US02SW). Manganese was detected at elevated concentrations in samples US02SW and US03SW at 101 μg/L and 46.1 μg/L, respectively. Selenium was detected at an elevated concentration in US02SW at 6.7 μg/L. Zinc was detected at elevated concentrations in all samples at concentrations of 77.8 μg/L (US03SW), 117 μg/L (US01SW), and 547 μg/L (US02SW).

Bismuth 214 was detected in US01SW and US03SW at estimated concentrations of 19.4 pCi/L J and 23.9 pCi/L J, respectively. Lead 212 was detected in US02SW and US03SW at 4.49 pCi/L and 3.76 pCi/L, respectively. Lead 214 was detected in US01SW and US03SW at estimated concentrations of 12.1 pCi/L J and 21.5 pCi/L J, respectively. Thallium 208 was detected in US01SW and US03SW at 1.50 pCi/L and 1.48 pCi/L.

7.2.7 Unnamed Spring Sediment Sample Results

Sample results are summarized in Table 7-6. Cadmium was detected at elevated concentrations in US01SD and US02SD at 63.9 mg/kg and 3.5 mg/kg, respectively. Chromium was detected at an elevated concentration in US03SD at 25.2 mg/kg. Copper was detected at elevated concentrations in US01SD and US03SD at 120 mg/kg and 29.9 mg/kg, respectively. Lead was detected at elevated

concentrations in all samples at concentrations of 161 mg/kg (US03SD), 842 mg/kg (US02SD), and 11,800 mg/kg (US01SD). Selenium was detected at an elevated concentration in US01SD at 2.4 mg/kg. Thallium was detected at an elevated concentration in US01SD at 4.9 mg/kg. Zinc was detected at elevated concentrations in all samples at concentrations of 360 mg/kg (US03SD), 1,300 mg/kg (US02SD), and 19,800 mg/kg (US01SD).

The following radionuclides were detected in US01SD: bismuth 214 (2.65 pCi/g), cesium 137 (0.273 pCi/g), potassium 40 (5.32 pCi/g), protactinium 234m (4.42 pCi/g; J), lead 212 (0.315 pCi/g), lead 214 (2.82 pCi/g), radium 226 (7.91 pCi/g; J), radium 228 (0.260 pCi/g), thorium 227 (0.255 pCi/g), thorium 234 (4.22 pCi/g; J), uranium 235 (0.470 pCi/g; J), bismuth 212 (0.398 pCi/g), and thallium 208 (0.0941 pCi/g). The following radionuclides were detected in US02SD: bismuth 214 (1.44 pCi/g), cesium 137 (0.0514 pCi/g), potassium 40 (11.4 pCi/g), protactinium 234m (1.95 pCi/g; J), lead 212 (0.588 pCi/g), lead 214 (1.61 pCi/g), radium 226 (3.23 pCi/g; J), radium 228 (0.561 pCi/g), thorium 234 (1.30 pCi/g; J), uranium 235 (0.198 pCi/g; J), bismuth 212 (0.622 pCi/g), and thallium 208 (0.163 pCi/g). The following radionuclides were detected in US03SD: bismuth 214 (0.860 pCi/g), cesium 137 (0.0519 pCi/g), potassium 40 (19.2 pCi/g), lead 212 (0.926 pCi/g), lead 214 (0.920 pCi/g), radium 226 (1.89 pCi/g; J), radium 228 (0.855 pCi/g), bismuth 212 (0.883 pCi/g), radium 224 (0.947 pCi/g), and thallium 208 (0.299 pCi/g).

7.3 SOIL EXPOSURE PATHWAY

Three residents are located on site; no school or day-care facilities are located within 200 feet of the site. The facility has no worker whose workplace is within 200 feet of the waste rock piles. The nearest home (three residents) is located approximately 100 feet southeast of the waste rock piles. A total of 169 individuals reside within a 1-mile travel distance of the site (Table 7-7).

No resources such as commercial agriculture, silviculture, or livestock production or grazing occur on an area of contaminated soil at the site. Additionally, no terrestrial, sensitive environments are known to occur on an area of contaminated soil at the site. However, five mammal species in the Grandview Mine area have been listed as threatened or endangered by the state or federal government. Gray wolves (*Canis lupus*, a Federal listed endangered species) have been sighted and confirmed in the Colville National Forest, although these are likely lone dispersing wolves. Camera surveillance has not detected wolves, and no systematic surveys for wolves have been conducted (Ecology 2000b). Grizzly bears (*Ursus arctos*, a Federal listed threatened and State listed endangered species) are present throughout the Colville National Forest, although the number of bears is lower near the mine site and

Sullivan Lake, located southeast of the site. A grizzly bear den has been found in the Colville National Forest, east of the mine near the Idaho border, and grizzly bears have been radio-located on both sides of Pend Oreille River (Ecology 2000b). The mine site is adjacent to a designated grizzly bear recovery area, which begins east of State Route 31. The North American (Canada) lynx (*Lynx canadensis*, a proposed Federal listed threatened and State listed threatened species) may travel through the mine area, and tracks of a lynx were found in the Slate Creek drainage in 1978 (Ecology 2000a). The Pacific fisher (*Martes pennanti pacifica*, a Federal listed species of concern and State listed endangered species) is a large, weasellike animal. There have been unconfirmed sightings in the adjacent Pend Oreille Mine area, and it is believed that fisher may be present around Sullivan and Slate creeks and at Sullivan Lake (Ecology 2000a). The woodland (mountain) caribou (*Rangifer tarandus caribou*, a Federal and State listed endangered species) potentially could enter the mine area, but all woodland caribou that have been sighted previously on the adjacent Pend Oreille Mine were transplanted animals that had been released nearby and were returning to the release site. There is a woodland caribou recovery area, which includes mostly wilderness area east of the mine, within 25 miles south of the United States-Canada border and further east into Idaho (Ecology 2000a). The site is not fenced.

7.3.1 Sample Locations

Nine surface soil samples were collected from the former wastewater drainage ditch (FD01SS through FD09SS). FD01SS through FD06SS were collected beginning at the lower level mill area and were spaced at intervals of approximately 60 feet toward the flume and the suspected tailings pile. FD07SS through FD09SS were collected downgradient and west of the suspected tailings pile to the edge of the Riverside Bluff (Figure 3-3).

7.3.2 Former Wastewater Drainage Ditch Sample Results

Sample results are summarized in Table 7-8. Nine inorganic elements were detected at elevated concentrations in the former wastewater drainage ditch surface soil samples. Arsenic was detected at elevated concentrations in four out of nine samples, ranging in concentration from 15.7 mg/kg (FD06SS) to 31.2 mg/kg (FD01SS). Cadmium was detected at elevated concentrations in all samples, ranging in concentration from 15.6 mg/kg (FD03SS) to 41.8 mg/kg (FD05SS). Chromium was detected at an elevated concentration in FD01SS at 133 mg/kg. Copper was detected at elevated concentrations in seven out of nine samples, ranging in concentration from 67.0 mg/kg (FD09SS) to 3,730 mg/kg (FD01SS). Lead was detected at elevated concentrations in all samples, ranging in concentration from

921 mg/kg (FD07SS) to 43,000 mg/kg (FD01SS). Mercury was detected at elevated concentrations in all samples, ranging in concentration from an estimated low 0.34 mg/kg JL (FD07SS) to 3.9 mg/kg (FD01SS). Selenium was detected at elevated concentrations in five out of nine samples, ranging in concentration from 1.3 mg/kg (FD05SS and FD08SS) to 6.4 mg/kg (FD01SS). Silver was detected at an elevated concentration in FD01SS at 7.4 mg/kg. Zinc was detected at elevated concentrations in all samples, ranging in concentration from 4,570 mg/kg (FD03SS) to 12,100 mg/kg (FD05SS).

Sixteen radionuclides were detected in the former wastewater drainage ditch surface soil samples. Bismuth 214 was detected in all samples at concentrations ranging from 1.48 pCi/g (FD09SS) to 5.24 pCi/g (FD04SS). Cesium 137 was detected in all samples at concentrations ranging from 0.0530 pCi/g (FD08SS) to 0.421 pCi/g (FD05SS). Potassium 40 was detected in all samples at concentrations ranging from 0.989 pCi/g (FD07SS) to 12.7 pCi/g (FD09SS). Protactinium 234m was detected in all samples at concentrations ranging from an estimated 2.28 pCi/g J (FD09SS) to an estimated 8.89 pCi/g J (FD04SS). Lead 212 was detected in all samples at concentrations ranging from 0.065 pCi/g (FD02SS) to 0.918 (FD09SS). Lead 214 was detected in all samples at concentrations ranging from 1.67 pCi/g (FD09SS) to 5.68 pCi/g (FD04SS). Radium 223 was detected in eight out of nine samples at concentrations ranging from 0.161 pCi/g (FD09SS) to 0.531 pCi/g (FD04SS). Radium 226 was detected in all samples at concentrations ranging from an estimated 3.58 pCi/g J (FD02SS) to an estimated 10.3 pCi/g J (FD04SS). Radium 228 was detected in FD05SS and FD09SS at 0.163 pCi/g and 0.864 pCi/g, respectively. Radon 219 was detected in four out of nine samples at concentrations ranging from 0.247 pCi/g (FD05SS) to 0.582 pCi/g (FD04SS). Thorium 227 was detected in three out of nine samples at concentrations of 0.272 pCi/g (FD08SS), 0.333 pCi/g (FD05SS), and 0.503 pCi/g (FD04SS). Thorium 234 was detected in all samples at concentrations ranging from an estimated 0.689 pCi/g J (FD09SS) to an estimated 6.38 pCi/g J (FD03SS). Uranium 235 was detected in all samples at concentrations ranging from an estimated 0.170 pCi/g J (FD08SS) to 0.523 pCi/g (FD02SS). Bismuth 212 was detected in FD09SS at 0.986 pCi/g. Radium 224 was detected in FD09SS at 0.688 pCi/g. Thallium 208 was detected in six out of nine samples at concentrations ranging from 0.0163 pCi/g (FD06SS) to 0.275 pCi/g (FD09SS).

7.4 AIR MIGRATION PATHWAY

The air migration pathway TDL is a 4-mile radius extending from the property boundaries of the site (Figure 7-1). Farms and rural residential development are found to the east and south of the mine property. The main crops raised on agricultural lands along Pend Oreille River are small grains and hay.

Most of the agricultural land in the area originated from 160-acre plots that were homesteaded at the turn of the century. A few privately owned farms occur in the vicinity of Grandview Mine and are operated primarily for hay and beef cattle. Such farms are located north of the mine site along Threemile Creek, east of State Route 31 and opposite the adjacent Pend Oreille Mine, and across Pend Oreille River north of Flume Creek. These operators also lease Forest Service-managed lands in proximity to their base properties for use as summer pasture (Ecology 2000b). The closest relatively high-density residential area is Pend Oreille Village, located along the river approximately 1.5 miles south of the mine site. At present, the village has approximately 30 residents. The town of Metaline Falls, population 230, is located approximately 2 miles southwest of the mine site. Metaline is located across the river from Metaline Falls and has a population of 172 (Ecology 2000b). Forest Service-managed lands are located north of the adjacent Pend Oreille Mine.

The site has no workers. The total population within 4 miles of the site is 587 (EPA 2000b). Population within 0 to 0.25 mile, 0.25 to 0.5 mile, 0.5 to 1 mile, 1 to 2 miles, 2 to 3 miles, and 3 to 4 miles from the site is presented in Table 7-9. The START assumes commercial agriculture occurs within 0.5 mile of the site.

Sensitive environments within the site air pathway TDL include wetlands and the Salmo-Priest Wilderness Area. It is unknown whether there are other sensitive environments within the site air pathway TDL. Based on wetland maps from the United States Fish and Wildlife Service (1992), the START estimates that there are 230.2 acres of wetlands within 4 miles of the site. Table 7-9 provides population and wetland acreage by distance ring within 4 miles of the site. The Salmo-Priest Wilderness Area is located approximately 3 miles east of the mine site. The wilderness area is 39,940 acres in size and is located within the Colville National Forest and the Idaho Panhandle National Forest. Threatened or endangered species that occur within 4 miles of the site include the gray wolf (*Canis lupus*), grizzly bears (*Ursus arctos*), the North American (Canada) lynx (*Lynx canadensis*), the Pacific fisher (*Martes pennanti pacifica*), and the woodland (mountain) caribou (*Rangifer tarandus caribou*). The bald eagle (*Haliaeetus leucocephalus*, a Federal listed threatened species) inhabits areas along the shores of saltwater and freshwater lakes and rivers and typically nests in mature or old growth trees. An active bald eagle nest is located a few miles upstream from the mine site along Pend Oreille River near Sand Creek (Ecology 2000b). The American peregrine falcon (*Falco peregrinus anatum*, a State listed endangered species) lives typically along mountain ranges, river valleys, and coastlines. Peregrine falcons may occasionally fly along Pend Oreille River near the mine (Ecology 2000b).

Table 7-1

GROUNDWATER WELLS AND ASSOCIATED POPULATION WITHIN A 4-MILE RADIUS GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION METALINE FALLS, WASHINGTON

DISTANCE (miles)	WELL IDENTIFICATION	WELL POPULATION [a]
0 to 0.25	Domestic (0)	0
0.25 to 0.5	Domestic (7)	13.58
0.5 to 1	Domestic (3)	5.82
1 to 2	Domestic (12)	23.28
2 to 3	Domestic (3)	5.82
3 to 4	Domestic (10)	19.4
Total	**35**	**67.9**

Source: EPA 2000b; USCB 1990.

[a] Domestic well population was estimated based on the average number of persons per household for Metaline Falls (1.94 people).

Table 7-2

PEND OREILLE VILLAGE GROUNDWATER SAMPLES ANALYTICAL RESULTS SUMMARY GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION METALINE FALLS, WASHINGTON

EPA Sample Number	00434241	00434231	00434232
CLP Sample Number	MJ00BW	MJ00BJ	MJ00BK
Location ID Number	BK03GW	PO01GW	PO02GW
Description	Background	Target	
Gamma Spectroscopy (pCi/L)			
Bi214	**28.2 J**	**1340 J**	**1160 J**
Pb214	**28.4 J**	**1400 J**	**1200 J**
TAL Metals (µg/L)			
Aluminum	51.9 U	**69.8 JB**	**61.4 JB**
Arsenic	7.4 U	**23.4**	**22.4**
Barium	**52.8 JB** SQL = 200 U	**125 JB**	**125 JB**
Calcium	**99100**	**102000**	**99800**
Chromium	0.70 U	0.70 U	**0.79 JB**
Copper	**12.2 JB** SQL = 25 U	**8.0 JB**	**8.6 JB**
Iron	**201**	**1350**	**1630**
Magnesium	**15700**	**30800**	**30200**
Manganese	**19.1**	**245**	**241**
Nickel	**3.0 JB** SQL = 40 U	**2.0 JB**	**3.0 JB**
Potassium	**1140 JB**	**2820 JB**	**2770 JB**
Selenium	3.9 U	**5.1**	3.9 U
Sodium	**2970 JB**	**5910**	**5740**
Thallium	**10.4**	8.0 U	8.0 U
Zinc	**32.5**	**125**	**85.2**

Note: Bold type indicates that the sample concentration is above the detection limit.
Underlined type indicates that the sample concentration is elevated as defined in Section 5.

Key:

B = The associated sample result is less than the method detection limit, but greater than or equal to the instrument detection limit.
Bi214 = Bismuth 214.
CLP = Contract Laboratory Program.
EPA = United States Environmental Protection Agency.
ID = Identification.
J = The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.
µg/L = Micrograms per liter.
Pb214 = Lead 214.
pCi/L = Picocuries per liter.
SQL = Sample quantitation limit.
TAL = Target Analyte List.
U = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Table 7-3

PEND OREILLE RIVER SURFACE WATER SAMPLES
ANALYTICAL RESULTS SUMMARY
GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION
METALINE FALLS, WASHINGTON

EPA Sample Number	00434239	00434234	00434236
CLP Sample Number	MJ00BS	MJ00BN	MJ00BQ
Location ID Number	BK02SW	PR01SW	PR02SW
Description	Background	Target	
Gamma Spectroscopy (pCi/L)			
Bi214	**7.66 J**	NDL	NDL
Tl208	**1.28**	NDL	NDL
TAL Metals (µg/L)			
Aluminum	75.1 U	**90.8 JB**	**98.9 JB**
Arsenic	**9.5 JB** SQL = 10 U	**9.8 JB**	**7.9 JB**
Barium	**62.4 JB** SQL = 200 U	**64.3 JB**	**63.9 JB**
Calcium	**21400**	**22100**	**21900**
Copper	**12.6 JB** SQL = 25 U	**10.7 JB**	**13.2 JB**
Iron	**20.7 JB**	**34.1 JB**	**38.3 JB**
Magnesium	**5570**	**5760**	**5700**
Manganese	**4.4 JB** SQL = 15 U	**4.5 JB**	**5.0 JB**
Nickel	**2.2 JB** SQL = 40 U	**2.2 JB**	**2.4 JB**
Potassium	**577 JB**	**576 JB**	**594 JB**
Sodium	**2430 JB**	**2430 JB**	**2470 JB**
Zinc	**19.2 JB** SQL = 20 U	**14.8 JB**	**15.4 JB**

Note: Bold type indicates that the sample concentration is above the detection limit.
Underlined type indicates that the sample concentration is elevated as defined in Section 5.

Key:

B = The associated sample result is less than the method detection limit, but greater than or equal to the instrument detection limit.
Bi214 = Bismuth 214.
CLP = Contract Laboratory Program.
EPA = United States Environmental Protection Agency.
ID = Identification.
J = The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.
µg/L = Micrograms per liter.
NDL = No detection limit.
pCi/L = Picocuries per liter.
SQL = Sample quantitation limit.
TAL = Target Analyte List.
Tl208 = Thallium 208.
U = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Table 7-4

PEND OREILLE RIVER SEDIMENT SAMPLES
ANALYTICAL RESULTS SUMMARY
GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION
METALINE FALLS, WASHINGTON

EPA Sample Number	00434240	00434235	00434237
CLP Sample Number	MJ00BT	MJ00BP	MJ00BR
Location ID Number	BK02SD	PR01SD	PR02SD
Depth (inches bgs)	0-6	0-6	0-6
Description	Background	Target	
Gamma Spectroscopy (pCi/g)			
Ba140	0.14 UJ	0.22 UJ	0.25 UJ
Bi214	**0.457**	**0.381**	**1.46**
Cs137	**0.00897**	0.031 UJ	**0.0948**
K40	**7.21**	**4.27**	**13.5**
Pa234m	**2.03 J**	**1.97 J**	NDL
Pb212	**0.378**	**0.255**	**0.984**
Pb214	**0.514**	**0.431**	**1.60**
Ra226	**0.951 J**	**0.934 J**	**3.69 J**
Ra228	**0.338**	**0.273**	**0.900**
Th234	**0.474 J**	NDL	**1.25 J**
U235	NDL	NDL	**0.223 J**
Bi212	**0.315**	**0.192**	**1.23**
Ra224	**0.213**	NDL	NDL
Tl208	**0.113**	**0.0812**	**0.308**
TAL Metals (mg/kg)			
Aluminum	**2390**	**391**	**5320**
Arsenic	**7.4**	**5.2**	**4.8**
Barium	**25.9 JB** SQL = 200 U	**6.8 JB**	**65.3**
Cadmium	0.12 U	**0.18 JB**	**1.4**
Calcium	**123000**	**150000**	**28300**
Chromium	**7.8**	**1.1 JB**	**9.5**
Cobalt	**2.1 JB** SQL = 50 U	**0.57 JB**	**4.3 JB**
Copper	**9.3**	**7.7**	**28.2**
Iron	**7180**	**4290**	**10700**
Lead	**7.7**	**349**	**827**
Magnesium	**72300**	**95000**	**16900**
Manganese	**217**	**166**	**269**
Mercury	R	R	**0.07 JB**
Nickel	**5.8 JB** SQL = 40 U	**3.1 JB**	**10.2 JB**
Potassium	**645 JB**	**97.5 JB**	**903 JB**
Silver	**0.24 JB** SQL = 10 U	**0.28 JB**	**0.46 JB**
Sodium	**229 JB**	**188 JB**	**146 JB**
Thallium	1.9 U	1.8 U	2.1 U
Vanadium	**10.6 JB** SQL = 50 U	**1.8 JB**	**14.5**
Zinc	**112**	**173**	**1090**

Key is on the next page.

Table 7-4

PEND OREILLE RIVER SEDIMENT SAMPLES
ANALYTICAL RESULTS SUMMARY
GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION
METALINE FALLS, WASHINGTON

Note: Bold type indicates that the sample concentration is above the detection limit.
Underlined type indicates that the sample concentration is elevated as defined in Section 5.

Key:

B	= The associated sample result is less than the method detection limit, but greater than or equal to the instrument detection limit.
Ba140	= Barium 140.
bgs	= Below ground surface.
Bi212	= Bismuth 212.
Bi214	= Bismuth 214.
CLP	= Contract Laboratory Program.
Cs137	= Cesium 137.
EPA	= United States Environmental Protection Agency.
ID	= Identification.
J	= The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.
K40	= Potassium 40.
mg/kg	= Milligrams per kilogram.
NDL	= No detection limit.
Pa234m	= Protactinium 234m.
Pb212	= Lead 212.
Pb214	= Lead 214.
pCi/g	= Picocuries per gram.
R	= Rejected.
Ra224	= Radium 224.
Ra226	= Radium 226.
Ra228	= Radium 228.
SQL	= Sample quantitation limit.
TAL	= Target Analyte List.
Th234	= Thorium 234.
Tl208	= Thallium 208.
U	= The material was analyzed for, but was not detected above the level of the associated value.
U235	= Uranium 235. The associated value is either the sample quantitation limit or the sample detection limit.
UJ	= The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

Table 7-5

UNNAMED SPRING SURFACE WATER SAMPLES
ANALYTICAL RESULTS SUMMARY
GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION
METALINE FALLS, WASHINGTON

EPA Sample Number	00434239	00434201	00434203	00434205
CLP Sample Number	MJ00BS	MJCG08	MJCG10	MJCG12
Location ID Number	BK02SW	US01SW	US02SW	US03SW
Description	Background	Target		
Gamma Spectroscopy (pCi/L)				
Bi214	**7.66 J**	**19.4 J**	NDL	**23.9 J**
Pb212	NDL	NDL	**4.49**	**3.76**
Pb214	NDL	**12.1 J**	NDL	**21.5 J**
Tl208	**1.28**	**1.50**	NDL	**1.48**
TAL Metals (µg/L)				
Aluminum	75.1 U	**393**	**1540**	**528**
Arsenic	**9.5 JB** SQL = 10 U	**10.3**	**8.70 JB**	**10.4**
Barium	**62.4 JB** SQL = 200 U	**53.10 JB**	**80.40 JB**	**56.10 JB**
Cadmium	0.50 U	0.50 U	**1.50 JB**	0.50 U
Calcium	**21400**	**70500**	**84500**	**67300**
Chromium	0.70 U	0.70 U	**3.20 JB**	**1.40 JB**
Copper	**12.6 JB** SQL = 25 U	**9.1 JB**	**23.1 JB**	**11.3 JB**
Iron	**20.7 JB**	**253**	**2470**	**827**
Lead	2.30 U	**105**	**1340**	**37.7**
Magnesium	**5570**	**18300**	**21700**	**21700**
Manganese	**4.4 JB** SQL = 15 U	**11.2 JB**	**101**	**46.1**
Nickel	**2.2 JB** SQL = 40 U	**2.80JB**	**6.10JB**	**3.40 JB**
Potassium	**577 JB**	**3250 JB**	**2940 JB**	**1970 JB**
Selenium	3.9 U	**4.6 JB**	**6.7**	3.9 U
Sodium	**2430 JB**	**3720 JB**	**3930 JB**	**5910**
Vanadium	0.80 U	**2.4 JB**	**8.2 JB**	**2.7 JB**
Zinc	**19.2 JB** SQL = 20 U	**117**	**547**	**77.8**

Note: Bold type indicates that the sample concentration is above the detection limit.
Underlined type indicates that the sample concentration is elevated as defined in Section 5.

Key:

B = The associated sample result is less than the method detection limit, but greater than or equal to the instrument detection limit.
Bi214 = Bismuth 214.
CLP = Contract Laboratory Program.
EPA = United States Environmental Protection Agency.
ID = Identification.
J = The analyte was positively identified.
The associated numerical value is the approximate concentration of the analyte in the sample.
µg/L = Micrograms per liter.
NDL = No detection limit.
Pb212 = Lead 212.
Pb214 = Lead 214.
pCi/L = Picocuries per liter.
SQL = Sample quantitation limit.
TAL = Target Analyte List.
Tl208 = Thallium 208.
U = The material was analyzed for, but was not detected above the level of the associated value.
The associated value is either the sample quantitation limit or the sample detection limit.

Table 7-6

UNNAMED SPRING SEDIMENT SAMPLES
ANALYTICAL RESULTS SUMMARY
GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION
METALINE FALLS, WASHINGTON

EPA Sample Number	00434240	00434202	00434204	00434206
CLP Sample Number	MJ00BT	MJCG09	MJCG11	MJCG13
Location ID Number	BK02SD	US01SD	US02SD	US03SD
Depth (inches bgs)	0-6	0-6	0-6	0-6
Description	Background	Target		
Gamma Spectroscopy (pCi/g)				
Bi214	0.457	2.65	1.44	0.860
Cs137	0.00897	0.273	0.0514	0.0519
K40	7.21	5.32	11.4	19.2
Pa234m	2.03 J	4.42 J	1.95 J	NDL
Pb212	0.378	0.315	0.588	0.926
Pb214	0.514	2.82	1.61	0.920
Ra226	0.951 J	7.91 J	3.23 J	1.89 J
Ra228	0.338	0.260	0.561	0.855
Th227	NDL	0.255	NDL	NDL
Th234	0.474 J	4.22 J	1.30 J	NDL
U235	NDL	0.470 J	0.198 J	NDL
Bi212	0.315	0.398	0.622	0.883
Ra224	0.213	NDL	NDL	0.947
Tl208	0.113	0.0941	0.163	0.299
TAL Metals (mg/kg)				
Aluminum	2390	5500	4120	10600
Arsenic	7.4	16.9	4.8	9.0
Barium	25.9 JB SQL = 200 U	87.0	38.8 JB	77.3
Cadmium	0.12 U	63.9	3.5	0.13 U
Calcium	123000	75100	40600	9320
Chromium	7.8	12.4	11.1	25.2
Cobalt	2.1 JB SQL = 50 U	4.7 JB	3.6 JB	8.7 JB
Copper	9.3	120	17.6	29.9
Iron	7180	10500	9890	19800
Lead	7.7	11800	842	161
Magnesium	72300	22500	15700	8480
Manganese	217	213	197	266
Mercury	R	2.1	0.11 JB	0.07 UJK
Nickel	5.8 JB SQL = 40 U	21.6 JK (16 AC)	10.7 JK (7.93 AC)	21.6 JK (16 AC)
Potassium	645 JB	796	622 JB	1440
Selenium	0.95 U	2.4	0.91 U	1.1 U
Silver	0.24 JB SQL = 10 U	2.3 U	0.46 U	0.54 U
Sodium	229 JB	192 JB	182 JB	229 JB
Thallium	1.9 U	4.9	1.9 U	2.4 JB
Vanadium	10.6 JB SQL = 50 U	20.6	20.8	40.0
Zinc	112	19800	1300	360

Key is on the next page.

Table 7-6

UNNAMED SPRING SEDIMENT SAMPLES
ANALYTICAL RESULTS SUMMARY
GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION
METALINE FALLS, WASHINGTON

Note: Bold type indicates that the sample concentration is above the detection limit.
Underlined type indicates that the sample concentration is elevated as defined in Section 5.

Key:

AC	= Adjusted concentration.
B	= The associated sample result is less than the method detection limit, but greater than or equal to the instrument detection limit.
bgs	= Below ground surface.
Bi212	= Bismuth 212.
Bi214	= Bismuth 214.
CLP	= Contract Laboratory Program.
Cs137	= Cesium 137.
EPA	= United States Environmental Protection Agency.
ID	= Identification.
J	= The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.
K	= Unknown bias.
K40	= Potassium 40.
mg/kg	= Milligrams per kilogram.
NDL	= No detection limit.
Pa234m	= Protactinium 234m.
Pb212	= Lead 212.
Pb214	= Lead 214.
pCi/g	= Picocuries per gram.
R	= Rejected.
Ra224	= Radium 224.
Ra226	= Radium 226.
Ra228	= Radium 228.
SQL	= Sample quantitation limit.
TAL	= Target Analyte List.
Th227	= Thorium 227.
Th234	= Thorium 234.
Tl208	= Thallium 208.
U	= The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
U235	= Uranium 235.
UJ	= The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

Table 7-7

RESIDENT POPULATION WITHIN A 1-MILE RADIUS
GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION
METALINE FALLS, WASHINGTON

DISTANCE RING	POPULATION
On site	3
0 to 0.25 mile	5
0.25 to 0.5 mile	36
0.5 to 1 mile	125
Total	**169**

Source: EPA 2000b.

Ta[illegible]-8

FORMER WASTEWATER DRAINAGE DITCH SURFACE SOIL SAMPLES
ANALYTICAL RESULTS SUMMARY
GRANDVIEW MINE PRELIMINARY ASSESSEMT/SITE INSPECTION
METALINE FALLS, WASHINGTON

EPA Sample Number	00434238	00434218	00434219	00434220	00434221	00434222	00434223	00434228	00434229	00434230
CLP Sample Number	MJ00BM	MJCG25	MJCG26	MJCG27	MJCG28	MJCG29	MJCG30	MJ00BE	MJ00BG	MJ00BH
Location ID Number	BK01SS	FD01SS	FD02SS	FD03SS	FD04SS	FD05SS	FD06SS	FD07SS	FD08SS	FD09SS
Depth (inches bgs)	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6
Description	Background	Target								
Gamma Spectroscopy (pCi/g)										
Bi214	0.799	3.87	4.11	4.34	5.24	2.89	2.09	2.29	2.63	1.48
Cs137	1.31	0.0671	0.07	0.348	0.216	0.421	0.228	0.129	0.0530	0.295
K40	15.2	1.28	1.34	1.18	1.81	2.89	1.24	0.989	1.09	12.7
Pa234m	NDL	8.37 J	8.79 J	7.14 J	8.89 J	4.87 J	7.39 J	3.96 J	7.08 J	2.28 J
Pb212	0.974	0.115	0.065	0.0850	0.126	0.141	0.0793	0.0762	0.0703	0.918
Pb214	0.878	4.21	4.39	4.77	5.68	3.11	2.33	2.54	2.86	1.67
Ra223	NDL	0.415	0.324	0.496	0.531	NDL	0.267	0.218	0.198	0.161
Ra226	1.41 J	7.52 J	3.58 J	6.82 J	10.3 J	8.31 J	3.71 J	6.84 J	4.58 J	4.12 J
Ra228	0.910	0.11 UJ	0.2 UJ	0.19 UJ	0.14 UJ	0.163	0.12 UJ	0.15 UJ	0.092 UJ	0.864
Rn219	NDL	0.415	NDL	0.385	0.582	0.247	NDL	NDL	NDL	NDL
Th227	NDL	NDL	NDL	NDL	0.503	0.333	NDL	NDL	0.272	NDL
Th234	NDL	5.29 J	5.55 J	6.38 J	5.27 J	3.69 J	3.57 J	3.58 J	2.98 J	0.689 J
U235	NDL	0.347 J	0.523	0.355 J	0.412 J	0.500 J	0.187 J	0.404 J	0.170 J	0.249 J
Bi212	0.980	NDL	NDL	NDL	NDL	NDL	NDL	NDL	NDL	0.986
Ra224	0.605	NDL	NDL	NDL	NDL	NDL	NDL	NDL	NDL	0.688
Tl208	0.289	0.0364	0.0223	NDL	0.0332	0.0215	0.0163	NDL	NDL	0.275
TAL Metals (mg/kg)										
Aluminum	12300	537	425	546	946	3010	1110	760	264	11300
Antimony	0.89 U	10.1 JB	8.6 JB	0.77 U	1.3 JB	0.91 U	0.85 U	0.77 U	1.2 U	1.1 U
Arsenic	5.2	31.2	22.1	9.3	13.7	16.8	15.7	12.6	12.1	13.5
Barium	222	63.6	10.8 JB	20.8 JB	20.4 JB	100	51.4	30.5 JB	69.7	109
Cadmium	0.12 U	26.4	27.8	15.6	23.2	41.8	35	30	28.1	19.9
Calcium	25200	81400	99300	99600	111000	134000	126000	104000	106000	52800
Chromium	20.7	133	33.3	4.7	10.0	9.4	8.3	10.6	7.5	13.9
Cobalt	8.7 JB SQL = 12.3 U	4.8 JB	1.7 JB	0.46 JB	1 JB	1.7 JB	0.67 JB	1.2 JB	0.44 JB	6.8 JB
Copper	17.8	3730	658	46.8	132	233	170	858	38.0	67.0
Iron	16400	30500	13900	3170	5710	5470	4500	5100	3240	19500
Lead	67.8	43000	23200	1250	2840	5560	3870	921	9520	1970
Magnesium	3580	43200	52300	50500	53300	51100	56900	47800	55600	19000
Manganese	616	468	395	217	287	283	278	277	265	784
Mercury	0.06 UJK	3.9	0.99	0.54	1.0	2.4	1.2 JL	0.34 JL	0.92 JL	0.83 JL
Nickel	18.4 JK	40.7 JK (30.1481 AC)	22.3 JK (16.5185 AC)	8.0 JB	10.8 JK (8 AC)	13.9 JK (10.2963 AC)	12.1	12.4	9.0	16.6
Potassium	2090	118 JB	116 JB	212 JB	266 JB	1890	308 JB	112 JB	80.7 JB	1160 JB
Selenium	0.96 U	6.4	3.5	0.83 U	0.93 U	1.3	1.1 JB	0.84 U	1.3	1.7
Silver	0.36 U	7.4	3.3 U	0.63 U	0.83 U	1.4 U	1.0 JB	0.49 JB	1.3 JB	0.84 JB
Sodium	234 JB	149 JB	139 JB	142 JB	126 JB	334 JB	150 JB	145 JB	142 JB	179 JB
Thallium	2.6	3.0	2.3	2.5	1.9 U	2.8	1.9 U	1.7 U	1.6 U	2.3 JB
Vanadium	29.7	17.5	19.0	18.7	22.1	21.8	21.9	17.5	18.9	24.3
Zinc	245	7890	8120	4570	6160	12100	11600	11100	10300	6390

Key is on the next page.

Table 7-8

FORMER WASTEWATER DRAINAGE DITCH SURFACE SOIL SAMPLES
ANALYTICAL RESULTS SUMMARY
GRANDVIEW MINE PRELIMINARY ASSESSEMT/SITE INSPECTION
METALINE FALLS, WASHINGTON

Note: Bold type indicates that the sample concentration is above the detection limit.
Underlined type indicates that the sample concentration is elevated as defined in Section 5.

Key:

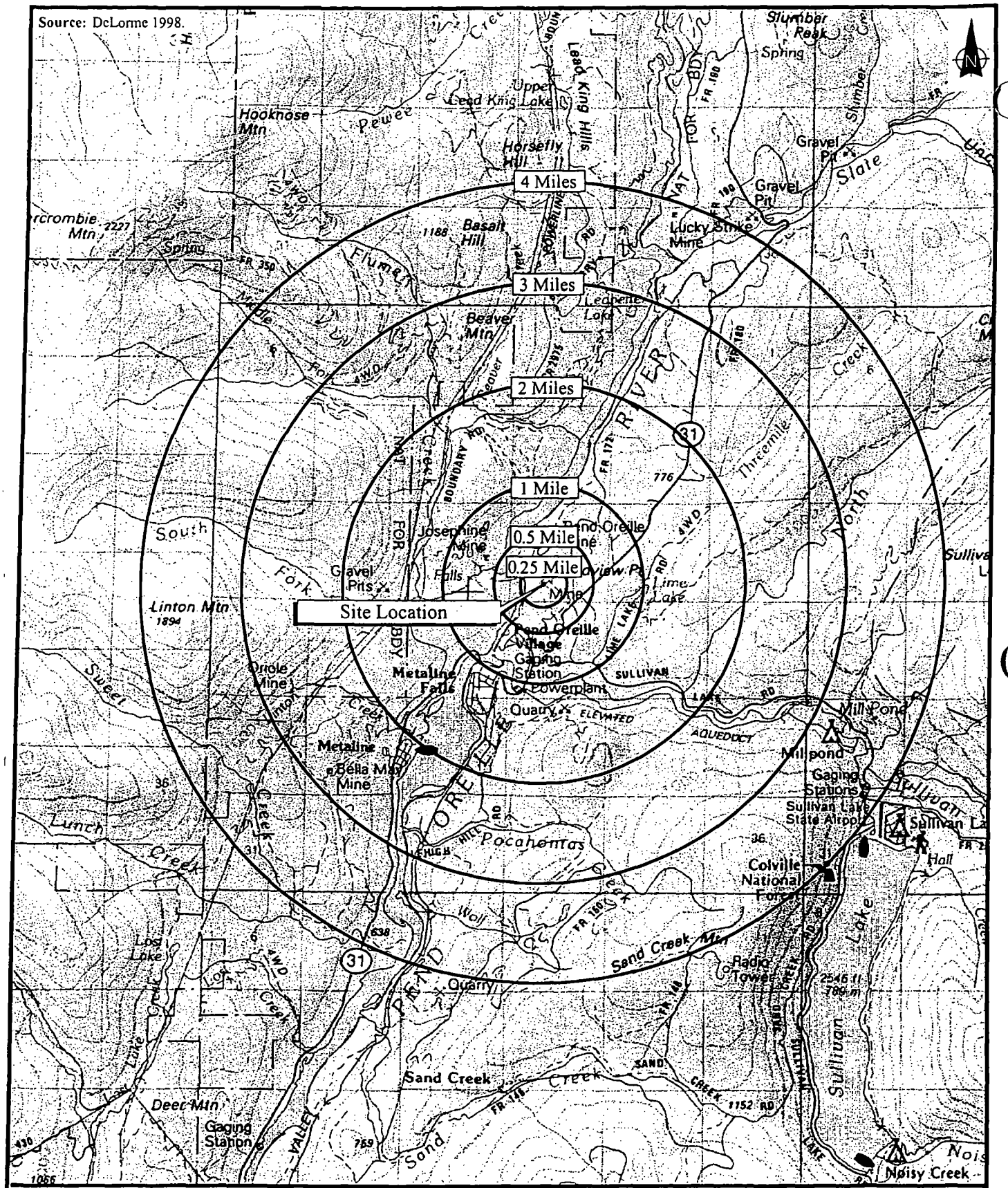
AC	= Adjusted concentration.
B	= The associated sample result is less than the method detection limit, but greater than or equal to the instrument detection limit.
bgs	= Below ground surface.
Bi212	= Bismuth 212.
Bi214	= Bismuth 214.
CLP	= Contract Laboratory Program.
Cs137	= Cesium 137.
EPA	= United States Environmental Protection Agency.
ID	= Identification.
J	= The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.
K	= Unknown bias.
K40	= Potassium 40.
L	= Low bias.
mg/kg	= Milligrams per kilogram.
NDL	= No detection limit.
Pa234m	= Protactinium 234m.
Pb212	= Lead 212.
Pb214	= Lead 214.
pCi/g	= Picocuries per gram.
Ra223	= Radium 223.
Ra224	= Radium 224.
Ra226	= Radium 226.
Ra228	= Radium 228.
Rn219	= Radon 219.
SQL	= Sample quantitation limit.
TAL	= Target Analyte List.
Th227	= Thorium 227.
Th234	= Thorium 234.
Tl208	= Thallium 208.
U	= The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
U235	= Uranium 235.
UJ	= The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

Table 7-9

POPULATION AND WETLAND ACREAGE WITHIN A 4-MILE RADIUS GRANDVIEW MINE PRELIMINARY ASSESSMENT/SITE INSPECTION METALINE FALLS, WASHINGTON

DISTANCE (miles)	POPULATION	WETLAND ACREAGE
On site	3	0
0 to 0.25	5	0
0.25 to 0.5	36	0
0.5 to 1	125	28.4
1 to 2	201	51.6
2 to 3	184	73.6
3 to 4	33	76.6
Total	**587**	**230.2**

Source: EPA 2000b.



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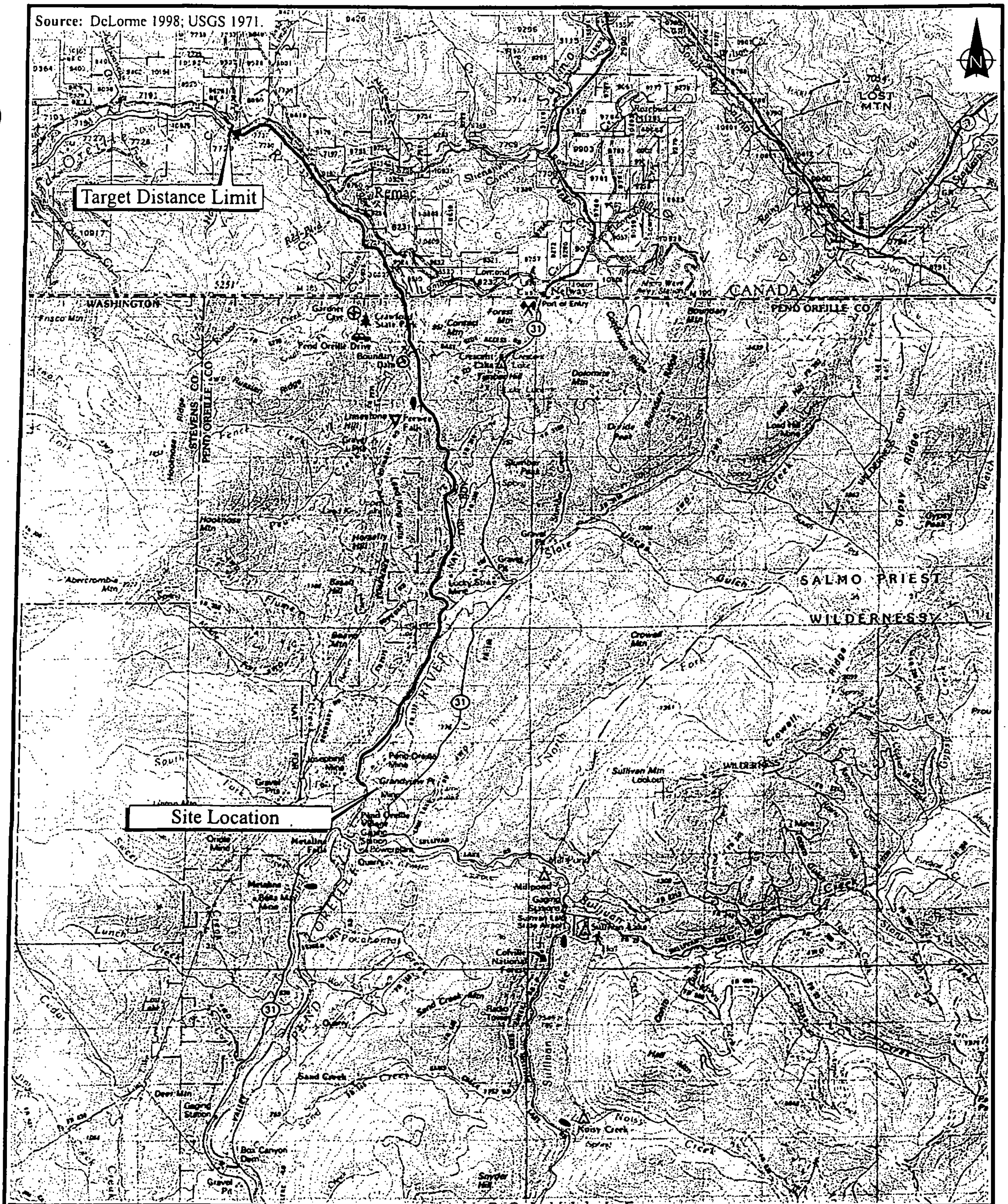
Seattle, Washington

GRANDVIEW MINE
PRELIMINARY ASSESSMENT/
SITE INSPECTION
Metaline Falls, Washington

Figure 7-1
4-MILE MAP

0 .5 1
Approximate Scale in Miles

Date: 02-18-01 | Drawn by: AES | 10:START-2\01010015\S627\fig 7-1



ecology and environment, inc. International Specialists in the Environment Seattle, Washington	GRANDVIEW MINE PRELIMINARY ASSESSMENT/ SITE INSPECTION Metaline Falls, Washington	Figure 7-2 15-MILE MAP

0 1 2 Approximate Scale in Miles	Date: 02-18-01	Drawn by: AES	10:START-2\01010015\S627\fig 7-2

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or PCBs are considered significant. There were 13 significant detections of SVOCs in the three transect samples collected. There were no detections of PCBs.

8.2 TARGETS

Samples were collected from suspected targets along potential groundwater migration, surface water migration, and soil exposure pathways including groundwater wells, Pend Oreille River, the unnamed spring, and the former wastewater drainage ditch.

Elevated concentrations were detected in the Pend Oreille Village groundwater samples, including arsenic (23.4 μg/L), manganese (245 μg/L), selenium (5.1 μg/L), and zinc (125 μg/L).

No elevated concentrations were detected in the Pend Oreille River surface water samples. Cadmium (1.4 mg/kg), copper (28.2 mg/kg), lead (827 mg/kg), and zinc (1,090 mg/kg) were detected at elevated concentrations in the Pend Oreille River co-located sediment samples.

Elevated concentrations were detected in the unnamed spring surface water samples, including arsenic (10.4 μg/L), lead (1,340 μg/L), manganese (101 μg/L), selenium (6.7 μg/L), and zinc (547 μg/L). Elevated concentrations were detected in the unnamed spring co-located sediment samples including cadmium (63.9 mg/kg), chromium (25.2 mg/kg), copper (120 mg/kg), lead (11,800 mg/kg), selenium (2.4 mg/kg), thallium (4.9 mg/kg), and zinc (19,800 mg/kg).

Elevated concentrations were detected in the former wastewater drainage ditch surface soil samples including arsenic (31.2 mg/kg), cadmium (41.8 mg/kg), chromium (133 mg/kg), copper (3,730 mg/kg), lead (43,000 mg/kg), mercury (3.9 mg/kg), selenium (6.4 mg/kg), silver (7.4 mg/kg), and zinc (12,100 mg/kg).

8.3 CONCLUSIONS

Results of the PA/SI indicate that the Grandview Mine site is a source of hazardous substance contamination, including inorganics. The PA/SI documented that significant levels of inorganics were present in all on-site source samples.

There were elevated inorganic detections in the Pend Oreille Village groundwater samples.

There were no elevated inorganic detections in the Pend Oreille River surface water samples. In the sediment samples, however, there were elevated inorganic detections.

There were elevated inorganic detections in the unnamed spring surface water and sediment samples.

8. SUMMARY AND CONCLUSIONS

In October 2000, the START conducted PA/SI sampling activities at the Grandview Mine site located in Metaline Falls, Washington. The site is an inactive lead-zinc mine located in the lower Pend Oreille River Valley.

The PA/SI involved the collection of samples from potential hazardous substance sources on site and from target areas potentially impacted through contaminant migration. Forty-one samples were collected for the PA/SI, including background and QA samples (one rinsate). Areas were identified for sampling based on the potential presence of hazardous substances or contaminants. Samples analyzed for TAL metals were performed by an EPA CLP laboratory. Samples analyzed for SVOCs and PCBs were analyzed at the EPA, Region 10, laboratory located in Manchester, Washington. Samples analyzed for Gamma spectroscopy were analyzed by the National Air and Radiation Environmental Laboratory. Subsection 8.1 summarizes the potential source analytical sample results for the soil exposure pathway. Subsection 8.2 summarizes the target analytical sample results for the groundwater migration pathway, the surface water migration pathway, and the soil exposure pathway. Subsection 8.3 presents the conclusions of the PA/SI.

8.1 SOURCES

Samples were collected from three on-site soil source areas including the suspected tailings pile, the waste rock piles, and the abandoned container and drum area.

The on-site soil sources contained significant concentrations of inorganic elements. The suspected tailings pile samples contained significant concentrations of cadmium (58.4 mg/kg), copper (91.5 mg/kg), lead (2,260 mg/kg), mercury (1.7 mg/kg; JL), selenium (1.1 mg/kg), and zinc (19,100 mg/kg).

The waste rock samples contained significant concentrations of arsenic (44.0 mg/kg), cadmium (23.3 mg/kg), lead (4,930 mg/kg), mercury (1.5 mg/kg), selenium (1.5 mg/kg), and zinc (7,420 mg/kg).

The abandoned container and drum area contained significant concentrations of arsenic (64.9 mg/kg), cadmium (99.5 mg/kg), copper (236 mg/kg), lead (14,600 mg/kg), mercury (6.0 mg/kg), selenium (3.0 mg/kg), and zinc (36,200 mg/kg). For the purpose of this report, any detection of SVOCs

There were elevated inorganic detections in the former wastewater drainage ditch surface soil samples.

As stated previously, radionuclide data were evaluated with respect to measured background concentrations. For radionuclide data, results normally are considered elevated or significant when the sample concentration exceeds the value of two standard deviations above the mean site-specific background concentration for that radionuclide. However, only one background sample was required to meet the DQOs identified for this PA/SI. Further, additional background samples are necessary to define the variability of the background population to accurately determine if radionuclides from the Grandview Mine are impacting identified targets. To date, there is no conclusive evidence suggesting off-site contamination from radionuclides present at Grandview Mine.

Hazardous substance contamination at the site includes inorganic elements. It appears that hazardous substances are migrating to targets that include groundwater drinking water wells, Pend Oreille River, the unnamed spring, the former wastewater drainage ditch, habitat used by threatened and endangered species, and on-site residents. Based on the findings compiled for this report, further action under CERCLA is recommended.

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APPENDIX A

PHOTOGRAPHIC DOCUMENTATION

PHOTOGRAPH IDENTIFICATION SHEET

Camera Serial No.: 645493 **TDD No.: 01-01-0015**
Lens Type: 35 mm **Site Name: Grandview Mine**

Photo No.	Dir.	Date	Time	By	Description
1-1	NE	10/23/00	0925	DB	Unnamed spring near road to upper level.
1-2	W	10/23/00	0926	DB	Waste rock pile #1.
1-3	N	10/23/00	0927	DB	Waste rock pile #1.
1-4	SW	10/23/00	0928	DB	Waste rock pile #2.
1-5	N	10/23/00	0930	DB	Waste rock pile #2 (left), waste rock pile #1 (center).
1-6	E	10/23/00	0934	DB	Former wastewater drainage ditch.
1-7	SW	10/23/00	0935	DB	Former wastewater drainage ditch.
1-8	NE	10/23/00	0938	DB	The START looking up the hill in the former wastewater drainage ditch.
1-9	NE	10/23/00	0940	DB	View from further down the former wastewater drainage ditch.
1-10	SW	10/23/00	0941	DB	View from further down the former wastewater drainage ditch.
1-11	N	10/23/00	0946	DB	Looking up slope in former wastewater drainage ditch.
1-12	W	10/23/00	0949	DB	Former wastewater drainage ditch flume.
1-13	SE	10/23/00	0952	DB	Former wastewater drainage ditch flume.
1-14	S-SW	10/23/00	0953	DB	Former wastewater drainage ditch flume.
1-15	E-NE	10/23/00	0957	DB	Flume deposition area.
1-16	SW	10/23/00	0958	DB	Flume deposition drainage area.
1-17	NW	10/23/00	1006	DB	Well area near flume deposition area.
1-18	SE	10/23/00	1007	DB	Pend Oreille Village wells on north side of Pend Oreille Village.
1-19	E	10/23/00	1015	DB	Pump house and wells in Pend Oreille Village.
1-20	E	10/23/00	1140	DM	The START collecting surface water sample number 00434201 at location US01SW. Water is clear, without odor. Location is 32.8 feet west of the concrete footings and 64.6 feet east of the water tower.
1-21	W	10/23/00	1145	DM	Sample location US01SW, sample number 00434201.
1-22	E	10/23/00	1150	DM	Sample location US01SD, sample number 00434202. Co-located sample with US01SW. No odor; sediment is a combination of sand, silt, and gravel.
1-23	DOWN	10/23/00	1155	DM	Sample from US01SD location, sample number 00434202.

PHOTOGRAPH IDENTIFICATION SHEET

Camera Serial No.: 645493 **TDD No.: 01-01-0015**
Lens Type: 35 mm **Site Name: Grandview Mine**

Photo No.	Dir.	Date	Time	By	Description
1-24	W	10/23/00	1215	DM	Sample location US02SW, sample number 00434203. Location is approximately 210 feet upstream from location US02SW. Water is clear with no odor.
1-25	W	10/23/00	1222	DM	Sample location US02SW, sample number 00434203.
2-1	W	10/23/00	1222	DM	Sample location US02SW, sample number 00434203.
2-2	W	10/23/00	1230	DM	Sample location US02SD, sample number 00434204. Sediment sample is predominantly gravel with some fines; no odor. Water flowing on road.
2-3	DOWN	10/23/00	1231	DM	Sample location US02SD, sample number 00434204.
2-4	DOWN	10/23/00	1240	DM	Sample location US03SW, sample number 00434205. Location is approximately 210 feet upstream of sample location US02SW. Water is flowing in a small ditch on the north side of the road. Water was turbid due to low flow while trying to collect the sample. No odor was detected.
2-5	DOWN	10/23/00	1248	DM	Sample location US03SW, sample number 00434205.
2-6	NW	10/23/00	1300	DM	Sample location US03SD, sample number 00434206. Sample is co-located with US03SW. Sediment was collected from a ditch north of the road. Sediment had clayey silt with sand and some gravel. No odor; worms and grubs present.
2-7	DOWN	10/23/00	1302	DM	Sample location US03SD, sample number 00434206.
2-8	N	10/23/00	1410	DM	Sample location WP01SB, sample number 00434207. The START collecting sample from toe of waste rock pile #1, 2 feet bgs.
2-9	N	10/23/00	1415	DM	Sample location WP01SB, sample number 00434207. Soil consists of gravelly sand with sparse cobbles. Location is 86.5 feet north of US01SW and was collected 2 feet bgs.
2-10	NW	10/23/00	1422	DM	Sample location WP02SB, sample number 00434208. Location is approximately 64.5 feet northwest of WP01SB and was collected 2 feet bgs. Soils consists of gravelly sand with sparse cobbles.
2-11	DOWN	10/23/00	1429	DM	Sample location WP02SB, sample number 00434208.
2-12	NW	10/23/00	1435	DM	Sample location WP03SB, sample number 00434209. Location is 49 feet northwest of location WP02SB and was collected 2 feet bgs. Soil consists of cobbley sand. Wood and metal debris found in pile.
2-13	NW	10/23/00	1440	DM	Sample location WP03SB, sample number 00434209.

PHOTOGRAPH IDENTIFICATION SHEET

Camera Serial No.: 645493 **TDD No.: 01-01-0015**
Lens Type: 35 mm **Site Name: Grandview Mine**

Photo No.	Dir.	Date	Time	By	Description
2-14	SW	10/23/00	1450	DM	Sample location WP04SB, sample number 00434210. Location is 73 feet southwest of water tower. Soil consists of sandy gravel with sparse cobbles.
2-15	DOWN	10/23/00	1455	DM	Sample location WP04SB, sample location 00434210.
2-16	E	10/23/00	1505	DM	Sample location WP05SB, sample number 00434211. Location is 38 feet south of WP04SB. Sample was collected 2 feet bgs and consists of sandy gravel without cobbles.
2-17	DOWN	10/23/00	1510	DM	Sample location WP05SB, sample number 00434211.
2-18	DOWN	10/23/00	1520	DM	Sample location DA01SS, sample number 00434212. Sample collected from 0-6 inches bgs approximately 71.1 feet southwest of change room/assay room structure in drum area ditch. Collected on south side of drum area, southwest corner of building. Soil consists of dark brown organics with sand and silt.
2-19	DOWN	10/23/00	1530	DM	Sample location DA01SS, sample number 00434212.
2-20	DOWN	10/23/00	1535	DM	Sample location DA02SS, sample number 00434212. Sample collected 0-6 inches bgs. Consists of dark brown organic matter with sandy silt. Collected 9 feet north of DA01SS and approximately 625 feet southwest from southwest corner of assay room structure.
2-21	DOWN	10/23/00	1540	DM	Sample location DA02SS, sample number 00434213.
2-22		10/23/00	1545	DM	Sample not used because sewage was encountered.
2-23	DOWN	10/23/00	1551	DM	Sample not used because sewage was encountered.
2-24	DOWN	10/23/00	1600	DM	Sample location DA03SS, sample number 00434214. Sample collected approximately 100 feet west of DA02SS. Sample collected 0-6 inches bgs. Soil consists of brown organic rich soil (1 inch) and then brown and gray clay. The top 2 inches consists of cedar needles and leaves.
3-1	S	10/23/00	1618	DM	Sample location DA03SS, sample number 00434214.
3-2	E	10/23/00	1620	DM	Sample location DA04SS, sample number 00434215. Sample location is approximately 18 feet northeast of DA03SS. Collected 0-6 inches bgs. Soil sample was collected from north bank of drum area. Soil consists of gray and brown clayey sand.
3-3	N	10/23/00	1630	DM	Sample location DA04SS, sample number 00434215.

PHOTOGRAPH IDENTIFICATION SHEET

Camera Serial No.: 645493 **TDD No.: 01-01-0015**
Lens Type: 35 mm **Site Name: Grandview Mine**

Photo No.	Dir.	Date	Time	By	Description
3-4	S	10/23/00	1632	DM	Sample location DA05SS, sample number 00434216. Sample was collected approximately 89 feet southwest of DA03SS. Soil consists of homogenous gray silt. Collected 0-6 inches bgs.
3-5	DOWN	10/23/00	1638	DM	Sample location DA05SS, sample number 00434216.
3-6	N	10/23/00	1640	DM	Sample location DA06SS, sample number 00434217. Sample was collected approximately 13 feet north of DA05SS. Soil consists of sand and clay with sparse angular gravel and snails. Sample collected 0-6 inches bgs.
3-7	N	10/23/00	1641	DM	Sample location DA06SS, sample number 00434217.
3-8	E	10/24/00	0833	DM	Sample location FD09SS, sample number 00434230. Collected sample approximately 390 feet northwest of tailings pile just over edge of bluff to river. Soil collected from under approximately 2 inches of organic duff. Sample collected 0-6 inches bgs.
3-9	DOWN	10/24/00	0845	DM	Sample location FD09SS, sample number 00434230.
3-10	NE	10/24/00	0854	DM	Sample location FD08SS, sample number 00434229. Sample collected 0-6 inches bgs. Soil consists of 1 inch organic duff underlain by dark organic sandy silt which overlays gray silt. Location is approximately 195 feet east of FD09SS.
3-11	DOWN	10/24/00	0859	DM	Sample location FD08SS, sample number 00434229.
3-12	NE	10/24/00	0909	DM	Sample location FD07SS, sample number 00434228. Sample location is approximately 195 feet east of FD08SS. Soil is gray sandy silt. Collected 0-6 inches bgs at the edge of tailings pile.
3-13	DOWN	10/24/00	0916	DM	Sample location FD07SS, sample number 00434228.
3-14	E	10/24/00	1005	DM	Sample location TP01SS, sample 00434224. Sample is a five-point composite going east to west for 100 feet. Each portion collected 25 feet apart. Composite line is approximately 99 feet west of flume mouth. Soil consists of gray sandy silt, collected 0-6 inches bgs.
3-15	DOWN	10/24/00	1006	DM	Sample location TP01SS, sample number 00434224.
3-16	E	10/24/00	1017	DM	Sample location TP01SB, sample number 00434225. Sample is co-located with TP01SS at 2 feet bgs. Soil consists of same gray sandy silt.
3-17	DOWN	10/24/00	1025	DM	Sample location TP01SB, sample number 00434225.

PHOTOGRAPH IDENTIFICATION SHEET

Camera Serial No.: 645493 **TDD No.: 01-01-0015**
Lens Type: 35 mm **Site Name: Grandview Mine**

Photo No.	Dir.	Date	Time	By	Description
3-18	E	10/24/00	1050	LD	Sample location PO01GW, sample number 00434231. Water sample collected from pump house in Pend Oreille Village. Well was purged for approximately 20 minutes prior to sampling. Sample location PO01GW, sample number 00434231 (pump 1).
3-19	DOWN	10/24/00	1051	LD	Sample location PO01GW, sample number 00434231 pump 1.
3-20	S	10/24/00	1115	DM	Sample location PO02GW, sample number 00434232. Groundwater sample collected from Pend Oreille Village pump house (pump 3). Well was purged for approximately 20 minutes prior to sampling.
3-21	DOWN	10/24/00	1120	DM	Sample location PO02GW, sample number 00434232.
3-22	E	10/24/00	1131	DM	Sample location TP02SS, sample number 00434226. Five-point composite sample collected approximately 25 feet apart going east to west. Composite line is approximately 99 feet southwest of TP01SS. Soil is uniform among the composite point locations and consists of gray sandy silt.
3-23	DOWN	10/24/00	1132	DM	Sample location TP02SS, sample number 00434226.
3-24	DOWN	10/24/00	1133	DM	Sample location TP02SS, sample number 00434226.
4-1	W	10/24/00	1215	DM	Sample location TP02SB, sample number 00434227. Co-located sample with TP02SS collected 2 feet bgs. Soil is uniform among the composite point locations and consists of gray sandy silt.
4-2	DOWN	10/24/00	1216	DM	Sample location TP02SB, sample number 00434227.
4-3	SW	10/24/00	1309	DM	Sample location FD06SS, sample number 00434223. Sample location is at mouth of the flume to the tailings pile. Soil consists of gray to brown sandy silt with some organic matter. Collected 0-6 inches bgs.
4-4	DOWN	10/24/00	1310	DM	Sample location FD06SS, sample number 00434223.
4-5	SW	10/24/00	1321	DM	Sample location FD05SS, sample number 00434222. Location is approximately 180 feet northeast of FD06SS. Soil consists of gray silt with some organic debris. One-half inch of organic duff present. Collected 0-6 inches bgs.
4-6	DOWN	10/24/00	1322	DM	Sample location FD05SS, sample number 00434222.
4-7	SW	10/24/00	1330	DM	Sample location FD04SS, sample number 00434221. Soil sample collected approximately 180 feet northeast of FD05SS. Soil consists of gray silt with some brown clayey patches. One-half inch of organic debris present on top of the silt. Collected 0-6 inches bgs.

PHOTOGRAPH IDENTIFICATION SHEET

Camera Serial No.: 645493 **TDD No.: 01-01-0015**
Lens Type: 35 mm **Site Name: Grandview Mine**

Photo No.	Dir.	Date	Time	By	Description
4-8	DOWN	10/24/00	1331	DM	Sample location FD04SS, sample number 00434221.
4-9	SW	10/24/00	1344	DM	Sample location FD03SS, sample number 00434220. Collected sample approximately 180 feet northeast of FD04SS. Soil consists of light gray and brown well-sorted silt covered by 0.5-inch organic duff. Collected 0-6 inches bgs.
4-10	DOWN	10/24/00	1345	DM	Sample location FD03SS, sample number 00434220.
4-11	SW	10/24/00	1353	DM	Sample location FD02SS, sample number 00434219. Soil consists of approximately 2 inches of brown sand overlying gray silt. Sample collected approximately 180 feet northeast of FD03SS. Collected 0-6 inches bgs.
4-12	DOWN	10/24/00	1354	DM	Sample location FD02SS, sample number 00434219.
4-13	SW	10/24/00	1408	DM	Sample location FD01SS, sample number 00434218. Sample collected approximately 180 feet northeast of FD02SS. Soil consists of gray and brown sand with 5-10% reddish gravel. One-half inch organic duff on top. Collected 0-6 inches bgs.
4-14	DOWN	10/24/00	1409	DM	Sample location FD01SS, sample number 00434218.
4-15	N	10/24/00	1505	LD	View of City of Seattle monitoring well 65 feet west of WP05SB.
4-16	S	10/25/00	0905	LD	Sample location BK01SS, sample number 00434238. Upgradient from Grandview Mine and Circle Motel.
4-17	DOWN	10/25/00	0910	LD	Sample location BK01SS, sample number 00434238.
4-18	W	10/25/00	1100	DM	View of bald eagle 5.7 miles north of Grandview Mine.
4-19	W	10/25/00	1101	DM	View of bald eagle 5.7 miles north of Grandview Mine.
4-20	W	10/25/00	1145	DM	Sample location PR01SW, sample number 00434234. Collected Pend Oreille River sample approximately 250 feet downstream of bluff where FD09SS was collected. Water is clear and odorless. Current approximately 4 knots.
4-21	DOWN	10/25/00	1230	DM	Sample location PR01SD, sample number 00434235. Co-located sample with PR01SW. Sediment is mostly well-graded sand with some gravel.
4-22	SE	10/25/00	1240	DM	Overview picture of locations PR01SW and PR01SD.
4-23	W	10/25/00	1245	DM	Sample location PR02SW, sample number 00434236. Water collected directly below bluff where FD09SS was collected. Water is clear and odorless in cove area.

PHOTOGRAPH IDENTIFICATION SHEET

Camera Serial No.: 645493 **TDD No.: 01-01-0015**
Lens Type: 35 mm **Site Name: Grandview Mine**

Photo No.	Dir.	Date	Time	By	Description
4-24	DOWN	10/25/00	1255	DM	Sample location PR02SD, sample number 00434237. Co-located sample with PR02SW. Sediment is sandy with some silt.
4-25	E	10/25/00	1305	DM	Overview of sample locations PR02SW and PR02SD, on east side of the river.
5-1	E	10/25/00	1306	DM	Overview of sample locations PR02SW and PR02SD, on east side of the river.
5-2	DOWN	10/25/00	1330	DM	Sample location BK02SW, sample number 00434239. Background surface water sample collected approximately 300 yards upstream of PR02SW. Water is clear and odorless.
5-3	DOWN	10/25/00	1340	DM	Sample location BK02SD, sample number 00434240. Co-located background sample with BK02SW. Sediment consists of small gravel with fine and coarse sand.
5-4	SE	10/25/00	1345	DM	Overview of sample locations BK02SW and BK02SD.
5-5	DOWN	10/26/00	0903	DM	Pump house interior at sample location BK03GW.
5-6	DOWN	10/26/00	0921	DM	Sample location BK03GW, sample number 00434241. Background groundwater sample was collected from a private well northeast of Grandview Mine. Water was clear and odorless.
5-7	E	10/26/00	0930	DM	Overview of pump house for sample location BK03GW.

Key:

bgs = Below ground surface.
DB = David Byers.
DM = Dione Mazzolini.
E = East.
LD = Leatta Dahlhoff.
N = North.
NE = Northeast.
NW = Northwest.
S = South
SE = Southeast.
SW = Southwest.
TDD = Technical Direction Document.
W = West.

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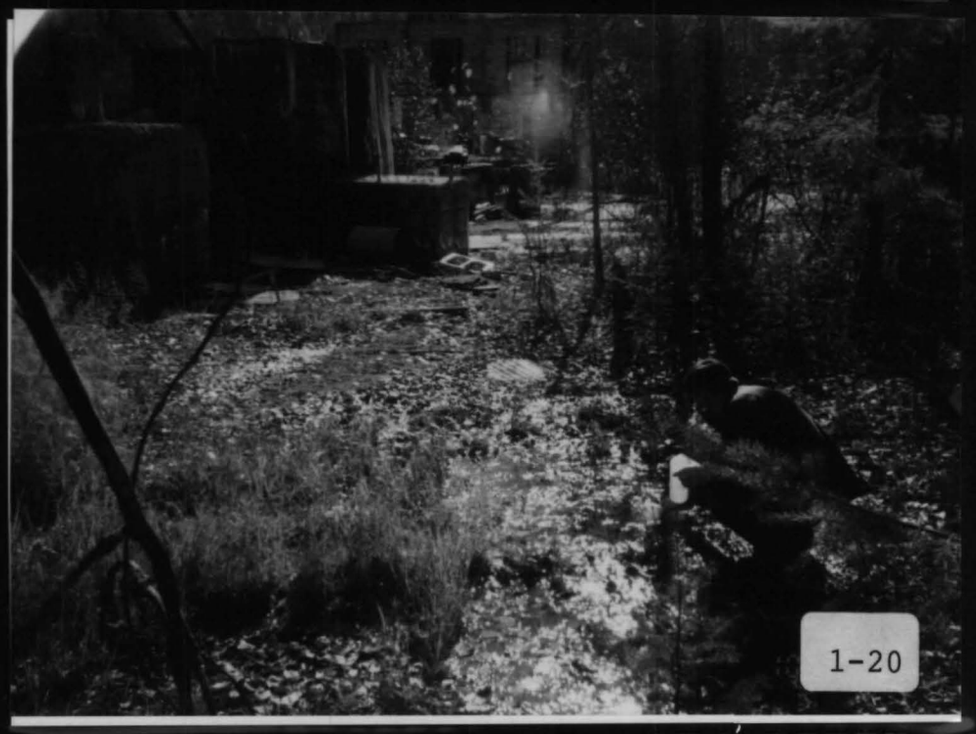
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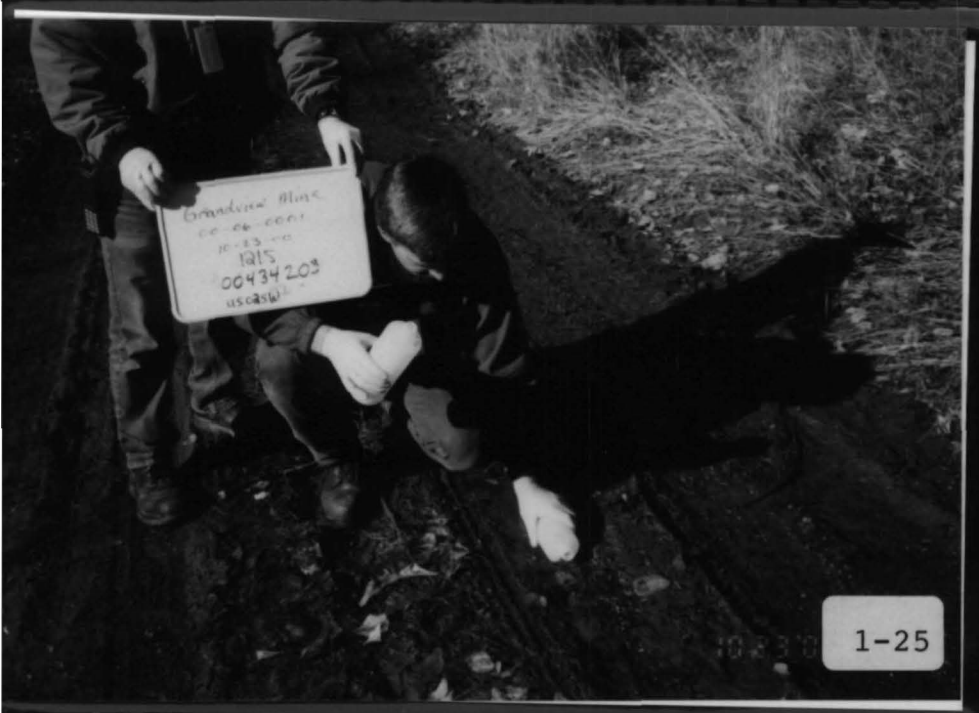

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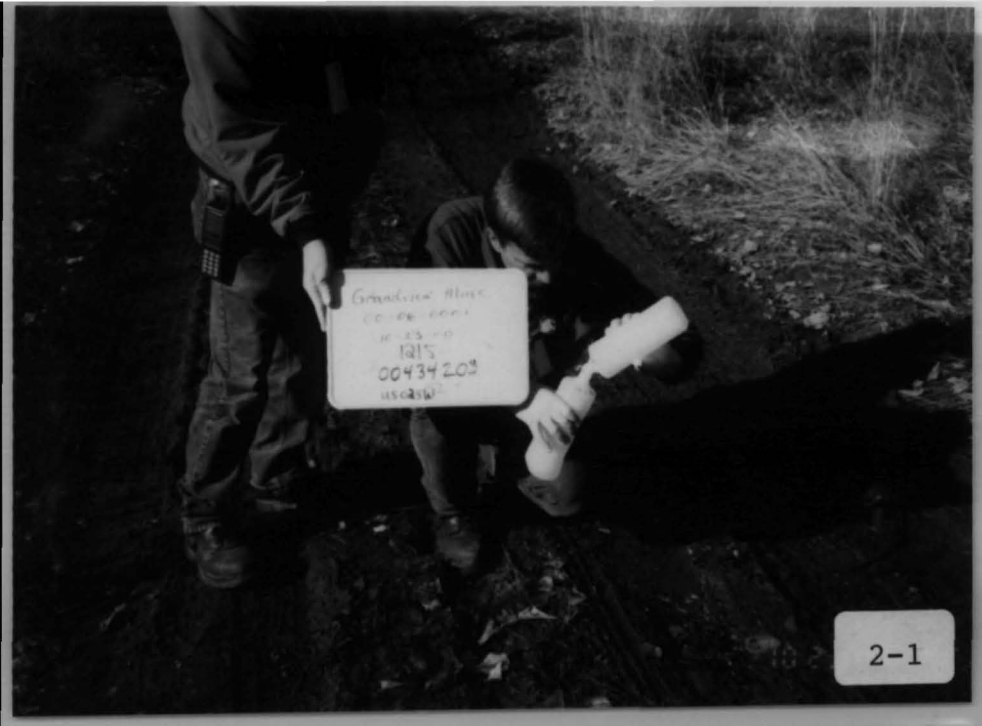

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00434205
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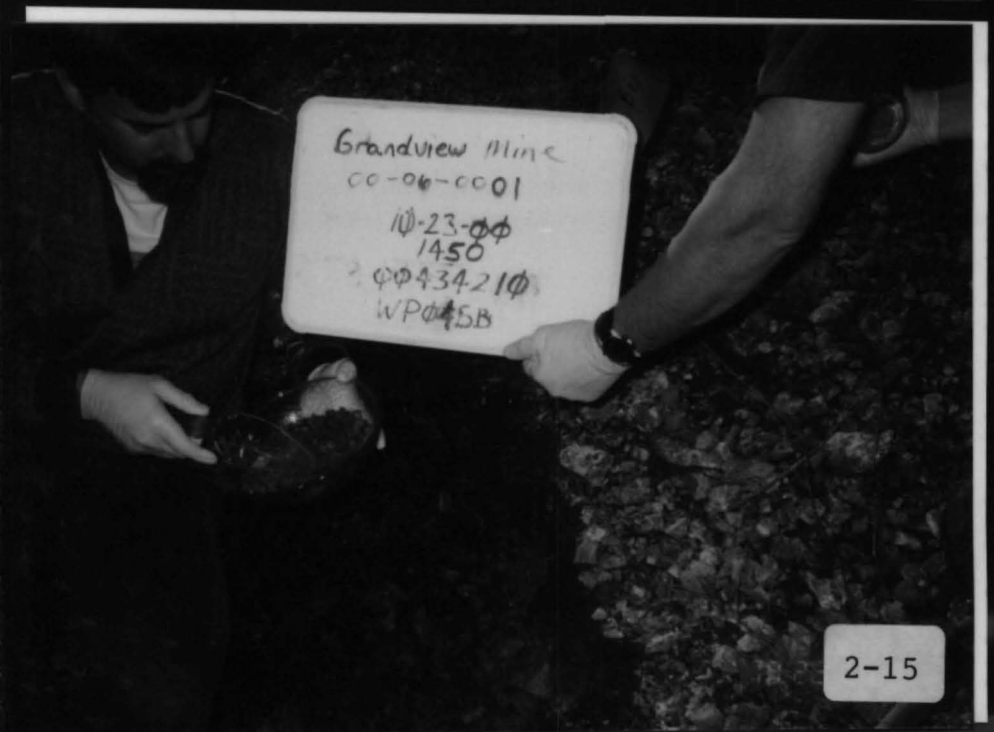

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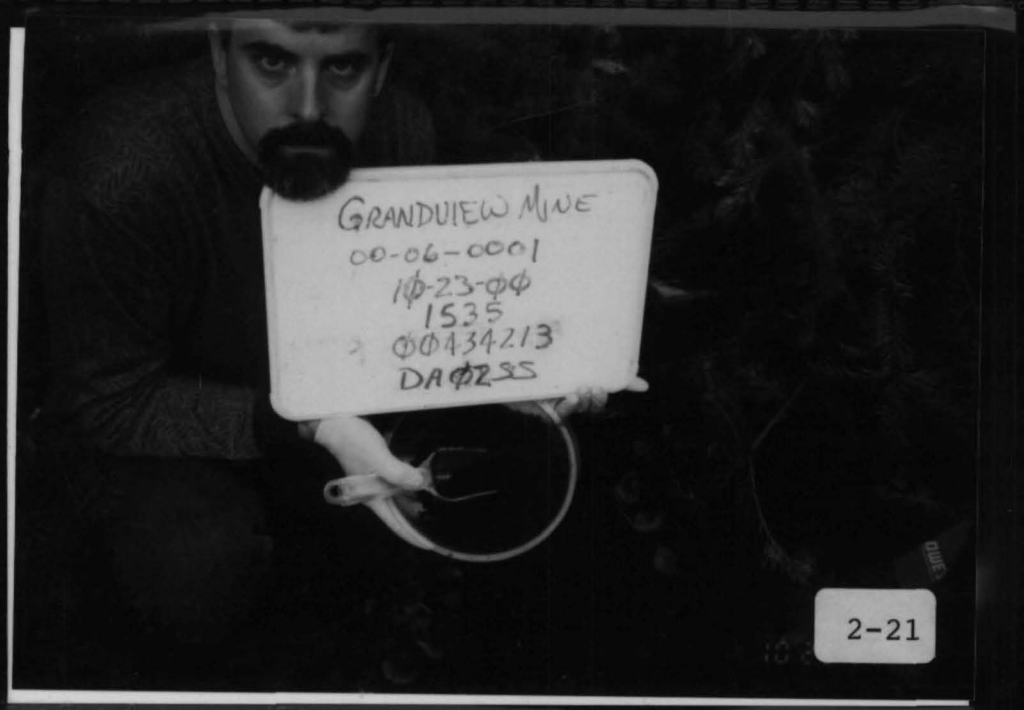

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GRANDVIEW MINE
00-06-0041
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1600
00434214
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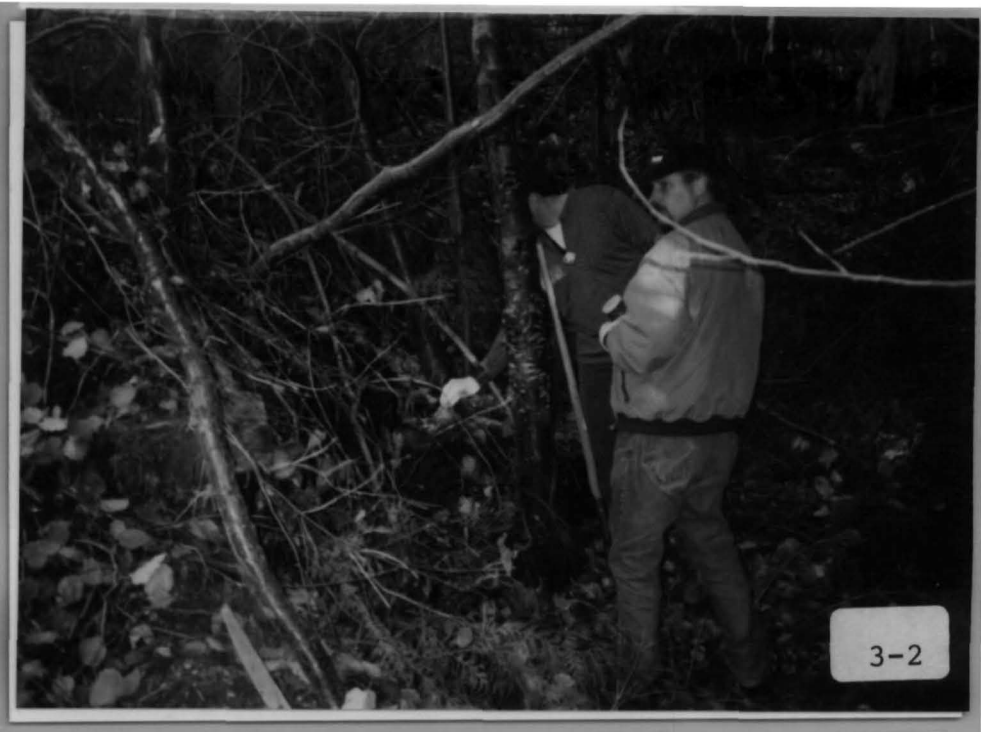

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1620
00434215
DA0455

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GRANDVIEW MINE
10-24-00
0833
FD-08-55
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GRANDVIEW MINE
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0854
FD-08-55
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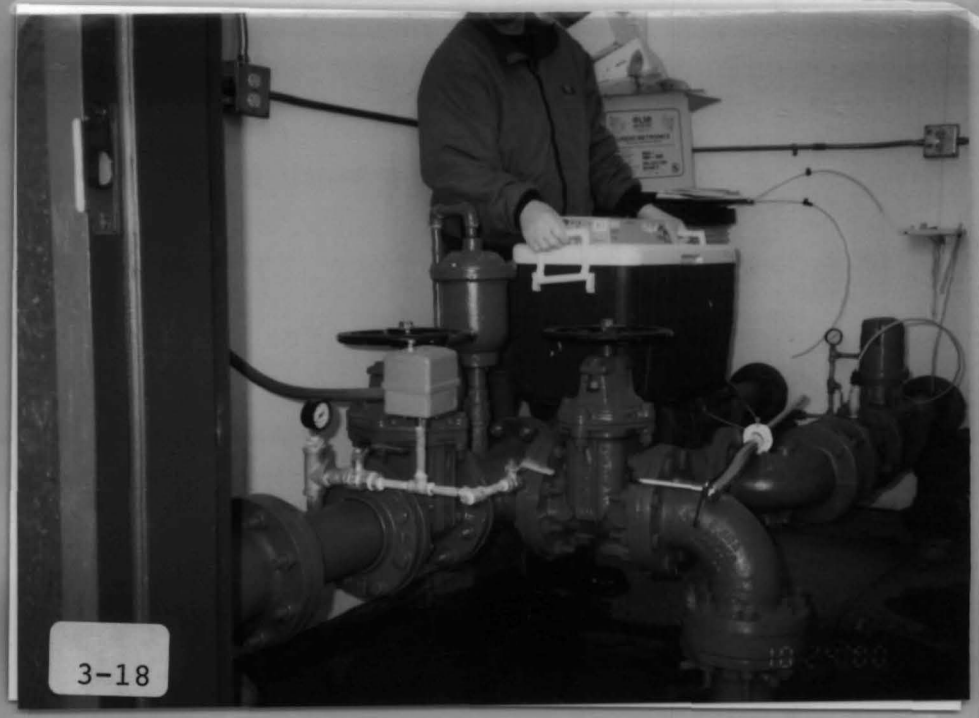

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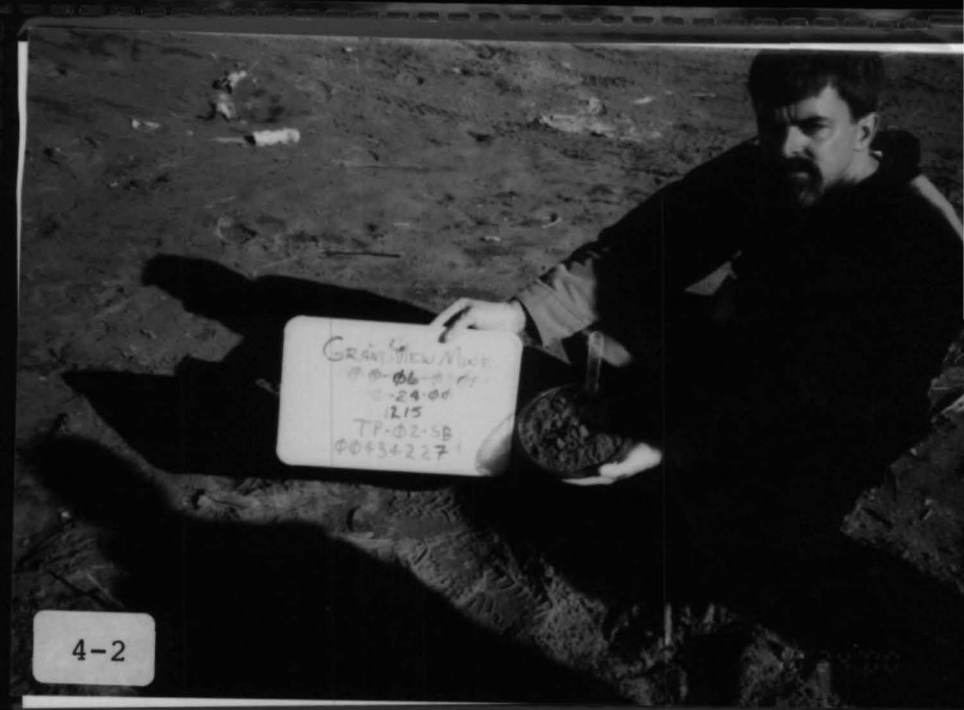
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TP-02-SB

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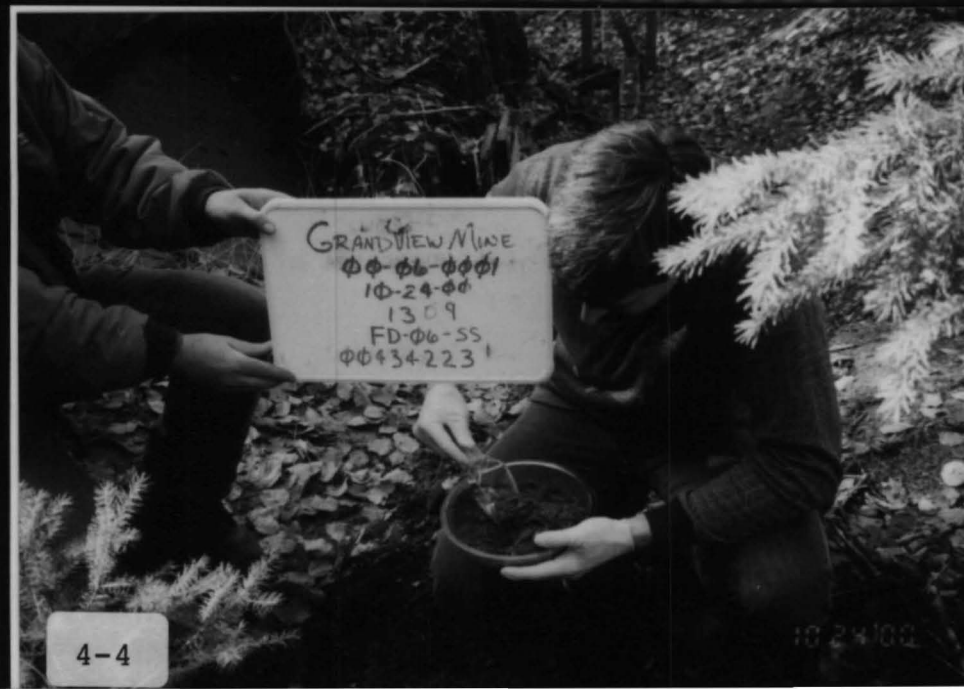
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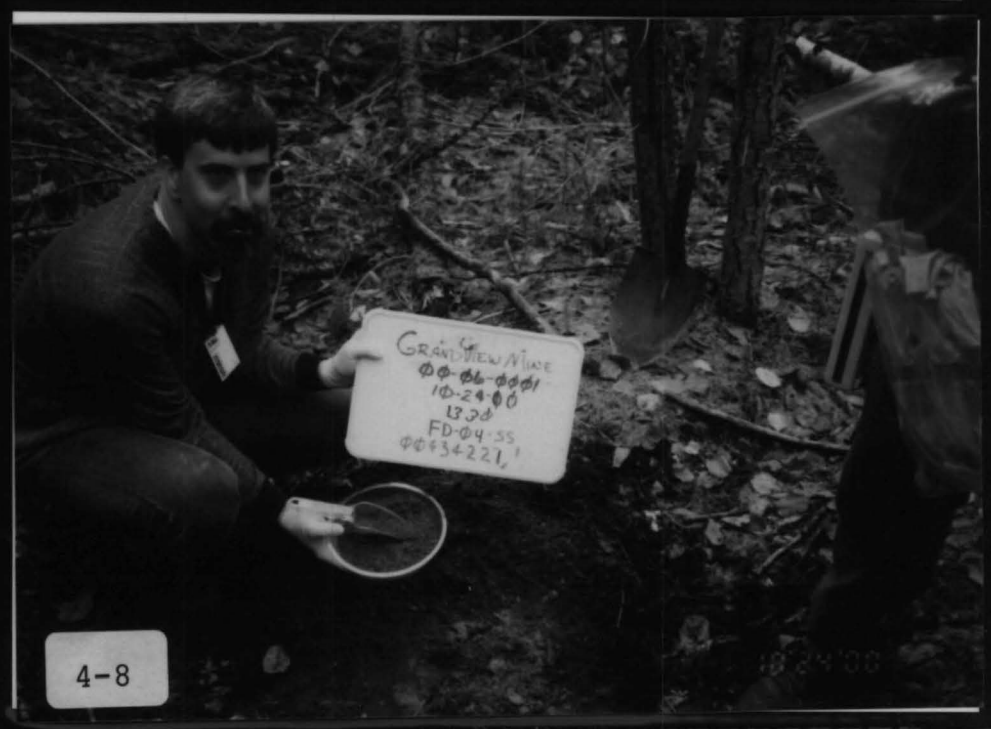

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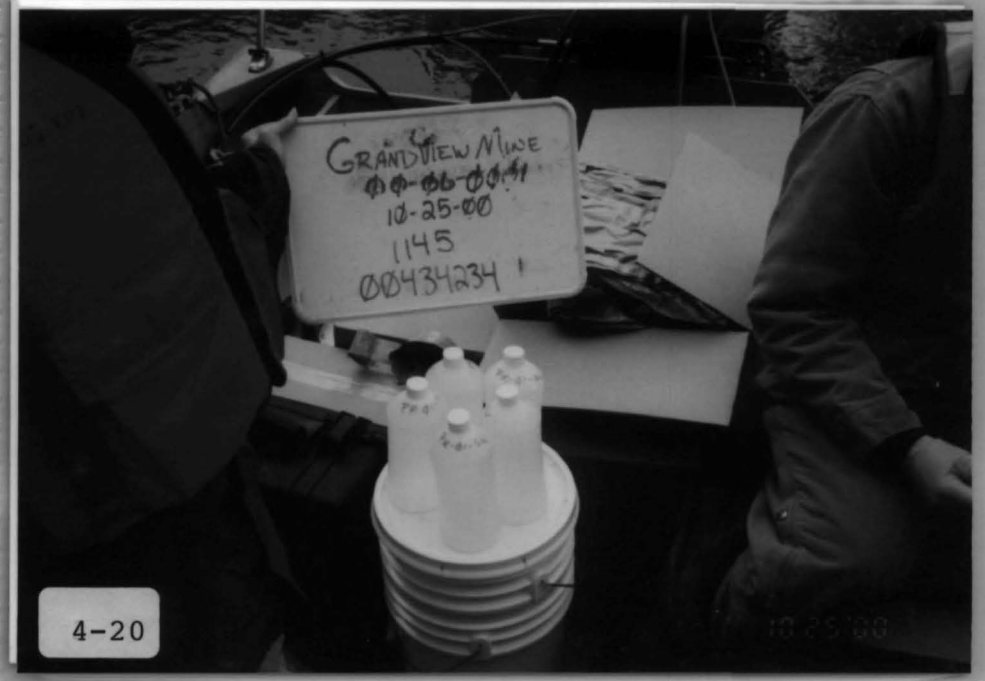

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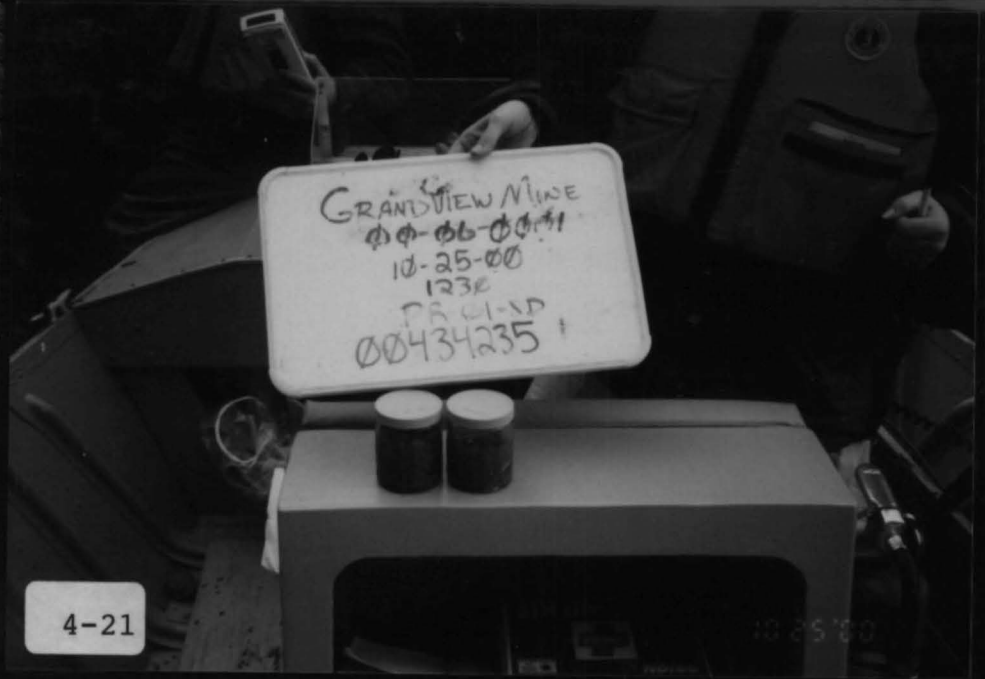

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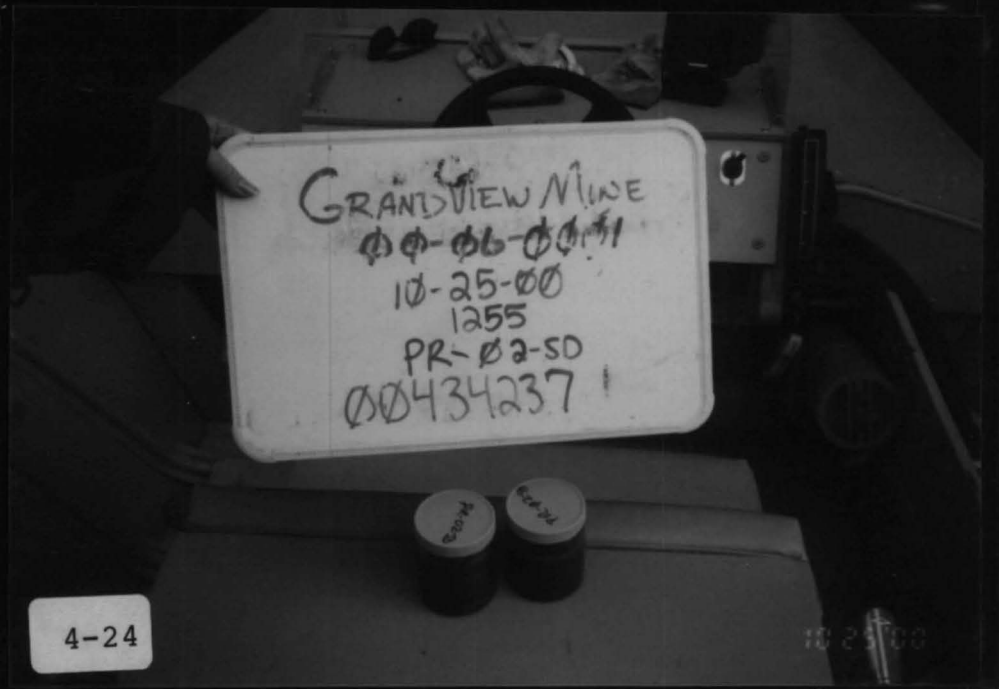

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GRANDVIEW MINE
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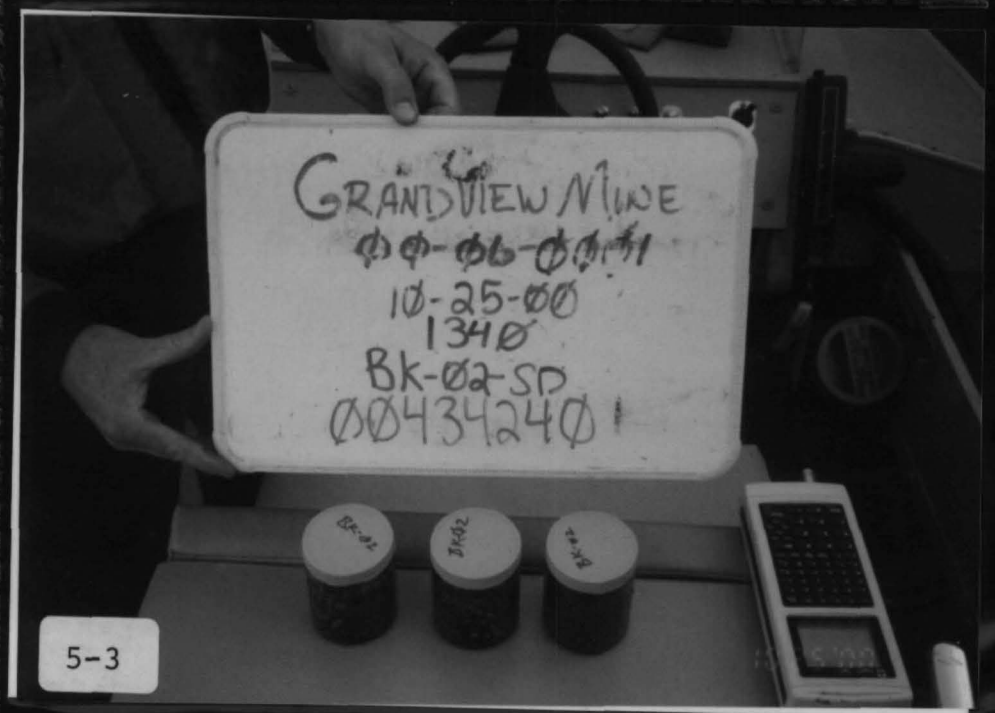
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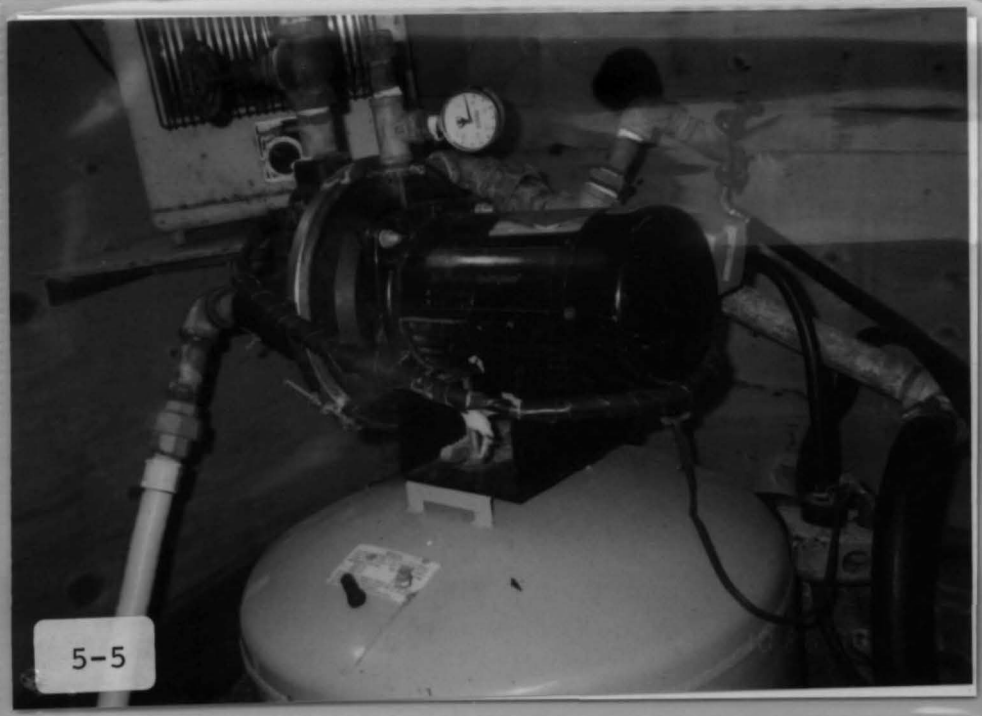
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APPENDIX B

GLOBAL POSITIONING SYSTEM DATA

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GLOBAL POSITIONING SYSTEM DATA
GRANDVIEW MINE
METALINE FALLS, WASHINGTON

EPA Regional Tracking	Field Number	Decimal Degrees		Longitude			Latitude			PDOP	Horizontal Accuracy (meters)
		Longitude	Latitude	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds		
00434204	US02SD	-117.35840	48.87106	-117	21	30.24537	48	52	15.81642	5.3	0.846
00434201	US01SW	-117.35932	48.87094	-117	21	33.53977	48	52	15.39466	5.7	0.887
00434228	FD07SS	-117.36484	48.86959	-117	21	53.41706	48	52	10.51468	5.8	0.721
00434229	FD08SS	-117.36543	48.86948	-117	21	55.55117	48	52	10.12760	5.3	0.68
00434230	FD09SS	-117.36636	48.86949	-117	21	58.91278	48	52	10.17619	9.9	2.18
00434225	TP01SB	-117.36415	48.86968	-117	21	50.94373	48	52	10.85193	7	3.197
00434224	TP01SS	-117.36415	48.86968	-117	21	50.94373	48	52	10.85193	7	3.36
00434227	TP02SB	-117.36439	48.86972	-117	21	51.81936	48	52	11.00290	6.5	1.389
00434226	TP02SS	-117.36439	48.86972	-117	21	51.81936	48	52	11.00290	6.1	0.322
00434234	PR01SW	-117.36577	48.87100	-117	21	56.76700	48	52	15.61387	4.3	1.695
00434236	PR02SW	-117.36668	48.86966	-117	22	0.03312	48	52	10.76326	5.6	1.647
00434205	US03SW	-117.35755	48.87100	-117	21	27.18969	48	52	15.61572	3.3	1.361
00434239	BK02SW	-117.36762	48.86845	-117	22	3.43283	48	52	6.42340	3.6	1.298
00434223	FD06SS	-117.36346	48.86955	-117	21	48.44126	48	52	10.37337	3.6	0.535
00434222	FD05SS	-117.36280	48.86957	-117	21	46.06466	48	52	10.44705	9.2	1.347
00434221	FD04SS	-117.36220	48.86953	-117	21	43.93039	48	52	10.32271	8.4	1.438
00434220	FD03SS	-117.36182	48.86967	-117	21	42.56770	48	52	10.82120	10	1.59
00434219	FD02SS	-117.36128	48.86984	-117	21	40.61940	48	52	11.41107	5	0.558
00434218	FD01SS	-117.36072	48.87002	-117	21	38.59662	48	52	12.07555	4.7	1.9
00434210	WP04SB	-117.35976	48.87110	-117	21	35.14634	48	52	15.96777	6.4	2.162
00434211	WP05SB	-117.35986	48.87103	-117	21	35.50281	48	52	15.69793	6.3	2.099
00434207	WP01SB	-117.35912	48.87113	-117	21	32.81882	48	52	16.07914	7.4	2.392
00434202	US01SD	-117.35930	48.87093	-117	21	33.47575	48	52	15.35031	7	1.729
00434208	WP02SB	-117.35915	48.87132	-117	21	32.94795	48	52	16.74636	4.2	1.506
00434209	WP03SB	-117.35924	48.87145	-117	21	33.26457	48	52	17.20748	3.5	1.666
00434203	US02SW	-117.35841	48.87105	-117	21	30.28424	48	52	15.78396	5.7	1.679
00434206	US03SD	-117.35755	48.87100	-117	21	27.18969	48	52	15.61572	3.3	1.361
00434238	BK01SS	-117.35710	48.86556	-117	21	25.57232	48	51	56.00951	5	2.217
00434235	PR01SD	-117.36577	48.87100	-117	21	56.76700	48	52	15.61387	4.3	1.695
00434237	PR02SD	-117.36668	48.86966	-117	22	0.03312	48	52	10.76326	5.6	1.647
00434240	BK02SD	-117.36762	48.86845	-117	22	3.43283	48	52	6.42340	3.6	1.298
00434241	BK03GW	-117.34551	48.87528	-117	20	43.84890	48	52	30.99628	4.7	0.9

Key:

EPA = United States Environmental Protection Agency.
PDOP = Position dilution of precision.

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APPENDIX C

DATA VALIDATION MEMORANDA AND ANALYTICAL RESULTS

ecology and environment, inc.
International Specialists in the Environment

1500 Wells Fargo Center , 999 Third Avenue
Seattle , Washington 98104
Tel: (206) 624-9537 , Fax: (206) 621-9832

MEMORANDUM

DATE: November 29, 2000

TO: Leatta Dahlhoff, Project Manager, E & E, Seattle, WA

FROM: Mark Woodke, START Chemist, E & E, Seattle, WA MW

SUBJ: **Inorganic Data Quality Assurance Summary, Grandview Mine Site, Metaline, Washington**

REF: TDD: 00-06-0001 PAN: EF-01-01-SI-DM

The data validation of 10 water and 31 soil samples collected from the Grandview Mine site located in Metaline, Washington, has been completed. Analysis for CLP Metals (EPA CLP SOW ILM04.1) was performed by Chemtech Consulting Group, Englewood, New Jersey.

All listed samples were present in the provided data validation packages. The (B) bias qualifiers indicate results above the Instrument Detection Limits but less than the Contract Required Detection Limits; (J) qualifiers, indicating estimated quantities, were applied by the START chemist to (B)-qualified results. When additional bias qualifiers were also applied to these estimated quantities (JB), the other qualifiers were deleted by the START chemist as the (B) bias qualifier is the most restrictive for Hazard Ranking System purposes.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

IN REPLY REFER TO: OEA-095 November 28, 2000

MEMORANDUM

SUBJECT: Grandview Mine, CLP Metals Analysis, Data Validation
Case: 28639
SDG: MJCG09

FROM: Laura Castrilli, Chemist
Quality Assurance and Data Unit, OEA

TO: Joanne Labaw, Site Assessment Manager
Office of Environmental Cleanup

CC: Bruce Woods, Region 10 CLP TPO
Mark Woodke, Ecology & Environment
Leatta Dahlhoff, Ecology & Environment

The following is a validation of ICP-AES and mercury analyses of twenty soil/sediment samples from the Grandview Mine site. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-Concentration, ILM04.1. Analyses were conducted by Chemtech Consulting Group, Englewood, New Jersey. This validation was conducted for the following samples:

MJ00BM	MJCG13	MJCG16	MJCG19	MJCG22	MJCG25	MJCG28
MJCG09	MJCG14	MJCG17	MJCG20	MJCG23	MJCG26	MJCG29
MJCG11	MJCG15	MJCG18	MJCG21	MJCG24	MJCG27	

Data Qualifications

The following comments refer to the Chemtech Laboratory's performance in meeting quality control specifications outlined in the *CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM04.1.* The comments presented herein are based on the information provided for the review.

1.0 Timeliness - Acceptable

The technical (40 CFR part 136) holding time from the date of collection for mercury in water is 28 days. The holding time for the remaining metals in water is 180 days. The samples were collected between 10/23/00 and 10/25/00. ICP-AES analyses were completed on 10/31/00. Mercury analyses were completed on 11/02/00. All analyses

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were conducted within the technical water holding times, therefore no qualification was made on the basis of holding time.

2.0 Sample Preparation - Acceptable

The samples were prepared for mercury analyses on 11/01/00. The samples were prepared for ICP-AES analyses on 10/29/00. No qualification was made based on sample preparation.

3.0 Calibrations/Calibration Verifications - Acceptable

The samples were analyzed for mercury by CVAAS on 11/02/00. The initial calibration included one blank and five standards. The curve was linear with a correlation coefficient greater than 0.995.

The samples were analyzed by ICP-AES on 10/31/00. The instrument was standardized the day of analysis according to the analytical method using one blank and a single calibration standard for each element.

All ICP-AES and CVAAS (mercury) calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Calibration verification samples are required before and after sample analysis and after every 10 samples during analysis. Mercury recoveries must be within 80-120%. Other metal recoveries must be within 90-110%.

All ICP-AES and CVAAS (mercury) calibration verification (initial and continuing) samples bracketing reported sample results met the frequency and recovery criteria; therefore no qualification was made based on ICP-AES or CVAAS calibration verification.

4.0 Laboratory Control Samples - Acceptable

Laboratory Control samples (LCS) are digested and analyzed along with the samples to verify the efficiency of laboratory procedures (LCS analyses are not required for mercury in water). All recoveries associated with reported sample results met the acceptance criteria for control samples, therefore no qualification was made based on LCS results.

5.0 Blanks -

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified if the analyte concentration was less than five times the analytical value in the blank.

Beryllium, nickel, and silver were detected in the preparation blank.

Barium, copper, manganese and potassium in the preparation blank had negative values with absolute values greater than the detection limits. Antimony, barium, beryllium, nickel, potassium, silver, and vanadium were detected in one or more continuing calibration blanks (CCBs). Aluminum, cobalt, copper, mercury, manganese, and potassium in several CCBs had negative results with absolute values greater than the detection limits. Based on blank contamination, the following qualifications were made:

- antimony in samples MJCG09, MJCG21, MJCG22, and MJCG28 was qualified 'U', undetected
- beryllium in all samples was qualified 'U', undetected
- mercury in samples MJCG11, MJCG13, MJCG19, MJCG20, MJCG23, and MJ00BM was qualified 'J', estimated, or 'UJ', estimated detection limit
- silver in all samples <u>except</u> MJCG25 was qualified 'U', undetected

The remaining sample results were greater than five times the associated blank levels (or were already undetected) and were not qualified on this basis.

6.0 ICP-AES Interference Check Sample - Acceptable

The interference check sample (ICS) is analyzed by ICP-AES to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run and recoveries must be between 80% and 120%. All ICS recoveries associated with reported sample results were within the recovery criterion.

The raw data for a number of samples had interfering levels of calcium, magnesium, and/or iron. Since the estimated interference was negligible, no qualification was made based on interference.

7.0 Duplicate Analysis - Acceptable

Duplicate analysis was done on sample MJ00BM. Soil/sediment duplicate results were within the ±35% Relative Percent Difference (RPD) or ±2xCRDL criteria for soil/sediment results < 5 times the CRDL criteria, therefore no qualification was made based on duplicate results.

8.0 Matrix Spike Analysis -

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%.

Matrix spike analysis was done on sample MJ00BM. All matrix spike

recoveries were within the required QC limits; therefore no qualification was made based on matrix spike recovery.

9.0 ICP-AES Serial Dilution -

Sample MJ00BM was analyzed by ICP-AES serial dilution to check for potential interferences. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) were within the 10%D criteria; with the exception of copper (10.8%D), sodium (22%D), and nickel (15%D). All sodium and nickel results were qualified 'J', estimated. Since the serial dilution for copper was so close to the acceptance criteria, no qualification was made based on the serial dilution result and laboratory 'E' qualifiers were removed from the copper results.

10.0 Detection Limits - Acceptable

Sample results which fall below the instrument detection limit (IDL) are assigned the value of the instrument detection limit and the 'U' qualifier is attached.

Contract Required Detection Limit (CRDL) standards are required for most analytes to demonstrate a linear calibration curve near the CRDL. CRDL standards were run at the required frequency.

11.0 Overall Assessment of the Data

This validation of the data is based on the criteria outlined in the *National Functional Guidelines for Inorganic Data Review (02/94)*. Approximately 19% of the data was qualified based on serial dilution results or blank contamination.

Below are the definitions for the National Functional Guidelines for Inorganic Data Review (02/94) qualifiers used when validating/qualifying data from Inorganic analysis.

DATA QUALIFIERS

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

J - The associated value is an estimated quantity.

R - The data are unusable. (Note: Analyte may or may not be present.)

UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

At the request of the site assessment manager, bias for the data was qualitatively assessed and if applicable, the following additional qualifiers were applied:

L - Low bias.

H - High bias.

K - Unknown Bias.

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJ00BM

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-20S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 81.3

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12300			P
7440-36-0	Antimony	0.89	U		P
7440-38-2	Arsenic	5.2			P
7440-39-3	Barium	222			P
7440-41-7	Beryllium	0.62	~~B~~	U	P
7440-43-9	Cadmium	0.12	U		P
7440-70-2	Calcium	25200			P
7440-47-3	Chromium	20.7			P
7440-48-4	Cobalt	8.7	JB		P
7440-50-8	Copper	17.8		~~E~~	P
7439-89-6	Iron	16400			P
7439-92-1	Lead	67.8			P
7439-95-4	Magnesium	3580			P
7439-96-5	Manganese	616			P
7439-97-6	Mercury	0.06	U	JK	CV
7440-02-0	Nickel	18.4		~~E~~ JK	P
7440-09-7	Potassium	2090			P
7782-49-2	Selenium	0.96	U		P
7440-22-4	Silver	0.36	~~B~~	U	P
7440-23-5	Sodium	234	JB	~~E~~ ~~JK~~	P
7440-28-0	Thallium	2.6			P
7440-62-2	Vanadium	29.7			P
7440-66-6	Zinc	245			P
	Cyanide				NR

11/27/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG09

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-01S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 51.3

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	5500			P
7440-36-0	Antimony	3.2	~~B~~	U	P
7440-38-2	Arsenic	16.9			P
7440-39-3	Barium	87.0			P
7440-41-7	Beryllium	0.56	~~B~~	U	P
7440-43-9	Cadmium	63.9			P
7440-70-2	Calcium	75100			P
7440-47-3	Chromium	12.4			P
7440-48-4	Cobalt	4.7	JB		P
7440-50-8	Copper	120		~~E~~	P
7439-89-6	Iron	10500			P
7439-92-1	Lead	11800			P
7439-95-4	Magnesium	22500			P
7439-96-5	Manganese	213			P
7439-97-6	Mercury	2.1			CV
7440-02-0	Nickel	21.6		~~E~~ JK	P
7440-09-7	Potassium	796	JB		P
7782-49-2	Selenium	2.4			P
7440-22-4	Silver	2.3	~~B~~	U	P
7440-23-5	Sodium	192	JB	~~E~~ JK	P
7440-28-0	Thallium	4.9			P
7440-62-2	Vanadium	20.6			P
7440-66-6	Zinc	19800			P
	Cyanide				NR

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG11

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-02S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 85.6

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	4120			P
7440-36-0	Antimony	0.84	U		P
7440-38-2	Arsenic	4.8			P
7440-39-3	Barium	38.8	JB		P
7440-41-7	Beryllium	0.35	~~B~~	4	P
7440-43-9	Cadmium	3.5			P
7440-70-2	Calcium	40600			P
7440-47-3	Chromium	11.1			P
7440-48-4	Cobalt	3.6	JB		P
7440-50-8	Copper	17.6		~~E~~	P
7439-89-6	Iron	9890			P
7439-92-1	Lead	842			P
7439-95-4	Magnesium	15700			P
7439-96-5	Manganese	197			P
7439-97-6	Mercury	0.11	JB	~~JK~~ MN	CV
7440-02-0	Nickel	10.7		~~E~~ JK	P
7440-09-7	Potassium	622	JB		P
7782-49-2	Selenium	0.91	U		P
7440-22-4	Silver	0.46	~~B~~	4	P
7440-23-5	Sodium	182	JB	~~E~~ ~~JK~~ MN	P
7440-28-0	Thallium	1.9	U		P
7440-62-2	Vanadium	20.8			P
7440-66-6	Zinc	1300			P
	Cyanide				NR

11/30/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG13

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-04S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 74.2

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	10600			P
7440-36-0	Antimony	0.97	U		P
7440-38-2	Arsenic	9.0			P
7440-39-3	Barium	77.3			P
7440-41-7	Beryllium	0.47	~~B~~	U	P
7440-43-9	Cadmium	0.13	U		P
7440-70-2	Calcium	9320			P
7440-47-3	Chromium	25.2			P
7440-48-4	Cobalt	8.7	JB		P
7440-50-8	Copper	29.9		~~E~~	P
7439-89-6	Iron	19800			P
7439-92-1	Lead	161			P
7439-95-4	Magnesium	8480			P
7439-96-5	Manganese	266			P
7439-97-6	Mercury	0.07	U	JK	CV
7440-02-0	Nickel	21.6		~~E~~JK	P
7440-09-7	Potassium	1440			P
7782-49-2	Selenium	1.1	U		P
7440-22-4	Silver	0.54	~~B~~	U	P
7440-23-5	Sodium	229	JB	~~E~~JK MW	P
7440-28-0	Thallium	2.4	JB		P
7440-62-2	Vanadium	40.0			P
7440-66-6	Zinc	360			P
	Cyanide				NR

11/20/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG14

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-05S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 94.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	518			P
7440-36-0	Antimony	0.77	U		P
7440-38-2	Arsenic	18.4			P
7440-39-3	Barium	20.8	J B		P
7440-41-7	Beryllium	0.31	~~B~~	U	P
7440-43-9	Cadmium	23.3			P
7440-70-2	Calcium	151000			P
7440-47-3	Chromium	1.8	J B		P
7440-48-4	Cobalt	0.50	J B		P
7440-50-8	Copper	13.6		~~E~~	P
7439-89-6	Iron	2960			P
7439-92-1	Lead	3850			P
7439-95-4	Magnesium	47900			P
7439-96-5	Manganese	245			P
7439-97-6	Mercury	1.1			CV
7440-02-0	Nickel	15.1		~~E~~ J	P
7440-09-7	Potassium	152	J B		P
7782-49-2	Selenium	1.1			P
7440-22-4	Silver	0.95	~~B~~	U	P
7440-23-5	Sodium	142	J B	~~E~~ ~~J~~ MW	P
7440-28-0	Thallium	1.8	J B		P
7440-62-2	Vanadium	11.4			P
7440-66-6	Zinc	7310			P
	Cyanide				NR

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG15

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-06S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 95.8

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	236			P
7440-36-0	Antimony	0.74	U		P
7440-38-2	Arsenic	16.4			P
7440-39-3	Barium	16.5	JB		P
7440-41-7	Beryllium	0.32	~~B~~	U	P
7440-43-9	Cadmium	13.0			P
7440-70-2	Calcium	151000			P
7440-47-3	Chromium	1.1	JB		P
7440-48-4	Cobalt	0.28	JB		P
7440-50-8	Copper	6.0	U	~~E~~	P
7439-89-6	Iron	2360			P
7439-92-1	Lead	4930			P
7439-95-4	Magnesium	62900			P
7439-96-5	Manganese	210			P
7439-97-6	Mercury	1.0			CV
7440-02-0	Nickel	11.9		~~E~~ JK	P
7440-09-7	Potassium	137	JB		P
7782-49-2	Selenium	0.80	U		P
7440-22-4	Silver	0.80	~~B~~	U	P
7440-23-5	Sodium	155	JB	~~E JKM~~ U	P
7440-28-0	Thallium	2.2			P
7440-62-2	Vanadium	8.9	JB		P
7440-66-6	Zinc	3830			P
	Cyanide				NR

11/07/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG16

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-07S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 95.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1500			P
7440-36-0	Antimony	0.75	U		P
7440-38-2	Arsenic	44.0			P
7440-39-3	Barium	28.8	JB		P
7440-41-7	Beryllium	0.35	~~B~~	U	P
7440-43-9	Cadmium	16.0			P
7440-70-2	Calcium	150000			P
7440-47-3	Chromium	4.7			P
7440-48-4	Cobalt	2.0	JB		P
7440-50-8	Copper	14.5		~~B~~	P
7439-89-6	Iron	5780			P
7439-92-1	Lead	810			P
7439-95-4	Magnesium	53900			P
7439-96-5	Manganese	262			P
7439-97-6	Mercury	0.71			CV
7440-02-0	Nickel	35.7		~~B~~ JK	P
7440-09-7	Potassium	494	JB		P
7782-49-2	Selenium	1.5			P
7440-22-4	Silver	0.71	~~B~~	U	P
7440-23-5	Sodium	178	JB	~~B~~ ~~J~~ MW	P
7440-28-0	Thallium	3.2			P
7440-62-2	Vanadium	24.6			P
7440-66-6	Zinc	7420			P
	Cyanide				NR

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG17

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-08S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 96.2

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	501			P
7440-36-0	Antimony	0.74	U		P
7440-38-2	Arsenic	17.2			P
7440-39-3	Barium	12.7	J B		P
7440-41-7	Beryllium	0.32	~~B~~	4	P
7440-43-9	Cadmium	2.8			P
7440-70-2	Calcium	185000			P
7440-47-3	Chromium	2.2			P
7440-48-4	Cobalt	0.56	J B		P
7440-50-8	Copper	8.7		~~E~~	P
7439-89-6	Iron	2140			P
7439-92-1	Lead	351			P
7439-95-4	Magnesium	48300			P
7439-96-5	Manganese	197			P
7439-97-6	Mercury	0.34			CV
7440-02-0	Nickel	20.4		~~E~~ J K	P
7440-09-7	Potassium	267	J B		P
7782-49-2	Selenium	0.80	U		P
7440-22-4	Silver	0.50	~~B~~	4	P
7440-23-5	Sodium	168	J B	~~E J K~~ MW	P
7440-28-0	Thallium	1.6	U		P
7440-62-2	Vanadium	20.2			P
7440-66-6	Zinc	729			P
	Cyanide				NR

11/01/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG18

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-09S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 94.6

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	458			P
7440-36-0	Antimony	0.76	U		P
7440-38-2	Arsenic	25.5			P
7440-39-3	Barium	21.0	JB		P
7440-41-7	Beryllium	0.30	~~B~~	4	P
7440-43-9	Cadmium	3.2			P
7440-70-2	Calcium	194000			P
7440-47-3	Chromium	1.3	JB		P
7440-48-4	Cobalt	0.49	JB		P
7440-50-8	Copper	11.2		~~B~~	P
7439-89-6	Iron	2090			P
7439-92-1	Lead	575			P
7439-95-4	Magnesium	24400			P
7439-96-5	Manganese	116			P
7439-97-6	Mercury	1.5			CV
7440-02-0	Nickel	14.9		~~B~~JK	P
7440-09-7	Potassium	126	JB		P
7782-49-2	Selenium	0.82	U		P
7440-22-4	Silver	0.51	~~B~~	4	P
7440-23-5	Sodium	126	JB	~~B~~JKm✓	P
7440-28-0	Thallium	1.7	U		P
7440-62-2	Vanadium	13.9			P
7440-66-6	Zinc	1040			P
	Cyanide				NR

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG19

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-10S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 64.9

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11400			P
7440-36-0	Antimony	1.1	U		P
7440-38-2	Arsenic	6.9			P
7440-39-3	Barium	99.8			P
7440-41-7	Beryllium	0.78	~~B~~	U	P
7440-43-9	Cadmium	5.9			P
7440-70-2	Calcium	31400			P
7440-47-3	Chromium	19.4			P
7440-48-4	Cobalt	10.2	J B		P
7440-50-8	Copper	74.8		~~E~~	P
7439-89-6	Iron	16900			P
7439-92-1	Lead	705			P
7439-95-4	Magnesium	15700			P
7439-96-5	Manganese	519			P
7439-97-6	Mercury	0.26		JK	CV
7440-02-0	Nickel	22.2		~~E~~ JK	P
7440-09-7	Potassium	631	J B		P
7782-49-2	Selenium	1.4	J B		P
7440-22-4	Silver	0.61	~~B~~	U	P
7440-23-5	Sodium	143	J B	~~E~~ ~~JK~~ MW	P
7440-28-0	Thallium	3.4			P
7440-62-2	Vanadium	18.5			P
7440-66-6	Zinc	1860			P
	Cyanide				NR

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG20

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-11S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 63.3

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11800			P
7440-36-0	Antimony	1.1	U		P
7440-38-2	Arsenic	6.2			P
7440-39-3	Barium	107			P
7440-41-7	Beryllium	0.70	~~B~~	U	P
7440-43-9	Cadmium	9.3			P
7440-70-2	Calcium	16600			P
7440-47-3	Chromium	17.5			P
7440-48-4	Cobalt	9.8	JB		P
7440-50-8	Copper	65.8		~~E~~	P
7439-89-6	Iron	17200			P
7439-92-1	Lead	1490			P
7439-95-4	Magnesium	4410			P
7439-96-5	Manganese	450			P
7439-97-6	Mercury	0.25		JK	CV
7440-02-0	Nickel	19.7		~~E~~ JK	P
7440-09-7	Potassium	909	JB		P
7782-49-2	Selenium	1.2	U		P
7440-22-4	Silver	0.73	~~B~~	U	P
7440-23-5	Sodium	158	JB	~~E~~ JK MW	P
7440-28-0	Thallium	3.1			P
7440-62-2	Vanadium	18.3			P
7440-66-6	Zinc	3400			P
	Cyanide				NR

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG21

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-12S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 70.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1570			P
7440-36-0	Antimony	2.2	~~B~~	U	P
7440-38-2	Arsenic	13.3			P
7440-39-3	Barium	26.4	J B		P
7440-41-7	Beryllium	0.47	~~B~~	U	P
7440-43-9	Cadmium	11.5			P
7440-70-2	Calcium	82200			P
7440-47-3	Chromium	48.8			P
7440-48-4	Cobalt	3.3	J B		P
7440-50-8	Copper	236		~~E~~	P
7439-89-6	Iron	26300			P
7439-92-1	Lead	5110			P
7439-95-4	Magnesium	42000			P
7439-96-5	Manganese	342			P
7439-97-6	Mercury	0.97			CV
7440-02-0	Nickel	25.1		~~E~~ JK	P
7440-09-7	Potassium	265	J B		P
7782-49-2	Selenium	1.1	U		P
7440-22-4	Silver	2.3	~~B~~	U	P
7440-23-5	Sodium	281	J B	~~E~~ ~~JK~~ MW	P
7440-28-0	Thallium	2.3	U		P
7440-62-2	Vanadium	18.5			P
7440-66-6	Zinc	2900			P
	Cyanide				NR

11/27/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG22

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-13S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 79.4

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	5570			P
7440-36-0	Antimony	4.2	~~B~~	U	P
7440-38-2	Arsenic	15.3			P
7440-39-3	Barium	189			P
7440-41-7	Beryllium	0.54	~~B~~	U	P
7440-43-9	Cadmium	67.5			P
7440-70-2	Calcium	76900			P
7440-47-3	Chromium	10.1			P
7440-48-4	Cobalt	5.4	JB		P
7440-50-8	Copper	212		~~E~~	P
7439-89-6	Iron	10900			P
7439-92-1	Lead	14600			P
7439-95-4	Magnesium	34000			P
7439-96-5	Manganese	338			P
7439-97-6	Mercury	1.9			CV
7440-02-0	Nickel	20.2		~~E~~JK	P
7440-09-7	Potassium	813	JB		P
7782-49-2	Selenium	3.0			P
7440-22-4	Silver	2.2	~~B~~	U	P
7440-23-5	Sodium	723	JB	~~E~~JK MW	P
7440-28-0	Thallium	2.8			P
7440-62-2	Vanadium	22.4			P
7440-66-6	Zinc	21800			P
	Cyanide				NR

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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EPA SAMPLE #

INORGANIC ANALYSIS DATA SHEET

MJCG23

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-14S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 82.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	307			P
7440-36-0	Antimony	0.87	U		P
7440-38-2	Arsenic	7.9			P
7440-39-3	Barium	5.2	JB		P
7440-41-7	Beryllium	0.38	~~B~~	U	P
7440-43-9	Cadmium	8.4			P
7440-70-2	Calcium	90300			P
7440-47-3	Chromium	5.5			P
7440-48-4	Cobalt	0.33	JB		P
7440-50-8	Copper	35.1		~~E~~	P
7439-89-6	Iron	2790			P
7439-92-1	Lead	264			P
7439-95-4	Magnesium	48900			P
7439-96-5	Manganese	219			P
7439-97-6	Mercury	0.35		JK	CV
7440-02-0	Nickel	5.7	JB	~~E~~ JKMW	P
7440-09-7	Potassium	150	JB		P
7782-49-2	Selenium	0.94	U		P
7440-22-4	Silver	0.51	~~B~~	U	P
7440-23-5	Sodium	136	JB	~~E~~ JKMW	P
7440-28-0	Thallium	1.9	U		P
7440-62-2	Vanadium	21.2			P
7440-66-6	Zinc	1790			P
	Cyanide				NR

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG24

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-15S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 79.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	6470			P
7440-36-0	Antimony	0.90	U		P
7440-38-2	Arsenic	64.9			P
7440-39-3	Barium	57.4			P
7440-41-7	Beryllium	0.49	~~B~~	U	P
7440-43-9	Cadmium	99.5			P
7440-70-2	Calcium	30700			P
7440-47-3	Chromium	16.3			P
7440-48-4	Cobalt	9.4	J B		P
7440-50-8	Copper	216		~~E~~	P
7439-89-6	Iron	31900			P
7439-92-1	Lead	3640			P
7439-95-4	Magnesium	16900			P
7439-96-5	Manganese	300			P
7439-97-6	Mercury	6.0			CV
7440-02-0	Nickel	37.2		~~E~~ JK	P
7440-09-7	Potassium	902	J B		P
7782-49-2	Selenium	2.1			P
7440-22-4	Silver	1.7	~~B~~	U	P
7440-23-5	Sodium	198	J B	~~E~~ ~~J~~ MV	P
7440-28-0	Thallium	4.1			P
7440-62-2	Vanadium	19.5			P
7440-66-6	Zinc	36200			P
	Cyanide				NR

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG25

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-16S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 87.4

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	537			P
7440-36-0	Antimony	10.1	JB		P
7440-38-2	Arsenic	31.2			P
7440-39-3	Barium	63.6			P
7440-41-7	Beryllium	0.37	~~B~~	U	P
7440-43-9	Cadmium	26.4			P
7440-70-2	Calcium	81400			P
7440-47-3	Chromium	133			P
7440-48-4	Cobalt	4.8	JB		P
7440-50-8	Copper	3730		~~E~~	P
7439-89-6	Iron	30500			P
7439-92-1	Lead	43000			P
7439-95-4	Magnesium	43200			P
7439-96-5	Manganese	468			P
7439-97-6	Mercury	3.9			CV
7440-02-0	Nickel	40.7		~~E~~ JK	P
7440-09-7	Potassium	118	JB		P
7782-49-2	Selenium	6.4			P
7440-22-4	Silver	7.4			P
7440-23-5	Sodium	149	JB	~~E~~ ~~JK~~ MW	P
7440-28-0	Thallium	3.0			P
7440-62-2	Vanadium	17.5			P
7440-66-6	Zinc	7890			P
	Cyanide				NR

11/07/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG26

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-17S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 90.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	425			P
7440-36-0	Antimony	8.6	JB		P
7440-38-2	Arsenic	22.1			P
7440-39-3	Barium	10.8	JB		P
7440-41-7	Beryllium	0.37	B	U	P
7440-43-9	Cadmium	27.8			P
7440-70-2	Calcium	99300			P
7440-47-3	Chromium	33.3			P
7440-48-4	Cobalt	1.7	JB		P
7440-50-8	Copper	658		E	P
7439-89-6	Iron	13900			P
7439-92-1	Lead	23200			P
7439-95-4	Magnesium	52300			P
7439-96-5	Manganese	395			P
7439-97-6	Mercury	0.99			CV
7440-02-0	Nickel	22.3		EJK	P
7440-09-7	Potassium	116	JB		P
7782-49-2	Selenium	3.5			P
7440-22-4	Silver	3.3		U	P
7440-23-5	Sodium	139	JB	~~EJKM~~	P
7440-28-0	Thallium	2.3			P
7440-62-2	Vanadium	19.0			P
7440-66-6	Zinc	8120			P
	Cyanide				NR

11/27/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG27

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 .SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-18S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 93.6

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	546			P
7440-36-0	Antimony	0.77	U		P
7440-38-2	Arsenic	9.3			P
7440-39-3	Barium	20.8	J B		P
7440-41-7	Beryllium	0.35	~~B~~	4	P
7440-43-9	Cadmium	15.6			P
7440-70-2	Calcium	99600			P
7440-47-3	Chromium	4.7			P
7440-48-4	Cobalt	0.46	J B		P
7440-50-8	Copper	46.8		~~E~~	P
7439-89-6	Iron	3170			P
7439-92-1	Lead	1250			P
7439-95-4	Magnesium	50500			P
7439-96-5	Manganese	217			P
7439-97-6	Mercury	0.54			CV
7440-02-0	Nickel	8.0	J B	~~E~~ ~~J~~ K MW	P
7440-09-7	Potassium	212	J B		P
7782-49-2	Selenium	0.83	U		P
7440-22-4	Silver	0.63	~~B~~	4	P
7440-23-5	Sodium	142	J B	~~E~~ ~~J~~ K MW	P
7440-28-0	Thallium	2.5			P
7440-62-2	Vanadium	18.7			P
7440-66-6	Zinc	4570			P
	Cyanide				NR

11/07/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG28

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-19S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 83.2

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	946			P
7440-36-0	Antimony	1.3	JB		P
7440-38-2	Arsenic	13.7			P
7440-39-3	Barium	20.4	JB		P
7440-41-7	Beryllium	0.42	~~B~~	U	P
7440-43-9	Cadmium	23.2			P
7440-70-2	Calcium	111000			P
7440-47-3	Chromium	10			P
7440-48-4	Cobalt	1.0	JB		P
7440-50-8	Copper	132		~~E~~	P
7439-89-6	Iron	5710			P
7439-92-1	Lead	2840			P
7439-95-4	Magnesium	53300			P
7439-96-5	Manganese	287			P
7439-97-6	Mercury	1.0			CV
7440-02-0	Nickel	10.8		~~E~~ JK	P
7440-09-7	Potassium	266	JB		P
7782-49-2	Selenium	0.93	U		P
7440-22-4	Silver	0.83	~~B~~	U	P
7440-23-5	Sodium	126	JB	~~E~~ JKmw	P
7440-28-0	Thallium	1.9	U		P
7440-62-2	Vanadium	22.1			P
7440-66-6	Zinc	6160			P
	Cyanide				NR

11/07/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG29

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG09

Matrix (soil/water): SOIL Lab Sample ID: 1205R-03S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 79.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	3010			P
7440-36-0	Antimony	0.91	U		P
7440-38-2	Arsenic	16.8			P
7440-39-3	Barium	100			P
7440-41-7	Beryllium	0.40	~~B~~	U	P
7440-43-9	Cadmium	41.8			P
7440-70-2	Calcium	134000			P
7440-47-3	Chromium	9.4			P
7440-48-4	Cobalt	1.7	J B		P
7440-50-8	Copper	233		~~E~~	P
7439-89-6	Iron	5470			P
7439-92-1	Lead	5560			P
7439-95-4	Magnesium	51100			P
7439-96-5	Manganese	283			P
7439-97-6	Mercury	2.4			CV
7440-02-0	Nickel	13.9		E JK	P
7440-09-7	Potassium	1890			P
7782-49-2	Selenium	1.3			P
7440-22-4	Silver	1.4	~~B~~	U	P
7440-23-5	Sodium	334	J B	~~E~~ ~~JK~~ J	P
7440-28-0	Thallium	2.8			P
7440-62-2	Vanadium	21.8			P
7440-66-6	Zinc	12100			P
	Cyanide				NR

11/27/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

IN REPLY REFER TO: OEA-095 November 28, 2000

MEMORANDUM

SUBJECT: Grandview Mine, CLP Metals Analysis, Data Validation
Case: 28639
SDG: MJCG30

FROM: Laura Castrilli, Chemist
Quality Assurance and Data Unit, OEA

TO: Joanne Labaw, Site Assessment Manager
Office of Environmental Cleanup

CC: Bruce Woods, Region 10 CLP TPO
Mark Woodke, Ecology & Environment
Leatta Dahlhoff, Ecology & Environment

The following is a validation of ICP-AES and mercury analyses of eleven soil/sediment samples from the Grandview Mine site. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-Concentration, ILM04.1. Analyses were conducted by Chemtech Consulting Group, Englewood, New Jersey. This validation was conducted for the following samples:

MJ00BC	MJ00BE	MJ00BG	MJ00BP	MJ00BT	MJCG30
MJ00BD	MJ00BF	MJ00BH	MJ00BR	MJCG30	

Data Qualifications

The following comments refer to the Chemtech Laboratory's performance in meeting quality control specifications outlined in the *CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM04.1.* The comments presented herein are based on the information provided for the review.

1.0 Timeliness - Acceptable

The technical (40 CFR part 136) holding time from the date of collection for mercury in water is 28 days. The holding time for the remaining metals in water is 180 days. The samples were collected on 10/24/00. ICP-AES analyses were completed on 11/01/00. Mercury analyses were completed on 11/02/00. All analyses were conducted within the technical water holding times, therefore no qualification

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was made on the basis of holding time.

2.0 Sample Preparation - Acceptable

The samples were prepared for mercury analyses on 11/01/00. The samples were prepared for ICP-AES analyses on 10/30/00. No qualification was made based on sample preparation.

3.0 Calibrations/Calibration Verifications - Acceptable

The samples were analyzed for mercury by CVAAS on 11/02/00. The initial calibration included one blank and five standards. The curve was linear with a correlation coefficient greater than 0.995.

The samples were analyzed by ICP-AES on 11/01/00. The instrument was standardized the day of analysis according to the analytical method using one blank and a single calibration standard for each element.

All ICP-AES and CVAAS (mercury) calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Calibration verification samples are required before and after sample analysis and after every 10 samples during analysis. Mercury recoveries must be within 80-120%. Other metal recoveries must be within 90-110%.

All ICP-AES and CVAAS (mercury) calibration verification (initial and continuing) samples bracketing reported sample results met the frequency and recovery criteria; therefore no qualification was made based on ICP-AES or CVAAS calibration verification.

4.0 Laboratory Control Samples - Acceptable

Laboratory Control samples (LCS) are digested and analyzed along with the samples to verify the efficiency of laboratory procedures (LCS analyses are not required for mercury in water). All recoveries associated with reported sample results met the acceptance criteria for control samples, therefore no qualification was made based on LCS results.

5.0 Blanks -

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified if the analyte concentration was less than five times the analytical value in the blank.

Aluminum and beryllium were detected in the preparation blank. Aluminum, antimony, barium, beryllium, calcium, magnesium, manganese,

potassium, sodium, and vanadium were detected in one or more continuing calibration blanks (CCBs). Copper and mercury in several CCBs had negative results with absolute values greater than the detection limits. Based on blank contamination, the following qualifications were made:

- antimony in samples MJ00BE, MJ00BG, MJ00BH, and MJCG31 was qualified 'U', undetected
- beryllium in all samples was qualified 'U', undetected
- mercury in samples MJ00BF and MJ00BR was qualified 'J', estimated

Mercury in samples MJ00BP and MJ00BT would have been qualified 'UJ' estimated detection limit but instead was qualified 'R' due to extremely low matrix spike recovery. The remaining sample results were greater than five times the associated blank levels (or were already undetected) and were not qualified on this basis.

6.0 ICP-AES Interference Check Sample - Acceptable

The interference check sample (ICS) is analyzed by ICP-AES to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run and recoveries must be between 80% and 120%. All ICS recoveries associated with reported sample results were within the recovery criterion.

The raw data for a number of samples had interfering levels of calcium and/or magnesium. Since the estimated interference was negligible, no qualification was made based on interference.

7.0 Duplicate Analysis - Acceptable

Duplicate analysis was done on sample MJ00BH. Soil/sediment duplicate results were within the ±35% Relative Percent Difference (RPD) or ±2xCRDL criteria for soil/sediment results < 5 times the CRDL criteria, therefore no qualification was made based on duplicate results. Laboratory '*' qualifiers were removed from the mercury results as the lab used the stricter water criteria to qualify the results.

8.0 Matrix Spike Analysis -

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%.

Matrix spike analysis was done on sample MJ00BH. All matrix spike recoveries were within the required QC limits; with the exception of mercury (negative 1.3%). Detected mercury results were qualified 'J' estimated (low bias suspected). Undetected mercury results were

qualified 'R', unusable.

9.0 ICP-AES Serial Dilution -

Sample MJ00BH was analyzed by ICP-AES serial dilution to check for potential interferences. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) were within the 10%D criteria; with the exception of potassium (23%D) and sodium (20%D). All potassium and sodium results were qualified 'J', estimated.

10.0 Detection Limits - Acceptable

Sample results which fall below the instrument detection limit (IDL) are assigned the value of the instrument detection limit and the 'U' qualifier is attached.

Contract Required Detection Limit (CRDL) standards are required for most analytes to demonstrate a linear calibration curve near the CRDL. CRDL standards were run at the required frequency.

11.0 Overall Assessment of the Data

This validation of the data is based on the criteria outlined in the *National Functional Guidelines for Inorganic Data Review (02/94)*. Approximately 19% of the data was qualified based on serial dilution results, matrix spike recovery, and/or blank contamination.

Below are the definitions for the National Functional Guidelines for Inorganic Data Review (02/94) qualifiers used when validating/qualifying data from Inorganic analysis.

DATA QUALIFIERS

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

J - The associated value is an estimated quantity.

R - The data are unusable. (Note: Analyte may or may not be present.)

UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

At the request of the site assessment manager, bias for the data was qualitatively assessed and if applicable, the following additional qualifiers were applied:

L - Low bias.

H - High bias.

K - Unknown Bias.

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJ00BC

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG30

Matrix (soil/water): SOIL Lab Sample ID: 1207R-03S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 93.8

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	102			P
7440-36-0	Antimony	0.77	U		P
7440-38-2	Arsenic	8.8			P
7440-39-3	Barium	4.9	J B		P
7440-41-7	Beryllium	0.14	~~B~~	U	P
7440-43-9	Cadmium	42.2			P
7440-70-2	Calcium	127000			P
7440-47-3	Chromium	2.4			P
7440-48-4	Cobalt	0.26	U		P
7440-50-8	Copper	35.6			P
7439-89-6	Iron	2280			P
7439-92-1	Lead	2260			P
7439-95-4	Magnesium	55400			P
7439-96-5	Manganese	251			P
7439-97-6	Mercury	0.95		~~N*~~ JL	CV
7440-02-0	Nickel	4.7	J B		P
7440-09-7	Potassium	64.4	J B	~~E~~ ~~JK~~	P
7782-49-2	Selenium	0.83	U		P
7440-22-4	Silver	0.56	J B		P
7440-23-5	Sodium	174	J B	~~E~~ ~~JK~~	P
7440-28-0	Thallium	1.7	U		P
7440-62-2	Vanadium	8.6	J B		P
7440-66-6	Zinc	11700			P
	Cyanide				NR

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJ00BD

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG30

Matrix (soil/water): SOIL Lab Sample ID: 1207R-04S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 94.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	150			P
7440-36-0	Antimony	0.77	U		P
7440-38-2	Arsenic	15.1			P
7440-39-3	Barium	4.9	JB		P
7440-41-7	Beryllium	0.13	~~B~~	U	P
7440-43-9	Cadmium	44.5			P
7440-70-2	Calcium	101000			P
7440-47-3	Chromium	5.8			P
7440-48-4	Cobalt	0.30	JB		P
7440-50-8	Copper	42.1			P
7439-89-6	Iron	2760			P
7439-92-1	Lead	929			P
7439-95-4	Magnesium	49500			P
7439-96-5	Manganese	240			P
7439-97-6	Mercury	1.3		~~N*~~ JL	CV
7440-02-0	Nickel	9.9			P
7440-09-7	Potassium	64.3	JB	~~E~~ JKMV	P
7782-49-2	Selenium	0.83	U		P
7440-22-4	Silver	0.50	JB		P
7440-23-5	Sodium	124	JB	~~E~~ JKMV	P
7440-28-0	Thallium	1.7	U		P
7440-62-2	Vanadium	17.3			P
7440-66-6	Zinc	14600			P
	Cyanide				NR

11/07/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJ00BE

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG30

Matrix (soil/water): SOIL Lab Sample ID: 1207R-05S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 93.7

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	126			P
7440-36-0	Antimony	0.83	~~B~~	U	P
7440-38-2	Arsenic	13.6			P
7440-39-3	Barium	6.2	J B		P
7440-41-7	Beryllium	0.14	~~B~~	U	P
7440-43-9	Cadmium	49.6			P
7440-70-2	Calcium	113000			P
7440-47-3	Chromium	5.8			P
7440-48-4	Cobalt	0.41	J B		P
7440-50-8	Copper	91.5			P
7439-89-6	Iron	3770			P
7439-92-1	Lead	2130			P
7439-95-4	Magnesium	60000			P
7439-96-5	Manganese	299			P
7439-97-6	Mercury	1.7		~~N*~~ JL	CV
7440-02-0	Nickel	10.0			P
7440-09-7	Potassium	64.3	J B	~~B~~ JKMW	P
7782-49-2	Selenium	1.1			P
7440-22-4	Silver	0.60	J B		P
7440-23-5	Sodium	155	J B	~~E~~ JKMW	P
7440-28-0	Thallium	1.7	U		P
7440-62-2	Vanadium	15.9			P
7440-66-6	Zinc	15900			P
	Cyanide				NR

12/27/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJ00BF

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG30

Matrix (soil/water): SOIL Lab Sample ID: 1207R-06S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 93.4

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	760			P
7440-36-0	Antimony	0.77	U		P
7440-38-2	Arsenic	12.6			P
7440-39-3	Barium	30.5	JB		P
7440-41-7	Beryllium	0.15	~~B~~	4	P
7440-43-9	Cadmium	30.0			P
7440-70-2	Calcium	104000			P
7440-47-3	Chromium	10.6			P
7440-48-4	Cobalt	1.2	JB		P
7440-50-8	Copper	858			P
7439-89-6	Iron	5100			P
7439-92-1	Lead	921			P
7439-95-4	Magnesium	47800			P
7439-96-5	Manganese	277			P
7439-97-6	Mercury	0.34		~~N*~~ JL	CV
7440-02-0	Nickel	12.4			P
7440-09-7	Potassium	112	JB	~~E~~ JKMW	P
7782-49-2	Selenium	0.84	U		P
7440-22-4	Silver	0.49	JB		P
7440-23-5	Sodium	145	JB	~~E~~ JKMW	P
7440-28-0	Thallium	1.7	U		P
7440-62-2	Vanadium	17.5			P
7440-66-6	Zinc	11100			P
	Cyanide				NR

11/27/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJ00BG

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG30

Matrix (soil/water): SOIL Lab Sample ID: 1207R-11S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 94.2

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	264			P
7440-36-0	Antimony	1.2	~~B~~	U	P
7440-38-2	Arsenic	12.1			P
7440-39-3	Barium	69.7			P
7440-41-7	Beryllium	0.15	~~B~~	U	P
7440-43-9	Cadmium	28.1			P
7440-70-2	Calcium	106000			P
7440-47-3	Chromium	7.5			P
7440-48-4	Cobalt	0.44	JB		P
7440-50-8	Copper	38.0			P
7439-89-6	Iron	3240			P
7439-92-1	Lead	9520			P
7439-95-4	Magnesium	55600			P
7439-96-5	Manganese	265			P
7439-97-6	Mercury	0.92		~~N*~~ JL	CV
7440-02-0	Nickel	9.0			P
7440-09-7	Potassium	80.7	JB	~~E~~ JKMW	P
7782-49-2	Selenium	1.3			P
7440-22-4	Silver	1.3	JB		P
7440-23-5	Sodium	142	JB	~~E~~ JKMW	P
7440-28-0	Thallium	1.6	U		P
7440-62-2	Vanadium	18.9			P
7440-66-6	Zinc	10300			P
	Cyanide				NR

12/18/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJ00BH

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG30

Matrix (soil/water): SOIL Lab Sample ID: 1207R-08S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 78.7

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11300			P
7440-36-0	Antimony	1.1	~~B~~	U	P
7440-38-2	Arsenic	13.5			P
7440-39-3	Barium	109			P
7440-41-7	Beryllium	0.45	~~B~~	U	P
7440-43-9	Cadmium	19.9			P
7440-70-2	Calcium	52800			P
7440-47-3	Chromium	13.9			P
7440-48-4	Cobalt	6.8	JB		P
7440-50-8	Copper	67.0			P
7439-89-6	Iron	19500			P
7439-92-1	Lead	1970			P
7439-95-4	Magnesium	19000			P
7439-96-5	Manganese	784			P
7439-97-6	Mercury	0.83		~~N*~~ JL	CV
7440-02-0	Nickel	16.6			P
7440-09-7	Potassium	1160	JB	~~E JKMW~~	P
7782-49-2	Selenium	1.7			P
7440-22-4	Silver	0.84	JB		P
7440-23-5	Sodium	179	JB	~~E JKMW~~	P
7440-28-0	Thallium	2.3	JB		P
7440-62-2	Vanadium	24.3			P
7440-66-6	Zinc	6390			P
	Cyanide				NR

11/27/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJ00BP

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG30

Matrix (soil/water): SOIL Lab Sample ID: 1207R-09S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 87.7

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	391			P
7440-36-0	Antimony	0.82	U		P
7440-38-2	Arsenic	5.2			P
7440-39-3	Barium	6.8	J B		P
7440-41-7	Beryllium	0.23	~~B~~	U	P
7440-43-9	Cadmium	0.18	J B		P
7440-70-2	Calcium	150000			P
7440-47-3	Chromium	1.1	J B		P
7440-48-4	Cobalt	0.57	J B		P
7440-50-8	Copper	7.7			P
7439-89-6	Iron	4290			P
7439-92-1	Lead	349			P
7439-95-4	Magnesium	95000			P
7439-96-5	Manganese	166			P
7439-97-6	Mercury	~~0.06~~	~~U~~	~~N*~~ R	CV
7440-02-0	Nickel	3.1	J B		P
7440-09-7	Potassium	97.5	J B	~~E~~ JKMV	P
7782-49-2	Selenium	0.89	U		P
7440-22-4	Silver	0.28	J B		P
7440-23-5	Sodium	188	J B	~~E~~ JKMV	P
7440-28-0	Thallium	1.8	U		P
7440-62-2	Vanadium	1.8	J B		P
7440-66-6	Zinc	173			P
	Cyanide				NR

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJ00BR

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG30

Matrix (soil/water): SOIL Lab Sample ID: 1207R-10S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 77.4

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	5320			P
7440-36-0	Antimony	0.93	U		P
7440-38-2	Arsenic	4.8			P
7440-39-3	Barium	65.3			P
7440-41-7	Beryllium	0.37	~~B~~	U	P
7440-43-9	Cadmium	1.4			P
7440-70-2	Calcium	28300			P
7440-47-3	Chromium	9.5			P
7440-48-4	Cobalt	4.3	J B		P
7440-50-8	Copper	28.2			P
7439-89-6	Iron	10700			P
7439-92-1	Lead	827			P
7439-95-4	Magnesium	16900			P
7439-96-5	Manganese	269			P
7439-97-6	Mercury	0.07	J B	~~N* J~~	CV
7440-02-0	Nickel	10.2	J B		P
7440-09-7	Potassium	903	J B	~~E J~~	P
7782-49-2	Selenium	1.0	U		P
7440-22-4	Silver	0.46	J B		P
7440-23-5	Sodium	146	J B	~~E J~~	P
7440-28-0	Thallium	2.1	U		P
7440-62-2	Vanadium	14.5			P
7440-66-6	Zinc	1090			P
	Cyanide				NR

11/21/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJ00BT

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG30

Matrix (soil/water): SOIL Lab Sample ID: 1207R-07S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 82.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	2390			P
7440-36-0	Antimony	0.87	U		P
7440-38-2	Arsenic	7.4			P
7440-39-3	Barium	25.9	JB		P
7440-41-7	Beryllium	0.21	~~B~~	4	P
7440-43-9	Cadmium	0.12	U		P
7440-70-2	Calcium	123000			P
7440-47-3	Chromium	7.8			P
7440-48-4	Cobalt	2.1	JB		P
7440-50-8	Copper	9.3			P
7439-89-6	Iron	7180			P
7439-92-1	Lead	7.7			P
7439-95-4	Magnesium	72300			P
7439-96-5	Manganese	217			P
7439-97-6	Mercury	~~0.06~~	~~U~~	~~N*R~~	CV
7440-02-0	Nickel	5.8	JB		P
7440-09-7	Potassium	645	JB	~~E~~ JKMW	P
7782-49-2	Selenium	0.95	U		P
7440-22-4	Silver	0.24	JB		P
7440-23-5	Sodium	229	JB	~~E~~ JKMW	P
7440-28-0	Thallium	1.9	U		P
7440-62-2	Vanadium	10.6	JB		P
7440-66-6	Zinc	112			P
	Cyanide				NR

11/27/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG30

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG30

Matrix (soil/water): SOIL Lab Sample ID: 1207R-01S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 82.7

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1110			P
7440-36-0	Antimony	0.85	U		P
7440-38-2	Arsenic	15.7			P
7440-39-3	Barium	51.4			P
7440-41-7	Beryllium	0.17	~~B~~	U	P
7440-43-9	Cadmium	35.0			P
7440-70-2	Calcium	126000			P
7440-47-3	Chromium	8.3			P
7440-48-4	Cobalt	0.67	JB		P
7440-50-8	Copper	170			P
7439-89-6	Iron	4500			P
7439-92-1	Lead	3870			P
7439-95-4	Magnesium	56900			P
7439-96-5	Manganese	278			P
7439-97-6	Mercury	1.2		~~N*~~ JL	CV
7440-02-0	Nickel	12.1			P
7440-09-7	Potassium	308	JB	~~E~~ JKMV	P
7782-49-2	Selenium	1.1	JB		P
7440-22-4	Silver	1.0	JB		P
7440-23-5	Sodium	150	JB	~~E~~ JKMV	P
7440-28-0	Thallium	1.9	U		P
7440-62-2	Vanadium	21.9			P
7440-66-6	Zinc	11600			P
	Cyanide				NR

11/27/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG31

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG30

Matrix (soil/water): SOIL Lab Sample ID: 1207R-02S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 94.9

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	279			P
7440-36-0	Antimony	0.78	~~B~~	4	P
7440-38-2	Arsenic	11.9			P
7440-39-3	Barium	6.2	JB		P
7440-41-7	Beryllium	0.14	~~B~~	4	P
7440-43-9	Cadmium	58.4			P
7440-70-2	Calcium	116000			P
7440-47-3	Chromium	3.4			P
7440-48-4	Cobalt	0.34	JB		P
7440-50-8	Copper	46.8			P
7439-89-6	Iron	2670			P
7439-92-1	Lead	1670			P
7439-95-4	Magnesium	54900			P
7439-96-5	Manganese	260			P
7439-97-6	Mercury	1.5		~~N*~~ JL	CV
7440-02-0	Nickel	8.0	JB		P
7440-09-7	Potassium	79.6	JB	~~E~~ JKMN	P
7782-49-2	Selenium	1.1			P
7440-22-4	Silver	0.58	JB		P
7440-23-5	Sodium	150	JB	~~E~~ JKMN	P
7440-28-0	Thallium	1.7	U		P
7440-62-2	Vanadium	13.5			P
7440-66-6	Zinc	19100			P
	Cyanide				NR

11/07/00

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

IN REPLY
REFER TO: OEA-095 November 27, 2000

MEMORANDUM

SUBJECT: Grandview Mine, CLP Metals Analysis, Data Validation
Case: 28639
SDG: MJCG08

FROM: Laura Castrilli, Chemist
Quality Assurance and Data Unit, OEA

TO: Joanne Labaw, Site Assessment Manager
Office of Environmental Cleanup

CC: Bruce Woods, Region 10 CLP TPO
Mark Woodke, Ecology & Environment
Leatta Dahlhoff, Ecology & Environment

The following is a validation of ICP-AES and mercury analyses of ten water samples from the Grandview Mine site. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-Concentration, ILM04.1. Analyses were conducted by Chemtech Consulting Group, Englewood, New Jersey. This validation was conducted for the following samples:

MJ00BJ	MJ00BL	MJ00BQ	MJ00BW	MJCG10
MJ00BK	MJ00BN	MJ00BS	MJCG08	MJCG12

Data Qualifications

The following comments refer to the Chemtech Laboratory's performance in meeting quality control specifications outlined in the *CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM04.1.* The comments presented herein are based on the information provided for the review.

1.0 Timeliness - Acceptable

The technical (40 CFR part 136) holding time from the date of collection for mercury in water is 28 days. The holding time for the remaining metals in water is 180 days. The samples were collected between 10/23/00 and 10/25/00. ICP-AES analyses were completed on 11/01/00. Mercury analyses were completed on 11/02/00. All analyses were conducted within the technical water holding times, therefore no

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qualification was made on the basis of holding time.

2.0 Sample Preparation - Acceptable

The samples were prepared for mercury analyses on 10/31/00. The samples were prepared for ICP-AES analyses on 10/30/00. No qualification was made based on sample preparation.

3.0 Calibrations/Calibration Verifications - Acceptable

The samples were analyzed for mercury by CVAAS on 11/02/00. The initial calibration included one blank and five standards. The curve was linear with a correlation coefficient greater than 0.995.

The samples were analyzed by ICP-AES on 11/01/00. The instrument was standardized the day of analysis according to the analytical method using one blank and a single calibration standard for each element.

All ICP-AES and CVAAS (mercury) calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Calibration verification samples are required before and after sample analysis and after every 10 samples during analysis. Mercury recoveries must be within 80-120%. Other metal recoveries must be within 90-110%.

All ICP-AES and CVAAS (mercury) calibration verification (initial and continuing) samples bracketing reported sample results met the frequency and recovery criteria; therefore no qualification was made based on ICP-AES or CVAAS calibration verification.

4.0 Laboratory Control Samples - Acceptable

Laboratory Control samples (LCS) are digested and analyzed along with the samples to verify the efficiency of laboratory procedures (LCS analyses are not required for mercury in water). All recoveries associated with reported sample results met the acceptance criteria for control samples, therefore no qualification was made based on LCS results.

5.0 Blanks -

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified if the analyte concentration was less than five times the analytical value in the blank.

Aluminum, beryllium, calcium, cobalt, copper, magnesium, manganese, and sodium were detected in the preparation blank. Aluminum,

antimony, barium, beryllium, calcium, magnesium, manganese, potassium, silver, and sodium were detected in one or more continuing calibration blanks (CCBs). Based on blank contamination, the following qualifications were made:

- aluminum in samples MJ00BS and MJ00BW was qualified 'U', undetected
- antimony in samples MJ00BJ, MJ00BN, MJ00BW, and MJCG08 was qualified 'U', undetected
- barium in sample MJ00BL was qualified 'U', undetected
- beryllium in all samples was qualified 'U', undetected
- potassium in sample MJ00BL was qualified 'U', undetected
- silver in all samples was qualified 'U', undetected
- sodium in sample MJ00BL was qualified 'U', undetected

The remaining sample results were greater than five times the associated blank levels (or were already undetected) and were not qualified on this basis.

6.0 ICP-AES Interference Check Sample - Acceptable

The interference check sample (ICS) is analyzed by ICP-AES to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run and recoveries must be between 80% and 120%. All ICS recoveries associated with reported sample results were within the recovery criterion.

None of the samples had interfering levels of metals, therefore no qualification was made based on interference.

7.0 Duplicate Analysis - Acceptable

Duplicate analysis was done on sample MJ00BS. Water duplicate results were within the ±20% Relative Percent Difference (RPD) or ±CRDL criteria for water results < 5 times the CRDL criteria, therefore no qualification was made based on duplicate results.

8.0 Matrix Spike Analysis -

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%.

Matrix spike analysis was done on sample MJ00BS. All matrix spike recoveries were within the required QC limits; therefore no

qualification was made based on matrix spike recovery.

9.0 ICP-AES Serial Dilution - Acceptable

Sample MJ00BS was analyzed by ICP-AES serial dilution to check for potential interferences. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) were within the 10%D criteria; therefore no qualification was made on this basis

10.0 Detection Limits - Acceptable

Sample results which fall below the instrument detection limit (IDL) are assigned the value of the instrument detection limit and the 'U' qualifier is attached.

Contract Required Detection Limit (CRDL) standards are required for most analytes to demonstrate a linear calibration curve near the CRDL. CRDL standards were run at the required frequency.

11.0 Overall Assessment of the Data

This validation of the data is based on the criteria outlined in the *National Functional Guidelines for Inorganic Data Review (02/94)*. Approximately 13% of the data was qualified based on blank contamination.

Note to electronic data users: be advised that the sampling date entered into/evaluated by the Computer Assistant Data Review Expert (CADRE) software for sample MJCG10 is 10/25/00. The sampling date hand recorded on the traffic report/chain of custody form appears to be 10/23/00. A data entry technician should confirm that the correct sampling date is present in the spreadsheet/database used to officially store/report validated project data.

Below are the definitions for the National Functional Guidelines for Inorganic Data Review (02/94) qualifiers used when validating/qualifying data from Inorganic analysis.

DATA QUALIFIERS

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

J - The associated value is an estimated quantity.

R - The data are unusable. (Note: Analyte may or may not be present.)

UJ - The material was analyzed for, but was not detected. The

associated value is an estimate and may be inaccurate or imprecise.

At the request of the site assessment manager, bias for the data was qualitatively assessed and if applicable, the following additional qualifiers were applied:

L - Low bias.

H - High bias.

K - Unknown Bias.

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJ00BJ

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG08

Matrix (soil/water): WATER Lab Sample ID: 1206R-04S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	69.8	JB		P
7440-36-0	Antimony	4.0	~~B~~	U	P
7440-38-2	Arsenic	23.4			P
7440-39-3	Barium	125	JB		P
7440-41-7	Beryllium	0.26	~~B~~	U	P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	102000			P
7440-47-3	Chromium	0.70	U		P
7440-48-4	Cobalt	1.2	U		P
7440-50-8	Copper	8.0	JB		P
7439-89-6	Iron	1350			P
7439-92-1	Lead	2.3	U		P
7439-95-4	Magnesium	30800			P
7439-96-5	Manganese	245			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	2.0	JB		P
7440-09-7	Potassium	2820	JB		P
7782-49-2	Selenium	5.1			P
7440-22-4	Silver	1.4	~~B~~	U	P
7440-23-5	Sodium	5910			P
7440-28-0	Thallium	8.0	U		P
7440-62-2	Vanadium	0.80	U		P
7440-66-6	Zinc	125			P
	Cyanide				NR

11/22/00

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJ00BK

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG08

Matrix (soil/water): WATER Lab Sample ID: 1206R-05S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	61.4	J B		P
7440-36-0	Antimony	3.6	U		P
7440-38-2	Arsenic	22.4			P
7440-39-3	Barium	125	J B		P
7440-41-7	Beryllium	0.27	~~B~~	U	P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	99800			P
7440-47-3	Chromium	0.79	J B		P
7440-48-4	Cobalt	1.2	U		P
7440-50-8	Copper	8.6	J B		P
7439-89-6	Iron	1630			P
7439-92-1	Lead	2.3	U		P
7439-95-4	Magnesium	30200			P
7439-96-5	Manganese	241			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	3.0	J B		P
7440-09-7	Potassium	2770	J B		P
7782-49-2	Selenium	3.9	U		P
7440-22-4	Silver	0.90	~~B~~	U	P
7440-23-5	Sodium	5740			P
7440-28-0	Thallium	8.0	U		P
7440-62-2	Vanadium	0.80	U		P
7440-66-6	Zinc	85.2			P
	Cyanide				NR

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EPA SAMPLE #

INORGANIC ANALYSIS DATA SHEET

MJ00BL

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG08

Matrix (soil/water): WATER Lab Sample ID: 1206R-06S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	70.7	J B		P
7440-36-0	Antimony	3.6	U		P
7440-38-2	Arsenic	7.4	U		P
7440-39-3	Barium	0.44	~~B~~	u	P
7440-41-7	Beryllium	0.20	~~B~~	u	P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	497	J B		P
7440-47-3	Chromium	0.70	U		P
7440-48-4	Cobalt	1.2	U		P
7440-50-8	Copper	8.0	J B		P
7439-89-6	Iron	99.8	J B		P
7439-92-1	Lead	3.4			P
7439-95-4	Magnesium	171	J B		P
7439-96-5	Manganese	3.6	J B		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	2.6	J B		P
7440-09-7	Potassium	52.5	~~B~~	u	P
7782-49-2	Selenium	3.9	U		P
7440-22-4	Silver	1.0	~~B~~	u	P
7440-23-5	Sodium	227	~~B~~	u	P
7440-28-0	Thallium	8.0	U		P
7440-62-2	Vanadium	0.80	U		P
7440-66-6	Zinc	65.6			P
	Cyanide				NR

Lab blank

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Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJ00BN

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG08

Matrix (soil/water): WATER Lab Sample ID: 1206R-07S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	90.8	B		P
7440-36-0	Antimony	5.3	~~B~~	U	P
7440-38-2	Arsenic	9.8	B		P
7440-39-3	Barium	64.3	B		P
7440-41-7	Beryllium	0.28	~~B~~	U	P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	22100			P
7440-47-3	Chromium	0.70	U		P
7440-48-4	Cobalt	1.2	U		P
7440-50-8	Copper	10.7	B		P
7439-89-6	Iron	34.1	B		P
7439-92-1	Lead	2.3	U		P
7439-95-4	Magnesium	5760			P
7439-96-5	Manganese	4.5	B		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	2.2	B		P
7440-09-7	Potassium	576	B		P
7782-49-2	Selenium	3.9	U		P
7440-22-4	Silver	1.2	~~B~~	U	P
7440-23-5	Sodium	2430	B		P
7440-28-0	Thallium	8.0	U		P
7440-62-2	Vanadium	0.80	U		P
7440-66-6	Zinc	14.8	B		P
	Cyanide				NR

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJ00BQ

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG08

Matrix (soil/water): WATER Lab Sample ID: 1206R-08S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	98.9	JB		P
7440-36-0	Antimony	3.6	U		P
7440-38-2	Arsenic	7.9	JB		P
7440-39-3	Barium	63.9	JB		P
7440-41-7	Beryllium	0.30	~~B~~	U	P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	21900			P
7440-47-3	Chromium	0.70	U		P
7440-48-4	Cobalt	1.2	U		P
7440-50-8	Copper	13.2	JB		P
7439-89-6	Iron	38.3	JB		P
7439-92-1	Lead	2.3	U		P
7439-95-4	Magnesium	5700			P
7439-96-5	Manganese	5.0	JB		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	2.4	JB		P
7440-09-7	Potassium	594	JB		P
7782-49-2	Selenium	3.9	U		P
7440-22-4	Silver	1.2	~~B~~	U	P
7440-23-5	Sodium	2470	JB		P
7440-28-0	Thallium	8.0	U		P
7440-62-2	Vanadium	0.80	U		P
7440-66-6	Zinc	15.4	JB		P
	Cyanide				NR

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJ00BS

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG08

Matrix (soil/water): WATER Lab Sample ID: 1206R-09S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	75.1	~~B~~	U	P
7440-36-0	Antimony	3.6	U		P
7440-38-2	Arsenic	9.5	~~B~~ J		P
7440-39-3	Barium	62.4	~~B~~ J		P
7440-41-7	Beryllium	0.30	~~B~~	U	P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	21400			P
7440-47-3	Chromium	0.70	U		P
7440-48-4	Cobalt	1.2	U		P
7440-50-8	Copper	12.6	~~B~~ J		P
7439-89-6	Iron	20.7	~~B~~ J		P
7439-92-1	Lead	2.3	U		P
7439-95-4	Magnesium	5570			P
7439-96-5	Manganese	4.4	~~B~~ J		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	2.2	~~B~~ J		P
7440-09-7	Potassium	577	~~B~~ J		P
7782-49-2	Selenium	3.9	U		P
7440-22-4	Silver	1.1	~~B~~	U	P
7440-23-5	Sodium	2430	~~B~~ J		P
7440-28-0	Thallium	8.0	U		P
7440-62-2	Vanadium	0.80	U		P
7440-66-6	Zinc	19.2	~~B~~ J		P
	Cyanide				NR

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EPA SAMPLE #

INORGANIC ANALYSIS DATA SHEET

MJ00BW

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG08

Matrix (soil/water): WATER Lab Sample ID: 1206R-10S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	51.9	~~B~~	U	P
7440-36-0	Antimony	3.7	~~B~~	U	P
7440-38-2	Arsenic	7.4	U		P
7440-39-3	Barium	52.8	J B		P
7440-41-7	Beryllium	0.38	~~B~~	U	P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	99100			P
7440-47-3	Chromium	0.70	U		P
7440-48-4	Cobalt	1.2	U		P
7440-50-8	Copper	12.2	J B		P
7439-89-6	Iron	201			P
7439-92-1	Lead	2.3	U		P
7439-95-4	Magnesium	15700			P
7439-96-5	Manganese	19.1			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	3.0	J B		P
7440-09-7	Potassium	1140	J B		P
7782-49-2	Selenium	3.9	U		P
7440-22-4	Silver	1.4	~~B~~	U	P
7440-23-5	Sodium	2970	J B		P
7440-28-0	Thallium	10.4			P
7440-62-2	Vanadium	0.80	U		P
7440-66-6	Zinc	32.5			P
	Cyanide				NR

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG08

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG08

Matrix (soil/water): WATER Lab Sample ID: 1206R-01S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	393			P
7440-36-0	Antimony	5.1	~~B~~	U	P
7440-38-2	Arsenic	10.3			P
7440-39-3	Barium	53.1	J B		P
7440-41-7	Beryllium	0.22	~~B~~	U	P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	70500			P
7440-47-3	Chromium	0.70	U		P
7440-48-4	Cobalt	1.2	U		P
7440-50-8	Copper	9.1	J B		P
7439-89-6	Iron	253			P
7439-92-1	Lead	105			P
7439-95-4	Magnesium	18300			P
7439-96-5	Manganese	11.2	J B		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	2.8	J B		P
7440-09-7	Potassium	3250	J B		P
7782-49-2	Selenium	4.6	J B		P
7440-22-4	Silver	1.4	~~B~~	U	P
7440-23-5	Sodium	3720	J B		P
7440-28-0	Thallium	8.0	U		P
7440-62-2	Vanadium	2.4	J B		P
7440-66-6	Zinc	117			P
	Cyanide				NR

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG10

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG08

Matrix (soil/water): WATER Lab Sample ID: 1206R-02S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1540			P
7440-36-0	Antimony	3.6	U		P
7440-38-2	Arsenic	8.7	J B		P
7440-39-3	Barium	80.4	J B		P
7440-41-7	Beryllium	0.32	~~B~~	U	P
7440-43-9	Cadmium	1.5	J B		P
7440-70-2	Calcium	84500			P
7440-47-3	Chromium	3.2	J B		P
7440-48-4	Cobalt	1.2	U		P
7440-50-8	Copper	23.1	J B		P
7439-89-6	Iron	2470			P
7439-92-1	Lead	1340			P
7439-95-4	Magnesium	21700			P
7439-96-5	Manganese	101			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	6.1	J B		P
7440-09-7	Potassium	2940	J B		P
7782-49-2	Selenium	6.7			P
7440-22-4	Silver	1.5	~~B~~	U	P
7440-23-5	Sodium	3930	J B		P
7440-28-0	Thallium	8.0	U		P
7440-62-2	Vanadium	8.2	J B		P
7440-66-6	Zinc	547			P
	Cyanide				NR

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE #

MJCG12

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-W0-0089

Lab Code: CHEM Case No.: 28639 SAS No.: SDG No.: MJCG08

Matrix (soil/water): WATER Lab Sample ID: 1206R-03S

Level (low/med): LOW Date Received: 10/27/00

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	528			P
7440-36-0	Antimony	3.6	U		P
7440-38-2	Arsenic	10.4			P
7440-39-3	Barium	56.1	JB		P
7440-41-7	Beryllium	0.25	~~B~~	U	P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	67300			P
7440-47-3	Chromium	1.4	JB		P
7440-48-4	Cobalt	1.2	U		P
7440-50-8	Copper	11.3	JB		P
7439-89-6	Iron	827			P
7439-92-1	Lead	37.7			P
7439-95-4	Magnesium	21700			P
7439-96-5	Manganese	46.1			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	3.4	JB		P
7440-09-7	Potassium	1970	JB		P
7782-49-2	Selenium	3.9	U		P
7440-22-4	Silver	1.5	~~B~~	U	P
7440-23-5	Sodium	5910			P
7440-28-0	Thallium	8.0	U		P
7440-62-2	Vanadium	2.7	JB		P
7440-66-6	Zinc	77.8			P
	Cyanide				NR

12/12/00

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

ecology and environment, inc.
International Specialists in the Environment

1500 Wells Fargo Center, 999 Third Avenue
Seattle, Washington 98104
Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: December 7, 2000

TO: Leatta Dahlhoff, START Project Manager, E & E, Seattle, WA

FROM: Mark Woodke, START Chemist, E & E, Seattle, WA MW

SUBJ: **Radiochemical Data Summary, Grandview Mine Site, Metaline Falls, Washington**

REF: TDD: 00-06-0001 PAN: EF-01-01-SI-DM

The data summary of sediment, soil and water samples collected from the Grandview Mine site located in Metaline, Washington, is been completed. Attached are the data packages as received from the National Air and Radiation Environmental Laboratory with the following modifications:

The "U" qualifier was applied to non-detected analytes; and

The "J" qualifier was applied to estimated quantities or estimated detection limits.

Qualifiers were applied based on statements in the data packages to enhance the usability of the data.

Data Qualifiers and Definitions

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

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

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intentionally left blank.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RADIATION AND INDOOR AIR
National Air and Radiation Environmental Laboratory
540 South Morris Avenue, Montgomery, AL 36115-2601
(334) 270-3400

RECEIVED
NOV 21 2000
Environmental Cleanup Office

November 20, 2000

MEMORANDUM

SUBJECT: Radiochemical Results for Grandview Mine Samples

FROM: John Griggs, Chief
Monitoring and Analytical Services Branch

TO: Joanne Labaw, Site Assessment Manager
Region 10

Attached is a data package for gamma analysis of water samples collected from the Grandview Mine site in Metaline Falls, Washington. The samples constitute NAREL batch number 0000082.

Radiochemical analyses usually require the subtraction of an instrument background measurement from a gross sample measurement. Both values are positive, but when the sample activity is low, random variations in the two measurements can cause the gross value to be less than the background, resulting in a measured activity less than zero. Although negative activities have no physical significance, they do have statistical significance, as for example in the evaluation of trends or the comparison of two groups of samples.

For all analyses except gamma spectroscopy, it is the policy of NAREL to report results as generated, whether positive, negative, or zero, together with the 2-sigma measurement uncertainty and a sample-specific estimate of the minimum detectable concentration (MDC). The activity, uncertainty, and MDC are given in the same units. The activity and 2-sigma uncertainty for a radionuclide measured by gamma spectroscopy are reported only if the nuclide is detected; so, the results of gamma analyses are never zero or negative. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226, and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected," or "ND;" and provides a sample-specific estimate of the MDC.

Specific information concerning all aspects of the radiological analysis of the samples is contained in the batch case narratives of the data packages. If you have any questions concerning the analytical results, please contact me at (334)270-3450.

Attachments

cc: Jerry Leitch, Region 10, w/o attachments
Mary Clark, (6601J), w/o attachments
Ed Sensintaffar, NAREL

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES

REPORT OF SAMPLE DELIVERY GROUP #0000082

Project: GRANDVIEW MINE
Analysis Procedure: Gamma spectroscopy
Date Reported: 11/20/2000

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A0.06012G	US-01-SW	SAM	WATER	10/23/2000	10/27/2000
A0.06014J	US-02-SW	SAM	WATER	10/23/2000	10/27/2000
A0.06016L	US-03-SW	SAM	WATER	10/23/2000	10/27/2000
A0.06042N	PO-01-GW	SAM	WATER	10/24/2000	10/27/2000
A0.06043P	PO-02-GW	SAM	WATER	10/24/2000	10/27/2000
A0.06044Q	GW-RS-01	SAM	WATER	10/24/2000	10/27/2000
A0.06049W	BK-02-SW	SAM	WATER	10/25/2000	10/27/2000
A0.06050N	PR-02-SW	SAM	WATER	10/25/2000	10/27/2000
A0.06051P	PR-01-SW	SAM	WATER	10/25/2000	10/27/2000
A0.06052Q	BK-03-GW	SAM	WATER	10/26/2000	10/27/2000

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria except the ^{214}Bi and ^{214}Pb results on the analysis of the duplicate.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Mary F. Wisdom 11/20/00

Mary F. Wisdom — Date
Quality Assurance Coordinator

John Griggs 11/20/00

John Griggs, Ph.D. — Date
Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "*Z* scores." A *Z* score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The *Z* score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The *Z* score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the *Z* score is computed.

Each standard uncertainty used to compute a *Z* score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Th-234, Pa-234m, Ra-226, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000082

ANALYSIS SUMMARY

Analysis Procedure: GAMMA
Title: Gamma spectroscopy

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A0.06012G		N/A	10/30/2000	0005002Z	0001822C
A0.06014J		N/A	11/18/2000	0005106G	0001822C
A0.06016L		N/A	10/31/2000	0005002Z	0001822C
A0.06042N		N/A	10/31/2000	0005002Z	0001822C
A0.06042N	DUP	N/A	11/15/2000	0005002Z	0001822C
A0.06043P		N/A	10/31/2000	0005002Z	0001822C
A0.06044Q		N/A	10/31/2000	0005002Z	0001822C
A0.06049W		N/A	11/01/2000	0005002Z	0001822C
A0.06050N		N/A	11/14/2000	0005071N	0001822C
A0.06051P		N/A	11/10/2000	0005050H	0001822C
A0.06052Q		N/A	11/10/2000	0005050H	0001822C

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000082

SAMPLE ANALYSIS REPORT

Sample #:	A0.06012G	QC batch #:	0001822C
Matrix:	WATER	Prep batch #:	0005002Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/30/2000 14:56	300.0	GE14	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.5e+01 UJ	PCI/L	10/23/2000
Bi214	1.94e+01 J	3.3e+00		PCI/L	10/23/2000
Co60	ND		2.7e+00 UJ	PCI/L	10/23/2000
Cs137	ND		3.2e+00	PCI/L	10/23/2000
I131	ND		6.0e+00	PCI/L	10/23/2000
K40	ND		2.7e+01	PCI/L	10/23/2000
Pb214	1.21e+01 J	3.6e+00		PCI/L	10/23/2000
Ra226	ND		8.9e+01 UJ	PCI/L	10/23/2000
Ra228	ND		9.0e+00 UJ	PCI/L	10/23/2000
Tl208	1.50e+00	1.7e+00		PCI/L	10/23/2000

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000082

SAMPLE ANALYSIS REPORT

Sample #:	A0.06014J	QC batch #:	0001822C
Matrix:	WATER	Prep batch #:	0005106G
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e+00 L	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/17/2000 12:34	1000.0	GE09	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		5.9e+01 UJ	PCI/L	10/23/2000
Co60	ND		5.0e+00	PCI/L	10/23/2000
Cs137	ND		4.3e+00	PCI/L	10/23/2000
I131	ND		3.8e+01	PCI/L	10/23/2000
K40	ND		5.7e+01	PCI/L	10/23/2000
Pb212	4.49e+00	5.8e+00		PCI/L	10/23/2000
Ra226	ND		7.6e+01 UJ	PCI/L	10/23/2000
Ra228	ND		1.6e+01 UJ	PCI/L	10/23/2000

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000082

SAMPLE ANALYSIS REPORT

Sample #:	A0.06016L	QC batch #:	0001822C
Matrix:	WATER	Prep batch #:	0005002Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/31/2000 01:01	300.0	GE14	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.7e+01 UJ	PCI/L	10/23/2000
Bi214	2.39e+01 J	3.5e+00		PCI/L	10/23/2000
Co60	ND		3.1e+00 UJ	PCI/L	10/23/2000
Cs137	ND		3.1e+00	PCI/L	10/23/2000
I131	ND		6.3e+00	PCI/L	10/23/2000
K40	ND		2.5e+01	PCI/L	10/23/2000
Pb212	3.76e+00	3.6e+00		PCI/L	10/23/2000
Pb214	2.15e+01 J	3.8e+00		PCI/L	10/23/2000
Ra226	ND		9.1e+01 UJ	PCI/L	10/23/2000
Ra228	ND		9.6e+00 UJ	PCI/L	10/23/2000
Tl208	1.48e+00	1.5e+00		PCI/L	10/23/2000

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000082

SAMPLE ANALYSIS REPORT

Sample #:	A0.06042N	QC batch #:	0001822C
Matrix:	WATER	Prep batch #:	0005002Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/31/2000 06:03	300.0	GE14	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		3.6e+01 UJ	PCI/L	10/24/2000
Bi214	1.34e+03 J	7.7e+01		PCI/L	10/24/2000
Co60	ND		6.5e+00 UJ	PCI/L	10/24/2000
Cs137	ND		8.9e+00	PCI/L	10/24/2000
I131	ND		1.3e+01	PCI/L	10/24/2000
K40	ND		5.8e+01	PCI/L	10/24/2000
Pb214	1.40e+03 J	8.0e+01		PCI/L	10/24/2000
Ra226	ND		2.4e+02 UJ	PCI/L	10/24/2000
Ra228	ND		2.2e+01 UJ	PCI/L	10/24/2000

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000082

SAMPLE ANALYSIS REPORT

Sample #:	A0.06042N	QC batch #:	0001822C
Matrix:	WATER	Prep batch #:	0005002Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e+00 L	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/14/2000 15:38	1000.0	GE05	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		5.0e+01 UJ	PCI/L	10/24/2000
Bi214	2.45e+01 J	7.6e+00		PCI/L	10/24/2000
Co60	ND		6.3e+00 UJ	PCI/L	10/24/2000
Cs137	ND		4.8e+00	PCI/L	10/24/2000
I131	ND		2.5e+01	PCI/L	10/24/2000
K40	ND		6.4e+01	PCI/L	10/24/2000
Pb214	1.98e+01 J	7.3e+00		PCI/L	10/24/2000
Ra226	ND		8.2e+01 UJ	PCI/L	10/24/2000
Ra228	ND		1.7e+01 UJ	PCI/L	10/24/2000

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GAMMA ANALYSES
SDG #0000082

SAMPLE ANALYSIS REPORT

Sample #:	A0.06043P	QC batch #:	0001822E
Matrix:	WATER	Prep batch #:	0005002Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/31/2000 11:07	300.0	GE14	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		3.2e+01 UJ	PCI/L	10/24/2000
Bi214	1.16e+03 J	6.7e+01		PCI/L	10/24/2000
Co60	ND		5.8e+00 UJ	PCI/L	10/24/2000
Cs137	ND		8.4e+00	PCI/L	10/24/2000
I131	ND		1.3e+01	PCI/L	10/24/2000
K40	ND		5.8e+01	PCI/L	10/24/2000
Pb214	1.20e+03 J	6.9e+01		PCI/L	10/24/2000
Ra226	ND		2.3e+02 UJ	PCI/L	10/24/2000
Ra228	ND		2.1e+01 UJ	PCI/L	10/24/2000

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000082

SAMPLE ANALYSIS REPORT

Sample #:	A0.06044Q	QC batch #:	0001822C
Matrix:	WATER	Prep batch #:	0005002Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/31/2000 16:10	300.0	GE14	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.6e+01 UJ	PCI/L	10/24/2000
Co60	ND		2.8e+00	PCI/L	10/24/2000
Cs137	ND		2.7e+00	PCI/L	10/24/2000
I131	ND		6.2e+00	PCI/L	10/24/2000
K40	1.21e+01	1.3e+01		PCI/L	10/24/2000
Ra226	ND		9.2e+01 UJ	PCI/L	10/24/2000
Ra228	ND		7.9e+00 UJ	PCI/L	10/24/2000
Tl208	1.74e+00	1.4e+00		PCI/L	10/24/2000

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000082

SAMPLE ANALYSIS REPORT

Sample #:	A0.06049W	QC batch #:	0001822C
Matrix:	WATER	Prep batch #:	0005002Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/31/2000 21:13	300.0	GE14	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.4e+01 UJ	PCI/L	10/25/2000
Bi214	7.66e+00 J	2.9e+00		PCI/L	10/25/2000
Co60	ND		2.8e+00 UJ	PCI/L	10/25/2000
Cs137	ND		2.8e+00	PCI/L	10/25/2000
I131	ND		5.8e+00	PCI/L	10/25/2000
K40	ND		2.6e+01	PCI/L	10/25/2000
Ra226	ND		9.1e+01	PCI/L	10/25/2000
Ra228	ND		9.1e+00	PCI/L	10/25/2000
Tl208	1.28e+00	1.5e+00		PCI/L	10/25/2000

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000082

SAMPLE ANALYSIS REPORT

Sample #:	A0.06050N	QC batch #:	0001822C
Matrix:	WATER	Prep batch #:	0005071N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e+00 L	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/13/2000 14:39	1000.0	GE11	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		3.4e+01 UJ	PCI/L	10/25/2000
Co60	ND		4.1e+00	PCI/L	10/25/2000
Cs137	ND		3.5e+00	PCI/L	10/25/2000
I131	ND		1.7e+01	PCI/L	10/25/2000
K40	ND		4.1e+01	PCI/L	10/25/2000
Ra226	ND		6.3e+01	PCI/L	10/25/2000
Ra228	ND		1.1e+01	PCI/L	10/25/2000

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000082

SAMPLE ANALYSIS REPORT

Sample #:	A0.06051P	QC batch #:	0001822C
Matrix:	WATER	Prep batch #:	0005050H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/09/2000 20:45	300.0	GE14	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		2.3e+01 UJ	PCI/L	10/25/2000
Co60	ND		2.9e+00	PCI/L	10/25/2000
Cs137	ND		3.0e+00	PCI/L	10/25/2000
I131	ND		1.2e+01	PCI/L	10/25/2000
K40	ND		2.8e+01	PCI/L	10/25/2000
Ra226	ND		8.7e+01	PCI/L	10/25/2000
Ra228	ND		8.8e+00	PCI/L	10/25/2000

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000082

SAMPLE ANALYSIS REPORT

Sample #:	A0.06052Q	QC batch #:	0001822C
Matrix:	WATER	Prep batch #:	0005050H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/10/2000 01:47	300.0	GE14	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		2.4e+01 UJ	PCI/L	10/26/2000
Bi214	2.82e+01 J	3.6e+00		PCI/L	10/26/2000
Co60	ND		2.8e+00 UJ	PCI/L	10/26/2000
Cs137	ND		3.1e+00	PCI/L	10/26/2000
I131	ND		1.2e+01	PCI/L	10/26/2000
K40	ND		2.2e+01	PCI/L	10/26/2000
Pb214	2.84e+01 J	4.1e+00		PCI/L	10/26/2000
Ra226	ND		8.7e+01 UJ	PCI/L	10/26/2000
Ra228	ND		1.0e+01 UJ	PCI/L	10/26/2000

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000082

QC BATCH SUMMARY

QC batch #: 0001822C
Preparation procedure: N/A
Analysis procedure: GAMMA

NAREL Sample #	QC Type	Yield (%)	± 2σ Uncertainty (%)	Analyst
A0.06012G		N/A		N/A
A0.06014J		N/A		N/A
A0.06016L		N/A		N/A
A0.06042N	DUP.	N/A		N/A
A0.06042N		N/A		N/A
A0.06043P		N/A		N/A
A0.06044Q		N/A		N/A
A0.06049W		N/A		N/A
A0.06050N		N/A		N/A
A0.06051P		N/A		N/A
A0.06052Q		N/A		N/A

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0001822C Analytical Procedure: GAMMA

LABORATORY DUPLICATES (PCI/L)

Sample ID	Nuclide	Original ± 2σ	Duplicate ± 2σ	RPD	Z
A0.06042N	BA140				
A0.06042N	BI214	1.34e+03 ± 7.7e+01	2.45e+01 ± 7.6e+00	192.82	**-21.28 LOW**
A0.06042N	CO60				
A0.06042N	CS137				
A0.06042N	I131				
A0.06042N	K40				
A0.06042N	PB214	1.40e+03 ± 8.0e+01	1.98e+01 ± 7.3e+00	194.42	**-21.43 LOW**
A0.06042N	RA226				
A0.06042N	RA228				

Analyst: N/A

QA Officer: Kirk McClure 11/16/00

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RADIATION AND INDOOR AIR
National Air and Radiation Environmental Laboratory
540 South Morris Avenue, Montgomery, AL 36115-2601
(334) 270-3400

RECEIVED
NOV 17 REC'D
Environmental Cleanup Office

November 16, 2000

MEMORANDUM

SUBJECT: Radiochemical Results for Grandview Mine Samples

FROM: John Griggs, Chief
Monitoring and Analytical Services Branch

TO: Joanne Labaw, Site Assessment Manager
Region 10

Attached are data packages for gamma analysis of soil and sediment samples collected from the Grandview Mine site in Metaline Falls, Washington. The samples constitute NAREL batch numbers 0000083, 0000084, and 0000085. The results of further analyses will be sent as they are completed.

Radiochemical analyses usually require the subtraction of an instrument background measurement from a gross sample measurement. Both values are positive, but when the sample activity is low, random variations in the two measurements can cause the gross value to be less than the background, resulting in a measured activity less than zero. Although negative activities have no physical significance, they do have statistical significance, as for example in the evaluation of trends or the comparison of two groups of samples.

For all analyses except gamma spectroscopy, it is the policy of NAREL to report results as generated, whether positive, negative, or zero, together with the 2-sigma measurement uncertainty and a sample-specific estimate of the minimum detectable concentration (MDC). The activity, uncertainty, and MDC are given in the same units. The activity and 2-sigma uncertainty for a radionuclide measured by gamma spectroscopy are reported only if the nuclide is detected; so, the results of gamma analyses are never zero or negative. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226, and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected," or "ND," and provides a sample-specific estimate of the MDC.

Specific information concerning all aspects of the radiological analysis of the samples is contained in the batch case narratives of the data packages. If you have any questions concerning the analytical results, please contact me at (334)270-3450.

Attachments

cc: Jerry Leitch, Region 10, w/o attachments
Mary Clark, (6601J), w/o attachments
Ed Sensintaffar, NAREL

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES

REPORT OF SAMPLE DELIVERY GROUP #0000084

Project: GRANDVIEW MINE
Analysis Procedure: Gamma spectroscopy
Date Reported: 11/15/2000

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A0.06018N	WP-01-SB	SAM	SOIL	10/23/2000	10/27/2000
A0.06019P	WP-02-SB	SAM	SOIL	10/23/2000	10/27/2000
A0.06020G	WP-03-SB	SAM	SOIL	10/23/2000	10/27/2000
A0.06021H	WP-04-SB	SAM	SOIL	10/23/2000	10/27/2000
A0.06022J	WP-05-SB	SAM	SOIL	10/23/2000	10/27/2000
A0.06023K	DA-01-SS	SAM	SOIL	10/23/2000	10/27/2000
A0.06024L	DA-02-SS	SAM	SOIL	10/23/2000	10/27/2000
A0.06025M	DA-03-SS	SAM	SOIL	10/23/2000	10/27/2000
A0.06026N	DA-04-SS	SAM	SOIL	10/23/2000	10/27/2000
A0.06027P	DA-05-SS	SAM	SOIL	10/23/2000	10/27/2000
A0.06028Q	DA-06-SS	SAM	SOIL	10/23/2000	10/27/2000
A0.06029R	FD-04-SS	SAM	SOIL	10/24/2000	10/27/2000
A0.06030J	FD-02-SS	SAM	SOIL	10/24/2000	10/27/2000

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

11-16-00

Mary F. Wisdom — Date
Quality Assurance Coordinator

11/16/00

John Griggs, Ph.D. — Date
Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "*Z* scores." A *Z* score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The *Z* score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The *Z* score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the *Z* score is computed.

Each standard uncertainty used to compute a *Z* score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Th-234, Pa-234m, Ra-226, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000084

ANALYSIS SUMMARY

Analysis Procedure: GAMMA
Title: Gamma spectroscopy

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A0.06018N		N/A	11/03/2000	0005020B	0001824E
A0.06019P		N/A	11/03/2000	0005020B	0001824E
A0.06020G		N/A	11/04/2000	0005020B	0001824E
A0.06020G	DUP	N/A	11/15/2000	0005079X	0001824E
A0.06021H		N/A	11/04/2000	0005020B	0001824E
A0.06022J		N/A	11/04/2000	0005020B	0001824E
A0.06023K		N/A	11/03/2000	0005020B	0001824E
A0.06024L		N/A	11/03/2000	0005020B	0001824E
A0.06025M		N/A	11/03/2000	0005020B	0001824E
A0.06026N		N/A	11/04/2000	0005020B	0001824E
A0.06027P		N/A	11/07/2000	0005020B	0001824E
A0.06028Q		N/A	11/03/2000	0005020B	0001824E
A0.06029R		N/A	11/04/2000	0005020B	0001824E
A0.06030J		N/A	11/08/2000	0005020B	0001824E

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000084

SAMPLE ANALYSIS REPORT

Sample #:	A0.06018N	QC batch #:	0001824E
Matrix:	SOIL	Prep batch #:	0005020B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.130e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/02/2000 14:22	1000.0	GE08	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.1e-01 UJ	PCI/GDRY	10/23/2000
Bi214		4.23e+00	2.5e-01		PCI/GDRY	10/23/2000
Co60		ND		4.8e-02 UJ	PCI/GDRY	10/23/2000
Cs137		6.59e-02	1.9e-02		PCI/GDRY	10/23/2000
I131		ND		7.6e-02 UJ	PCI/GDRY	10/23/2000
K40		2.09e+00 U	3.0e-01		PCI/GDRY	10/23/2000
Pa234m	*	4.80e+00 J	2.3e+00		PCI/GDRY	10/23/2000
Pb212		1.18e-01	3.8e-02		PCI/GDRY	10/23/2000
Pb214		4.90e+00	2.9e-01		PCI/GDRY	10/23/2000
Ra223		3.29e-01	9.4e-02		PCI/GDRY	10/23/2000
Ra226	*	1.11e+01 J	8.4e-01		PCI/GDRY	10/23/2000
Ra228		9.38e-02	5.7e-02		PCI/GDRY	10/23/2000
Rn219		2.75e-01	1.0e-01		PCI/GDRY	10/23/2000
Th227		4.00e-01	1.8e-01		PCI/GDRY	10/23/2000
Th234	*	4.11e+00 J	3.2e-01		PCI/GDRY	10/23/2000
Tl208		3.60e-02 U	2.0e-02		PCI/GDRY	10/23/2000
U235	*	6.54e-01 J	5.0e-02		PCI/GDRY	10/23/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000084

SAMPLE ANALYSIS REPORT

Sample #:	A0.06019P	QC batch #:	0001824E
Matrix:	SOIL	Prep batch #:	0005020B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.430e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/02/2000 14:22	1000.0	GE10	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		1.1e-01 UJ	PCI/GDRY	10/23/2000
Bi214		3.11e+00	1.8e-01		PCI/GDRY	10/23/2000
Co60		ND		2.4e-02 UJ	PCI/GDRY	10/23/2000
Cs137		1.89e-02	1.1e-02		PCI/GDRY	10/23/2000
I131		ND		4.5e-02 UJ	PCI/GDRY	10/23/2000
K40		1.33e+00 U	1.6e-01		PCI/GDRY	10/23/2000
Pa234m	*	5.12e+00 J	1.2e+00		PCI/GDRY	10/23/2000
Pb212		1.01e-01	2.3e-02		PCI/GDRY	10/23/2000
Pb214		3.45e+00	2.0e-01		PCI/GDRY	10/23/2000
Ra223		2.18e-01	5.9e-02		PCI/GDRY	10/23/2000
Ra226	*	5.48e+00 J	4.6e-01		PCI/GDRY	10/23/2000
Ra228		7.49e-02	3.0e-02		PCI/GDRY	10/23/2000
Rn219		2.14e-01	6.7e-02		PCI/GDRY	10/23/2000
Th227		2.78e-01	9.6e-02		PCI/GDRY	10/23/2000
Th234	*	3.01e+00 J	2.9e-01		PCI/GDRY	10/23/2000
Tl208		2.54e-02 U	1.1e-02		PCI/GDRY	10/23/2000
U235	*	1.61e-01 J	2.2e-02		PCI/GDRY	10/23/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000084

SAMPLE ANALYSIS REPORT

Sample #:	A0.06020G	QC batch #:	0001824E
Matrix:	SOIL	Prep batch #:	0005020B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.270e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/03/2000 15:09	1000.0	GE06	MHW

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		1.3e-01 UJ	PCI/GDRY	10/23/2000
Bi214		2.34e+00	1.4e-01		PCI/GDRY	10/23/2000
Co60		ND		2.4e-02 UJ	PCI/GDRY	10/23/2000
Cs137		ND		2.8e-02	PCI/GDRY	10/23/2000
I131		ND		5.3e-02	PCI/GDRY	10/23/2000
K40		3.45e+00 U	2.7e-01		PCI/GDRY	10/23/2000
Pa234m	*	4.78e+00 J	1.3e+00		PCI/GDRY	10/23/2000
Pb212		2.30e-01	2.7e-02		PCI/GDRY	10/23/2000
Pb214		2.61e+00	1.5e-01		PCI/GDRY	10/23/2000
Ra223		1.94e-01	5.7e-02		PCI/GDRY	10/23/2000
Ra226	*	3.01e+00 J	3.7e-01		PCI/GDRY	10/23/2000
Ra228		1.77e-01	3.2e-02		PCI/GDRY	10/23/2000
Th234	*	2.78e+00 J	3.0e-01		PCI/GDRY	10/23/2000
Tl208		6.54e-02 U	1.3e-02		PCI/GDRY	10/23/2000
U235	*	2.34e-01 J	2.4e-02		PCI/GDRY	10/23/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000084

SAMPLE ANALYSIS REPORT

Sample #:	A0.06021H	QC batch #:	0001824E
Matrix:	SOIL	Prep batch #:	0005020B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.100e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/03/2000 15:09	1000.0	GE07	MHW

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		1.2e-01 UJ	PCI/GDRY	10/23/2000
Bi212		1.23e-01	1.4e-01		PCI/GDRY	10/23/2000
Bi214		1.57e+00	9.7e-02		PCI/GDRY	10/23/2000
Co60		ND		2.2e-02 UJ	PCI/GDRY	10/23/2000
Cs137		ND		2.1e-02	PCI/GDRY	10/23/2000
I131		ND		4.3e-02	PCI/GDRY	10/23/2000
K40		1.72e+00 U	1.9e-01		PCI/GDRY	10/23/2000
Pa234m	*	2.38e+00 J	1.4e+00		PCI/GDRY	10/23/2000
Pb212		1.16e-01	2.3e-02		PCI/GDRY	10/23/2000
Pb214		1.78e+00	1.1e-01		PCI/GDRY	10/23/2000
Ra223		1.26e-01	4.9e-02		PCI/GDRY	10/23/2000
Ra226	*	1.17e+00 J	3.4e-01		PCI/GDRY	10/23/2000
Ra228		8.30e-02	3.2e-02		PCI/GDRY	10/23/2000
Rn219		1.32e-01	5.7e-02		PCI/GDRY	10/23/2000
Th234	*	2.07e+00 J	2.4e-01		PCI/GDRY	10/23/2000
Tl208		2.50e-02 U	1.2e-02		PCI/GDRY	10/23/2000
U235	*	1.80e-01 J	2.2e-02		PCI/GDRY	10/23/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000084

SAMPLE ANALYSIS REPORT

Sample #:	A0.06020G	QC batch #:	0001824E
Matrix:	SOIL	Prep batch #:	0005079X
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.270e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/14/2000 15:37	1000.0	GE02	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.9e-01 UJ	PCI/GDRY	10/23/2000
Bi214		2.48e+00	1.5e-01		PCI/GDRY	10/23/2000
Co60		ND		3.9e-02 UJ	PCI/GDRY	10/23/2000
Cs137		ND		3.6e-02	PCI/GDRY	10/23/2000
I131		ND		1.5e-01	PCI/GDRY	10/23/2000
K40		3.50e+00	3.6e-01		PCI/GDRY	10/23/2000
Pa234m	*	4.52e+00 J	2.0e+00		PCI/GDRY	10/23/2000
Pb212		2.02e-01	2.7e-02		PCI/GDRY	10/23/2000
Pb214		2.66e+00	1.6e-01		PCI/GDRY	10/23/2000
Ra226	*	2.62e+00 J	4.1e-01		PCI/GDRY	10/23/2000
Ra228		ND		1.1e-01 UJ	PCI/GDRY	10/23/2000
Th227		2.10e-01	8.5e-02		PCI/GDRY	10/23/2000
Th234	*	3.61e+00 J	3.3e-01		PCI/GDRY	10/23/2000
Tl208		6.03e-02	1.7e-02		PCI/GDRY	10/23/2000
U235	*	2.53e-01 J	2.7e-02		PCI/GDRY	10/23/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000084

SAMPLE ANALYSIS REPORT

Sample #:	A0.06022J	QC batch #:	0001824E
Matrix:	SOIL	Prep batch #:	0005020B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.870e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/03/2000 15:10	1000.0	GE10	MHW

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		1.1e-01 UJ	PCI/GDRY	10/23/2000
Bi214		1.50e+00	9.2e-02		PCI/GDRY	10/23/2000
Co60		ND		2.2e-02 UJ	PCI/GDRY	10/23/2000
Cs137		7.33e-02	1.2e-02		PCI/GDRY	10/23/2000
I131		ND		4.5e-02 UJ	PCI/GDRY	10/23/2000
K40		1.25e+00 U	1.6e-01		PCI/GDRY	10/23/2000
Pa234m	*	2.51e+00 J	1.0e+00		PCI/GDRY	10/23/2000
Pb212		7.09e-02	1.9e-02		PCI/GDRY	10/23/2000
Pb214		1.71e+00	1.0e-01		PCI/GDRY	10/23/2000
Ra223		1.84e-01	7.0e-02		PCI/GDRY	10/23/2000
Ra224		2.43e-01	2.7e-01		PCI/GDRY	10/23/2000
Ra226	*	4.19e+00 J	3.7e-01		PCI/GDRY	10/23/2000
Ra228		ND		6.9e-02 UJ	PCI/GDRY	10/23/2000
Th234	*	1.67e+00 J	2.2e-01		PCI/GDRY	10/23/2000
Tl208		1.58e-02 U	1.1e-02		PCI/GDRY	10/23/2000
U235	*	2.48e-01 J	2.2e-02		PCI/GDRY	10/23/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000084

SAMPLE ANALYSIS REPORT

Sample #:	A0.06023K	QC batch #:	0001824E
Matrix:	SOIL	Prep batch #:	0005020B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	6.900e+01 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/02/2000 14:22	1000.0	GE11	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.4e-01 UJ	PCI/GDRY	10/23/2000
Bi212		1.01e+00	3.0e-01		PCI/GDRY	10/23/2000
Bi214		2.28e+00	1.5e-01		PCI/GDRY	10/23/2000
Co60		ND		5.3e-02 UJ	PCI/GDRY	10/23/2000
Cs137		1.01e+00	7.0e-02		PCI/GDRY	10/23/2000
I131		ND		8.9e-02 UJ	PCI/GDRY	10/23/2000
K40		1.27e+01	8.9e-01		PCI/GDRY	10/23/2000
Pa234m	*	2.18e+00 J	2.8e+00		PCI/GDRY	10/23/2000
Pb212		1.27e+00	9.0e-02		PCI/GDRY	10/23/2000
Pb214		2.54e+00	1.6e-01		PCI/GDRY	10/23/2000
Ra223		2.21e-01	1.1e-01		PCI/GDRY	10/23/2000
Ra224		9.46e-01	5.9e-01		PCI/GDRY	10/23/2000
Ra226	*	7.11e+00 J	7.2e-01		PCI/GDRY	10/23/2000
Ra228		1.12e+00	9.7e-02		PCI/GDRY	10/23/2000
Th227		1.71e-01	1.3e-01		PCI/GDRY	10/23/2000
Th234	*	3.24e+00 J	4.4e-01		PCI/GDRY	10/23/2000
Tl208		3.49e-01	3.7e-02		PCI/GDRY	10/23/2000
U235	*	4.25e-01 J	4.3e-02		PCI/GDRY	10/23/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

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GAMMA ANALYSES
SDG #0000084

SAMPLE ANALYSIS REPORT

Sample #:	A0.06024L	QC batch #:	0001824E
Matrix:	SOIL	Prep batch #:	0005020B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	6.130e+01 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/02/2000 14:23	1000.0	GE12	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		4.0e-01 UJ	PCI/GDRY	10/23/2000
Bi212	1.27e+00	4.1e-01		PCI/GDRY	10/23/2000
Bi214	9.43e-01	1.1e-01		PCI/GDRY	10/23/2000
Co60	ND		7.4e-02 UJ	PCI/GDRY	10/23/2000
Cs137	1.03e+00	7.8e-02		PCI/GDRY	10/23/2000
I131	ND		1.3e-01 UJ	PCI/GDRY	10/23/2000
K40	1.33e+01	1.1e+00		PCI/GDRY	10/23/2000
Pb212	1.11e+00	1.0e-01		PCI/GDRY	10/23/2000
Pb214	1.05e+00	1.0e-01		PCI/GDRY	10/23/2000
Ra224	8.42e-01	8.6e-01		PCI/GDRY	10/23/2000
Ra226 *	1.45e+00 J	8.7e-01		PCI/GDRY	10/23/2000
Ra228	1.03e+00	1.1e-01		PCI/GDRY	10/23/2000
Tl208	3.52e-01	5.0e-02		PCI/GDRY	10/23/2000

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SAMPLE ANALYSIS REPORT

Sample #:	A0.06025M	QC batch #:	0001824E
Matrix:	SOIL	Prep batch #:	0005020B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.770e+01 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/02/2000 14:22	1000.0	GE05	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.4e-01 UJ	PCI/GDRY	10/23/2000
Bi212		3.35e-01	2.7e-01		PCI/GDRY	10/23/2000
Bi214		3.45e+00	2.2e-01		PCI/GDRY	10/23/2000
Co60		ND		5.3e-02 UJ	PCI/GDRY	10/23/2000
Cs137		3.17e-01	3.6e-02		PCI/GDRY	10/23/2000
I131		ND		8.6e-02 UJ	PCI/GDRY	10/23/2000
K40		1.61e+00	3.9e-01		PCI/GDRY	10/23/2000
Pa234m	*	1.07e+01 J	2.9e+00		PCI/GDRY	10/23/2000
Pb212		1.60e-01	4.7e-02		PCI/GDRY	10/23/2000
Pb214		3.86e+00	2.3e-01		PCI/GDRY	10/23/2000
Ra223		5.19e-01	1.2e-01		PCI/GDRY	10/23/2000
Ra226	*	6.11e+00 J	7.6e-01		PCI/GDRY	10/23/2000
Ra228		ND		1.8e-01 UJ	PCI/GDRY	10/23/2000
Rn219		4.01e-01	1.2e-01		PCI/GDRY	10/23/2000
Th227		4.66e-01	1.5e-01		PCI/GDRY	10/23/2000
Th234	*	4.96e+00 J	5.0e-01		PCI/GDRY	10/23/2000
Tl208		6.07e-02	2.9e-02		PCI/GDRY	10/23/2000
U235	*	3.48e-01 J	4.4e-02		PCI/GDRY	10/23/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

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SAMPLE ANALYSIS REPORT

Sample #:	A0.06026N	QC batch #:	0001824E
Matrix:	SOIL	Prep batch #:	0005020B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.290e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/03/2000 15:09	1000.0	GE02	MHW

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.4e-01 UJ	PCI/GDRY	10/23/2000
Bi214		2.48e+00	1.7e-01		PCI/GDRY	10/23/2000
Co60		ND		6.1e-02 UJ	PCI/GDRY	10/23/2000
Cs137		9.07e-01	6.9e-02		PCI/GDRY	10/23/2000
I131		ND		8.9e-02 UJ	PCI/GDRY	10/23/2000
K40		4.05e+00	5.4e-01		PCI/GDRY	10/23/2000
Pa234m	*	4.39e+00 J	3.1e+00		PCI/GDRY	10/23/2000
Pb212		3.32e-01	4.5e-02		PCI/GDRY	10/23/2000
Pb214		2.77e+00	1.7e-01		PCI/GDRY	10/23/2000
Ra226	*	2.56e+00 J	5.8e-01		PCI/GDRY	10/23/2000
Ra228		2.78e-01	6.9e-02		PCI/GDRY	10/23/2000
Th234	*	3.46e+00 J	4.3e-01		PCI/GDRY	10/23/2000
Tl208		9.03e-02	2.9e-02		PCI/GDRY	10/23/2000
U235	*	2.89e-01 J	3.6e-02		PCI/GDRY	10/23/2000

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SAMPLE ANALYSIS REPORT

Sample #:	A0.06027P	QC batch #:	0001824E
Matrix:	SOIL	Prep batch #:	0005020B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.220e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/06/2000 14:20	1000.0	GE02	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		3.9e-01 UJ	PCI/GDRY	10/23/2000
Bi214		6.45e+00	3.9e-01		PCI/GDRY	10/23/2000
Co60		ND		7.9e-02 UJ	PCI/GDRY	10/23/2000
Cs137		1.70e-01	3.6e-02		PCI/GDRY	10/23/2000
I131		ND		1.5e-01 UJ	PCI/GDRY	10/23/2000
K40		9.48e-01	4.8e-01		PCI/GDRY	10/23/2000
Pa234m	*	6.00e+00 J	3.9e+00		PCI/GDRY	10/23/2000
Pb212		7.76e-02	4.2e-02		PCI/GDRY	10/23/2000
Pb214		7.04e+00	4.1e-01		PCI/GDRY	10/23/2000
Ra223		5.54e-01	1.2e-01		PCI/GDRY	10/23/2000
Ra226	*	9.06e+00 J	9.5e-01		PCI/GDRY	10/23/2000
Ra228		ND		2.4e-01 UJ	PCI/GDRY	10/23/2000
Rn219		6.52e-01	1.6e-01		PCI/GDRY	10/23/2000
Th227		5.61e-01	1.8e-01		PCI/GDRY	10/23/2000
Th234	*	7.36e+00 J	6.0e-01		PCI/GDRY	10/23/2000
Tl208		2.49e-02	2.9e-02		PCI/GDRY	10/23/2000
U235	*	4.31e-01 J	5.2e-02		PCI/GDRY	10/23/2000

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GAMMA ANALYSES
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SAMPLE ANALYSIS REPORT

Sample #:	A0.06028Q	QC batch #:	0001824E
Matrix:	SOIL	Prep batch #:	0005020B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.010e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/02/2000 14:22	1000.0	GE09	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.4e-01 UJ	PCI/GDRY	10/23/2000
Bi212		9.07e-01	3.0e-01		PCI/GDRY	10/23/2000
Bi214		3.70e+00	2.3e-01		PCI/GDRY	10/23/2000
Co60		ND		5.2e-02 UJ	PCI/GDRY	10/23/2000
Cs137		5.99e-01	4.7e-02		PCI/GDRY	10/23/2000
I131		ND		9.3e-02 UJ	PCI/GDRY	10/23/2000
K40		9.23e+00	7.0e-01		PCI/GDRY	10/23/2000
Pa234m	*	8.25e+00 J	2.8e+00		PCI/GDRY	10/23/2000
Pb212		5.95e-01	5.8e-02		PCI/GDRY	10/23/2000
Pb214		4.04e+00	2.4e-01		PCI/GDRY	10/23/2000
Ra223		3.66e-01	1.1e-01		PCI/GDRY	10/23/2000
Ra226	*	9.98e+00 J	8.2e-01		PCI/GDRY	10/23/2000
Ra228		6.06e-01	7.6e-02		PCI/GDRY	10/23/2000
Th234	*	3.30e+00 J	4.5e-01		PCI/GDRY	10/23/2000
Tl208		1.87e-01	3.0e-02		PCI/GDRY	10/23/2000
U235	*	5.94e-01 J	4.9e-02		PCI/GDRY	10/23/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

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GAMMA ANALYSES
SDG #0000084

SAMPLE ANALYSIS REPORT

Sample #:	A0.06029R	QC batch #:	0001824E
Matrix:	SOIL	Prep batch #:	0005020B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.650e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/03/2000 15:09	1000.0	GE05	MHW

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.1e-01 UJ	PCI/GDRY	10/24/2000
Bi214		5.24e+00	3.1e-01		PCI/GDRY	10/24/2000
Co60		ND		4.7e-02 UJ	PCI/GDRY	10/24/2000
Cs137		2.16e-01	2.4e-02		PCI/GDRY	10/24/2000
I131		ND		7.2e-02 UJ	PCI/GDRY	10/24/2000
K40		1.81e+00	3.0e-01		PCI/GDRY	10/24/2000
Pa234m	*	8.89e+00 J	2.3e+00		PCI/GDRY	10/24/2000
Pb212		1.26e-01	3.4e-02		PCI/GDRY	10/24/2000
Pb214		5.68e+00	3.3e-01		PCI/GDRY	10/24/2000
Ra223		5.31e-01	9.3e-02		PCI/GDRY	10/24/2000
Ra226	*	1.03e+01 J	8.4e-01		PCI/GDRY	10/24/2000
Ra228		ND		1.4e-01 UJ	PCI/GDRY	10/24/2000
Rn219		5.82e-01	1.4e-01		PCI/GDRY	10/24/2000
Th227		5.03e-01	1.2e-01		PCI/GDRY	10/24/2000
Th234	*	6.27e+00 J	5.1e-01		PCI/GDRY	10/24/2000
Tl208		3.32e-02	1.9e-02		PCI/GDRY	10/24/2000
U235	*	4.12e-01 J	4.2e-02		PCI/GDRY	10/24/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

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GAMMA ANALYSES
SDG #0000084

SAMPLE ANALYSIS REPORT

Sample #:	A0.06030J	QC batch #:	0001824E
Matrix:	SOIL	Prep batch #:	0005020B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.440e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/07/2000 14:40	1000.0	GE02	DPS

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.8e-01 UJ	PCI/GDRY	10/24/2000
Bi214		4.11e+00	2.5e-01		PCI/GDRY	10/24/2000
Co60		ND		6.4e-02 UJ	PCI/GDRY	10/24/2000
Cs137		7.00e-02	2.4e-02		PCI/GDRY	10/24/2000
I131		ND		1.2e-01 UJ	PCI/GDRY	10/24/2000
K40		1.34e+00	3.6e-01		PCI/GDRY	10/24/2000
Pa234m	*	8.79e+00 J	3.0e+00		PCI/GDRY	10/24/2000
Pb212		6.50e-02	3.5e-02		PCI/GDRY	10/24/2000
Pb214		4.39e+00	2.6e-01		PCI/GDRY	10/24/2000
Ra223		3.24e-01	8.8e-02		PCI/GDRY	10/24/2000
Ra226	*	3.58e+00 J	6.3e-01		PCI/GDRY	10/24/2000
Ra228		ND		2.0e-01 UJ	PCI/GDRY	10/24/2000
Th234	*	5.55e+00 J	4.9e-01		PCI/GDRY	10/24/2000
Tl208		2.23e-02	2.5e-02		PCI/GDRY	10/24/2000
U235	*	5.23e-01 J	4.6e-02		PCI/GDRY	10/24/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000084

QC BATCH SUMMARY

QC batch #: 0001824E
Preparation procedure: N/A
Analysis procedure: GAMMA

NAREL Sample #	QC Type	Yield (%)	± 2σ Uncertainty (%)	Analyst
A0.06018N		N/A		N/A
A0.06019P		N/A		N/A
A0.06020G		N/A		N/A
A0.06020G	DUP	N/A		N/A
A0.06021H		N/A		N/A
A0.06022J		N/A		N/A
A0.06023K		N/A		N/A
A0.06024L		N/A		N/A
A0.06025M		N/A		N/A
A0.06026N		N/A		N/A
A0.06027P		N/A		N/A
A0.06028Q		N/A		N/A
A0.06029R		N/A		N/A
A0.06030J		N/A		N/A

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0001824E Analytical Procedure: GAMMA

LABORATORY DUPLICATES (PCI/GDRY)

Sample ID	Nuclide	Original ± 2σ	Duplicate ± 2σ	RPD	Z	
A0.06020G	BA140					
A0.06020G	BI214	2.34e+00 ± 1.4e-01	2.48e+00 ± 1.5e-01	5.81	0.70	OK
A0.06020G	CO60					
A0.06020G	CS137					
A0.06020G	I131					
A0.06020G	K40	3.45e+00 ± 2.7e-01	3.50e+00 ± 3.6e-01	1.44	0.15	OK
A0.06020G	PB212	2.30e-01 ± 2.7e-02	2.02e-01 ± 2.7e-02	12.96	-1.14	OK
A0.06020G	PB214	2.61e+00 ± 1.5e-01	2.66e+00 ± 1.6e-01	1.90	0.23	OK
A0.06020G	RA228	1.77e-01 ± 3.2e-02				
A0.06020G	TL208	6.54e-02 ± 1.3e-02	6.03e-02 ± 1.7e-02	8.11	-0.44	OK

Analyst: N/A

QA Officer: Rick McGhee 11/16/00

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES

REPORT OF SAMPLE DELIVERY GROUP #0000083

Project: GRANDVIEW MINE
Analysis Procedure: Gamma spectroscopy
Date Reported: 11/14/2000

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A0.06013H	US-01-SD	SAM	SEDIMENT	10/23/2000	10/27/2000
A0.06015K	US-02-SD	SAM	SEDIMENT	10/23/2000	10/27/2000
A0.06017M	US-03-SD	SAM	SEDIMENT	10/23/2000	10/27/2000
A0.06045R	BK-02-SD	SAM	SEDIMENT	10/25/2000	10/27/2000
A0.06046T	PR-01-SD	SAM	SEDIMENT	10/25/2000	10/27/2000
A0.06048V	PR-02-SD	SAM	SEDIMENT	10/25/2000	10/27/2000

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

11/16/00

for Mary F. Wisdom — Date
Quality Assurance Coordinator

11/16/00

John Griggs, Ph.D. — Date
Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "*Z* scores." A *Z* score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The *Z* score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The *Z* score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the *Z* score is computed.

Each standard uncertainty used to compute a *Z* score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Th-234, Pa-234m, Ra-226, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000083

ANALYSIS SUMMARY

Analysis Procedure: GAMMA
Title: Gamma spectroscopy

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A0.06013H		N/A	11/03/2000	0005020B	0001823D
A0.06015K		N/A	11/03/2000	0005020B	0001823D
A0.06017M		N/A	11/03/2000	0005020B	0001823D
A0.06045R		N/A	11/10/2000	0005056P	0001823D
A0.06045R	DUP	N/A	11/11/2000	0005056P	0001823D
A0.06046T		N/A	11/10/2000	0005056P	0001823D
A0.06048V		N/A	11/11/2000	0005056P	0001823D

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000083

SAMPLE ANALYSIS REPORT

Sample #:	A0.06013H	QC batch #:	0001823D
Matrix:	SEDIMENT	Prep batch #:	0005020B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.570e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/02/2000 14:21	1000.0	GE02	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.0e-01 UJ	PCI/GDRY	10/23/2000
Bi212		3.98e-01	2.4e-01		PCI/GDRY	10/23/2000
Bi214		2.65e+00	1.7e-01		PCI/GDRY	10/23/2000
Co60		ND		5.1e-02 UJ	PCI/GDRY	10/23/2000
Cs137		2.73e-01	3.1e-02		PCI/GDRY	10/23/2000
I131		ND		7.2e-02 UJ	PCI/GDRY	10/23/2000
K40		5.32e+00	5.4e-01		PCI/GDRY	10/23/2000
Pa234m	*	4.42e+00 J	2.9e+00		PCI/GDRY	10/23/2000
Pb212		3.15e-01	3.9e-02		PCI/GDRY	10/23/2000
Pb214		2.82e+00	1.7e-01		PCI/GDRY	10/23/2000
Ra226	*	7.91e+00 J	6.7e-01		PCI/GDRY	10/23/2000
Ra228		2.60e-01	5.6e-02		PCI/GDRY	10/23/2000
Th227		2.55e-01	1.2e-01		PCI/GDRY	10/23/2000
Th234	*	4.22e+00 J	4.8e-01		PCI/GDRY	10/23/2000
Tl208		9.41e-02	2.6e-02		PCI/GDRY	10/23/2000
U235	*	4.70e-01 J	4.0e-02		PCI/GDRY	10/23/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000083

SAMPLE ANALYSIS REPORT

Sample #:	A0.06015K	QC batch #:	0001823D
Matrix:	SEDIMENT	Prep batch #:	0005020B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.580e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/02/2000 14:22	1000.0	GE06	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		1.2e-01 UJ	PCI/GDRY	10/23/2000
Bi212		6.22e-01	1.4e-01		PCI/GDRY	10/23/2000
Bi214		1.44e+00	8.8e-02		PCI/GDRY	10/23/2000
Co60		ND		2.4e-02 UJ	PCI/GDRY	10/23/2000
Cs137		5.14e-02	1.2e-02		PCI/GDRY	10/23/2000
I131		ND		4.5e-02 UJ	PCI/GDRY	10/23/2000
K40		1.14e+01	7.0e-01		PCI/GDRY	10/23/2000
Pa234m	*	1.95e+00 J	1.2e+00		PCI/GDRY	10/23/2000
Pb212		5.88e-01	4.3e-02		PCI/GDRY	10/23/2000
Pb214		1.61e+00	9.6e-02		PCI/GDRY	10/23/2000
Ra226	*	3.23e+00 J	3.3e-01		PCI/GDRY	10/23/2000
Ra228		5.61e-01	4.6e-02		PCI/GDRY	10/23/2000
Th234	*	1.30e+00 J	2.3e-01		PCI/GDRY	10/23/2000
Tl208		1.63e-01	1.7e-02		PCI/GDRY	10/23/2000
U235	*	1.98e-01 J	2.0e-02		PCI/GDRY	10/23/2000

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000083

SAMPLE ANALYSIS REPORT

Sample #:	A0.06017M	QC batch #:	0001823~~D~~
Matrix:	SEDIMENT	Prep batch #:	0005020B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.700e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/02/2000 14:22	1000.0	GE07	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.5e-01 UJ	PCI/GDRY	10/23/2000
Bi212	8.83e-01	2.0e-01		PCI/GDRY	10/23/2000
Bi214	8.60e-01	6.1e-02		PCI/GDRY	10/23/2000
Co60	ND		2.8e-02 UJ	PCI/GDRY	10/23/2000
Cs137	5.19e-02	1.2e-02		PCI/GDRY	10/23/2000
I131	ND		4.9e-02 UJ	PCI/GDRY	10/23/2000
K40	1.92e+01	1.2e+00		PCI/GDRY	10/23/2000
Pb212	9.26e-01	6.3e-02		PCI/GDRY	10/23/2000
Pb214	9.20e-01	6.2e-02		PCI/GDRY	10/23/2000
Ra224	9.47e-01	3.7e-01		PCI/GDRY	10/23/2000
Ra226 *	1.89e+00 J	3.6e-01		PCI/GDRY	10/23/2000
Ra228	8.55e-01	6.8e-02		PCI/GDRY	10/23/2000
Tl208	2.99e-01	2.5e-02		PCI/GDRY	10/23/2000

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000085

SAMPLE ANALYSIS REPORT

Sample #:	A0.06037R	QC batch #:	0001825F
Matrix:	SOIL	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.150e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/09/2000 13:32	1000.0	GE06	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		3.4e-01 UJ	PCI/GDRY	10/24/2000
Bi212		8.68e-01	2.7e-01		PCI/GDRY	10/24/2000
Bi214		1.53e+00	1.1e-01		PCI/GDRY	10/24/2000
Co60		ND		4.5e-02 UJ	PCI/GDRY	10/24/2000
Cs137		2.73e-01	3.0e-02		PCI/GDRY	10/24/2000
I131		ND		1.6e-01 UJ	PCI/GDRY	10/24/2000
K40		1.15e+01	8.2e-01		PCI/GDRY	10/24/2000
Pa234m	*	2.67e+00 J	2.5e+00		PCI/GDRY	10/24/2000
Pb212		9.02e-01	7.5e-02		PCI/GDRY	10/24/2000
Pb214		1.75e+00	1.2e-01		PCI/GDRY	10/24/2000
Ra224		7.92e-01	5.6e-01		PCI/GDRY	10/24/2000
Ra226	*	4.08e+00 J	6.1e-01		PCI/GDRY	10/24/2000
Ra228		8.68e-01	8.5e-02		PCI/GDRY	10/24/2000
Th234	*	1.13e+00 J	4.3e-01		PCI/GDRY	10/24/2000
Tl208		2.79e-01	3.3e-02		PCI/GDRY	10/24/2000

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000085

SAMPLE ANALYSIS REPORT

Sample #:	A0.06038T	QC batch #:	0001825F
Matrix:	SOIL	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.050e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/09/2000 13:33	1000.0	GE08	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.0e-01 UJ	PCI/GDRY	10/24/2000
Bi214		1.20e+00	8.1e-02		PCI/GDRY	10/24/2000
Co60		ND		3.0e-02 UJ	PCI/GDRY	10/24/2000
Cs137		2.39e-02	9.9e-03		PCI/GDRY	10/24/2000
I131		ND		9.3e-02 UJ	PCI/GDRY	10/24/2000
K40		8.76e-01	2.1e-01		PCI/GDRY	10/24/2000
Pa234m	*	2.70e+00 J	1.4e+00		PCI/GDRY	10/24/2000
Pb212		9.45e-02	2.7e-02		PCI/GDRY	10/24/2000
Pb214		1.39e+00	9.0e-02		PCI/GDRY	10/24/2000
Ra226	*	3.46e+00 J	4.4e-01		PCI/GDRY	10/24/2000
Ra228		6.92e-02	4.3e-02		PCI/GDRY	10/24/2000
Th234	*	1.76e+00 J	1.7e-01		PCI/GDRY	10/24/2000
Tl208		1.61e-02	1.7e-02		PCI/GDRY	10/24/2000
U235	*	2.08e-01 J	2.6e-02		PCI/GDRY	10/24/2000

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000083

SAMPLE ANALYSIS REPORT

Sample #:	A0.06046T	QC batch #:	0001823D
Matrix:	SEDIMENT	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.480e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/09/2000 13:33	1000.0	GE12	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.2e-01 UJ	PCI/GDRY	10/25/2000
Bi212		1.92e-01	1.6e-01		PCI/GDRY	10/25/2000
Bi214		3.81e-01	4.6e-02		PCI/GDRY	10/25/2000
Co60		ND		3.4e-02 UJ	PCI/GDRY	10/25/2000
Cs137		ND		3.1e-02	PCI/GDRY	10/25/2000
I131		ND		8.0e-02	PCI/GDRY	10/25/2000
K40		4.27e+00	3.8e-01		PCI/GDRY	10/25/2000
Pa234m	*	1.97e+00 J	1.4e+00		PCI/GDRY	10/25/2000
Pb212		2.55e-01	3.6e-02		PCI/GDRY	10/25/2000
Pb214		4.31e-01	4.3e-02		PCI/GDRY	10/25/2000
Ra226	*	9.34e-01 J	3.5e-01		PCI/GDRY	10/25/2000
Ra228		2.73e-01	3.8e-02		PCI/GDRY	10/25/2000
Tl208		8.12e-02	1.9e-02		PCI/GDRY	10/25/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000083

SAMPLE ANALYSIS REPORT

Sample #:	A0.06048V	QC batch #:	0001823D
Matrix:	SEDIMENT	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.330e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/10/2000 12:00	1000.0	GE05	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		2.5e-01 UJ	PCI/GDRY	10/25/2000
Bi212	1.23e+00	2.6e-01		PCI/GDRY	10/25/2000
Bi214	1.46e+00	1.0e-01		PCI/GDRY	10/25/2000
Co60	ND		4.3e-02 UJ	PCI/GDRY	10/25/2000
Cs137	9.48e-02	2.2e-02		PCI/GDRY	10/25/2000
I131	ND		1.1e-01 UJ	PCI/GDRY	10/25/2000
K40	1.35e+01	9.0e-01		PCI/GDRY	10/25/2000
Pb212	9.84e-01	7.0e-02		PCI/GDRY	10/25/2000
Pb214	1.60e+00	1.0e-01		PCI/GDRY	10/25/2000
Ra226 *	3.69e+00 J	4.9e-01		PCI/GDRY	10/25/2000
Ra228	9.00e-01	8.0e-02		PCI/GDRY	10/25/2000
Th234 *	1.25e+00 J	3.2e-01		PCI/GDRY	10/25/2000
Tl208	3.08e-01	3.0e-02		PCI/GDRY	10/25/2000
U235 *	2.23e-01 J	2.9e-02		PCI/GDRY	10/25/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000083

QC BATCH SUMMARY

QC batch #: 0001823D
Preparation procedure: N/A
Analysis procedure: GAMMA

NAREL Sample #	QC Type	Yield (%)	± 2σ Uncertainty (%)	Analyst
A0.06013H		N/A		N/A
A0.06015K		N/A		N/A
A0.06017M		N/A		N/A
A0.06045R		N/A		N/A
A0.06045R	DUP	N/A		N/A
A0.06046T		N/A		N/A
A0.06048V		N/A		N/A

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0001823D Analytical Procedure: GAMMA

LABORATORY DUPLICATES (PCI/GDRY)

Sample ID	Nuclide	Original ± 2σ	Duplicate ± 2σ	RPD	Z
A0.06045R	BA140				
A0.06045R	BI212	3.15e-01 ± 1.6e-01	1.83e-01 ± 1.4e-01	53.01	-1.24 OK
A0.06045R	BI214	4.57e-01 ± 3.9e-02	5.06e-01 ± 4.6e-02	10.18	1.08 OK
A0.06045R	CO60				
A0.06045R	CS137	8.97e-03 ± 9.3e-03			
A0.06045R	I131				
A0.06045R	K40	7.21e+00 ± 4.8e-01	7.09e+00 ± 5.6e-01	1.68	-0.19 OK
A0.06045R	PB212	3.78e-01 ± 3.2e-02	3.40e-01 ± 3.1e-02	10.58	-1.12 OK
A0.06045R	PB214	5.14e-01 ± 3.9e-02	5.44e-01 ± 4.4e-02	5.67	0.63 OK
A0.06045R	RA228	3.38e-01 ± 3.9e-02	3.36e-01 ± 4.3e-02	0.59	-0.05 OK
A0.06045R	TL208	1.13e-01 ± 1.5e-02	1.03e-01 ± 1.7e-02	9.26	-0.73 OK

Analyst: N/A

QA Officer: Linda McCox 11/14/2000

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES

REPORT OF SAMPLE DELIVERY GROUP #0000085

Project: GRANDVIEW MINE
Analysis Procedure: Gamma spectroscopy
Date Reported: 11/14/2000

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A0.06031K	FD-01-SS	SAM	SOIL	10/24/2000	10/27/2000
A0.06032L	FD-03-SS	SAM	SOIL	10/24/2000	10/27/2000
A0.06033M	FD-07-SS	SAM	SOIL	10/24/2000	10/27/2000
A0.06034N	FD-05-SS	SAM	SOIL	10/24/2000	10/27/2000
A0.06035P	FD-06-SS	SAM	SOIL	10/24/2000	10/27/2000
A0.06036Q	FD-08-SS	SAM	SOIL	10/24/2000	10/27/2000
A0.06037R	FD-09-SS	SAM	SOIL	10/24/2000	10/27/2000
A0.06038T	TP-01-SS	SAM	SOIL	10/24/2000	10/27/2000
A0.06039U	TP-01-SB	SAM	SOIL	10/24/2000	10/27/2000
A0.06040L	TP-02-SS	SAM	SOIL	10/24/2000	10/27/2000
A0.06041M	TP-02-SB	SAM	SOIL	10/24/2000	10/27/2000
A0.06047U	BK-01-SS	SAM	SOIL	10/25/2000	10/27/2000

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

11-16-00

Mary F. Wisdom — Date
Quality Assurance Coordinator

11/16/00

John Griggs, Ph.D. — Date
Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "*Z* scores." A *Z* score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The *Z* score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The *Z* score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the *Z* score is computed.

Each standard uncertainty used to compute a *Z* score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Th-234, Pa-234m, Ra-226, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

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GAMMA ANALYSES
SDG #0000085

ANALYSIS SUMMARY

Analysis Procedure: GAMMA
Title: Gamma spectroscopy

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A0.06031K		N/A	11/09/2000	0005056P	0001825F
A0.06032L		N/A	11/09/2000	0005056P	0001825F
A0.06033M		N/A	11/10/2000	0005056P	0001825F
A0.06034N		N/A	11/09/2000	0005056P	0001825F
A0.06035P		N/A	11/10/2000	0005056P	0001825F
A0.06036Q		N/A	11/09/2000	0005056P	0001825F
A0.06037R		N/A	11/09/2000	0005056P	0001825F
A0.06037R	DUP	N/A	11/10/2000	0005056P	0001825F
A0.06038T		N/A	11/10/2000	0005056P	0001825F
A0.06039U		N/A	11/10/2000	0005056P	0001825F
A0.06040L		N/A	11/10/2000	0005056P	0001825F
A0.06041M		N/A	11/10/2000	0005056P	0001825F
A0.06047U		N/A	11/09/2000	0005056P	0001825F

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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SAMPLE ANALYSIS REPORT

Sample #:	A0.06031K	QC batch #:	0001825F
Matrix:	SOIL	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.970e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/08/2000 13:49	1000.0	GE07	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.4e-01 UJ	PCI/GDRY	10/24/2000
Bi214		3.87e+00	2.3e-01		PCI/GDRY	10/24/2000
Co60		ND		3.2e-02 UJ	PCI/GDRY	10/24/2000
Cs137		6.71e-02	1.7e-02		PCI/GDRY	10/24/2000
I131		ND		9.5e-02 UJ	PCI/GDRY	10/24/2000
K40		1.28e+00	2.4e-01		PCI/GDRY	10/24/2000
Pa234m	*	8.37e+00 J	2.1e+00		PCI/GDRY	10/24/2000
Pb212		1.15e-01	3.6e-02		PCI/GDRY	10/24/2000
Pb214		4.21e+00	2.5e-01		PCI/GDRY	10/24/2000
Ra223		4.15e-01	7.8e-02		PCI/GDRY	10/24/2000
Ra226	*	7.52e+00 J	6.7e-01		PCI/GDRY	10/24/2000
Ra228		ND		1.1e-01 UJ	PCI/GDRY	10/24/2000
Rn219		4.15e-01	9.7e-02		PCI/GDRY	10/24/2000
Th234	*	5.29e+00 J	4.7e-01		PCI/GDRY	10/24/2000
Tl208		3.64e-02	1.9e-02		PCI/GDRY	10/24/2000
U235	*	3.47e-01 J	3.6e-02		PCI/GDRY	10/24/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

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SAMPLE ANALYSIS REPORT

Sample #:	A0.06032L	QC batch #:	0001825F
Matrix:	SOIL	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.440e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/08/2000 13:49	1000.0	GE02	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		3.3e-01 UJ	PCI/GDRY	10/24/2000
Bi214		4.34e+00	2.7e-01		PCI/GDRY	10/24/2000
Co60		ND		6.4e-02 UJ	PCI/GDRY	10/24/2000
Cs137		3.48e-01	4.0e-02		PCI/GDRY	10/24/2000
I131		ND		1.3e-01 UJ	PCI/GDRY	10/24/2000
K40		1.18e+00	3.9e-01		PCI/GDRY	10/24/2000
Pa234m	*	7.14e+00 J	3.2e+00		PCI/GDRY	10/24/2000
Pb212		8.50e-02	3.9e-02		PCI/GDRY	10/24/2000
Pb214		4.77e+00	2.8e-01		PCI/GDRY	10/24/2000
Ra223		4.96e-01	1.1e-01		PCI/GDRY	10/24/2000
Ra226	*	6.82e+00 J	7.3e-01		PCI/GDRY	10/24/2000
Ra228		ND		1.9e-01 UJ	PCI/GDRY	10/24/2000
Rn219		3.85e-01	1.2e-01		PCI/GDRY	10/24/2000
Th234	*	6.38e+00 J	5.0e-01		PCI/GDRY	10/24/2000
U235	*	3.55e-01 J	4.1e-02		PCI/GDRY	10/24/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

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SAMPLE ANALYSIS REPORT

Sample #:	A0.06033M	QC batch #:	0001825F
Matrix:	SOIL	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.540e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/09/2000 13:32	1000.0	GE02	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.6e-01 UJ	PCI/GDRY	10/24/2000
Bi214		2.29e+00	1.5e-01		PCI/GDRY	10/24/2000
Co60		ND		5.5e-02 UJ	PCI/GDRY	10/24/2000
Cs137		1.29e-01	2.5e-02		PCI/GDRY	10/24/2000
I131		ND		1.1e-01 UJ	PCI/GDRY	10/24/2000
K40		9.89e-01	3.2e-01		PCI/GDRY	10/24/2000
Pa234m	*	3.96e+00 J	2.7e+00		PCI/GDRY	10/24/2000
Pb212		7.62e-02	3.0e-02		PCI/GDRY	10/24/2000
Pb214		2.54e+00	1.6e-01		PCI/GDRY	10/24/2000
Ra223		2.18e-01	7.9e-02		PCI/GDRY	10/24/2000
Ra226	*	6.84e+00 J	6.2e-01		PCI/GDRY	10/24/2000
Ra228		ND		1.5e-01 UJ	PCI/GDRY	10/24/2000
Th234	*	3.58e+00 J	3.6e-01		PCI/GDRY	10/24/2000
U235	*	4.04e-01 J	3.7e-02		PCI/GDRY	10/24/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

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SAMPLE ANALYSIS REPORT

Sample #:	A0.06034N	QC batch #:	0001825F
Matrix:	SOIL	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/08/2000 13:50	1000.0	GE09	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.7e-01 UJ	PCI/GDRY	10/24/2000
Bi214		2.89e+00	1.8e-01		PCI/GDRY	10/24/2000
Co60		ND		4.3e-02 UJ	PCI/GDRY	10/24/2000
Cs137		4.21e-01	3.7e-02		PCI/GDRY	10/24/2000
I131		ND		1.3e-01 UJ	PCI/GDRY	10/24/2000
K40		2.89e+00	3.8e-01		PCI/GDRY	10/24/2000
Pa234m	*	4.87e+00 J	2.5e+00		PCI/GDRY	10/24/2000
Pb212		1.41e-01	4.0e-02		PCI/GDRY	10/24/2000
Pb214		3.11e+00	1.9e-01		PCI/GDRY	10/24/2000
Ra226	*	8.31e+00 J	7.4e-01		PCI/GDRY	10/24/2000
Ra228		1.63e-01	5.6e-02		PCI/GDRY	10/24/2000
Rn219		2.47e-01	1.5e-01		PCI/GDRY	10/24/2000
Th227		3.33e-01	1.4e-01		PCI/GDRY	10/24/2000
Th234	*	3.69e+00 J	4.6e-01		PCI/GDRY	10/24/2000
Tl208		2.15e-02	2.5e-02		PCI/GDRY	10/24/2000
U235	*	5.00e-01 J	4.5e-02		PCI/GDRY	10/24/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

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SAMPLE ANALYSIS REPORT

Sample #:	A0.06035P	QC batch #:	0001825F
Matrix:	SOIL	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.200e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/09/2000 13:32	1000.0	GE05	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.4e-01 VJ	PCI/GDRY	10/24/2000
Bi214		2.09e+00	1.4e-01		PCI/GDRY	10/24/2000
Co60		ND		4.5e-02 VJ	PCI/GDRY	10/24/2000
Cs137		2.28e-01	2.6e-02		PCI/GDRY	10/24/2000
I131		ND		1.1e-01 VJ	PCI/GDRY	10/24/2000
K40		1.24e+00	2.8e-01		PCI/GDRY	10/24/2000
Pa234m	*	7.39e+00 J	2.1e+00		PCI/GDRY	10/24/2000
Pb212		7.93e-02	3.3e-02		PCI/GDRY	10/24/2000
Pb214		2.33e+00	1.4e-01		PCI/GDRY	10/24/2000
Ra223		2.67e-01	7.0e-02		PCI/GDRY	10/24/2000
Ra226	*	3.71e+00 J	5.2e-01		PCI/GDRY	10/24/2000
Ra228		ND		1.2e-01 VJ	PCI/GDRY	10/24/2000
Th234	*	3.57e+00 J	4.0e-01		PCI/GDRY	10/24/2000
Tl208		1.63e-02	2.1e-02		PCI/GDRY	10/24/2000
U235	*	1.87e-01 J	3.0e-02		PCI/GDRY	10/24/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

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SAMPLE ANALYSIS REPORT

Sample #:	A0.06036Q	QC batch #:	0001825P
Matrix:	SOIL	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.170e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/08/2000 13:50	1000.0	GE10	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		1.8e-01 UJ	PCI/GDRY	10/24/2000
Bi214		2.63e+00	1.6e-01		PCI/GDRY	10/24/2000
Co60		ND		2.9e-02 UJ	PCI/GDRY	10/24/2000
Cs137		5.30e-02	1.3e-02		PCI/GDRY	10/24/2000
I131		ND		7.9e-02 UJ	PCI/GDRY	10/24/2000
K40		1.09e+00	1.9e-01		PCI/GDRY	10/24/2000
Pa234m	*	7.08e+00 J	1.5e+00		PCI/GDRY	10/24/2000
Pb212		7.03e-02	2.6e-02		PCI/GDRY	10/24/2000
Pb214		2.86e+00	1.7e-01		PCI/GDRY	10/24/2000
Ra223		1.98e-01	5.4e-02		PCI/GDRY	10/24/2000
Ra226	*	4.58e+00 J	4.7e-01		PCI/GDRY	10/24/2000
Ra228		ND		9.2e-02 UJ	PCI/GDRY	10/24/2000
Th227		2.72e-01	9.7e-02		PCI/GDRY	10/24/2000
Th234	*	2.98e+00 J	3.1e-01		PCI/GDRY	10/24/2000
U235	*	1.70e-01 J	2.5e-02		PCI/GDRY	10/24/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

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SAMPLE ANALYSIS REPORT

Sample #:	A0.06037R	QC batch #:	0001825F
Matrix:	SOIL	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.150e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/08/2000 13:50	1000.0	GE11	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.4e-01 UJ	PCI/GDRY	10/24/2000
Bi212		9.86e-01	2.6e-01		PCI/GDRY	10/24/2000
Bi214		1.48e+00	1.0e-01		PCI/GDRY	10/24/2000
Co60		ND		3.8e-02 UJ	PCI/GDRY	10/24/2000
Cs137		2.95e-01	2.9e-02		PCI/GDRY	10/24/2000
I131		ND		9.8e-02 UJ	PCI/GDRY	10/24/2000
K40		1.27e+01	8.4e-01		PCI/GDRY	10/24/2000
Pa234m	*	2.28e+00 J	2.2e+00		PCI/GDRY	10/24/2000
Pb212		9.18e-01	6.6e-02		PCI/GDRY	10/24/2000
Pb214		1.67e+00	1.1e-01		PCI/GDRY	10/24/2000
Ra223		1.61e-01	7.6e-02		PCI/GDRY	10/24/2000
Ra224		6.88e-01	4.6e-01		PCI/GDRY	10/24/2000
Ra226	*	4.12e+00 J	5.2e-01		PCI/GDRY	10/24/2000
Ra228		8.64e-01	7.4e-02		PCI/GDRY	10/24/2000
Th234	*	6.89e-01 J	3.3e-01		PCI/GDRY	10/24/2000
Tl208		2.75e-01	2.8e-02		PCI/GDRY	10/24/2000
U235	*	2.49e-01 J	3.1e-02		PCI/GDRY	10/24/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

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SAMPLE ANALYSIS REPORT

Sample #:	A0.06037R	QC batch #:	0001825F
Matrix:	SOIL	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.150e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/09/2000 13:32	1000.0	GE06	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		3.4e-01 UJ	PCI/GDRY	10/24/2000
Bi212		8.68e-01	2.7e-01		PCI/GDRY	10/24/2000
Bi214		1.53e+00	1.1e-01		PCI/GDRY	10/24/2000
Co60		ND		4.5e-02 UJ	PCI/GDRY	10/24/2000
Cs137		2.73e-01	3.0e-02		PCI/GDRY	10/24/2000
I131		ND		1.6e-01 UJ	PCI/GDRY	10/24/2000
K40		1.15e+01	8.2e-01		PCI/GDRY	10/24/2000
Pa234m	*	2.67e+00 J	2.5e+00		PCI/GDRY	10/24/2000
Pb212		9.02e-01	7.5e-02		PCI/GDRY	10/24/2000
Pb214		1.75e+00	1.2e-01		PCI/GDRY	10/24/2000
Ra224		7.92e-01	5.6e-01		PCI/GDRY	10/24/2000
Ra226	*	4.08e+00 J	6.1e-01		PCI/GDRY	10/24/2000
Ra228		8.68e-01	8.5e-02		PCI/GDRY	10/24/2000
Th234	*	1.13e+00 J	4.3e-01		PCI/GDRY	10/24/2000
Tl208		2.79e-01	3.3e-02		PCI/GDRY	10/24/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

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SAMPLE ANALYSIS REPORT

Sample #:	A0.06038T	QC batch #:	0001825F
Matrix:	SOIL	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.050e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/09/2000 13:33	1000.0	GE08	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.0e-01 UJ	PCI/GDRY	10/24/2000
Bi214		1.20e+00	8.1e-02		PCI/GDRY	10/24/2000
Co60		ND		3.0e-02 UJ	PCI/GDRY	10/24/2000
Cs137		2.39e-02	9.9e-03		PCI/GDRY	10/24/2000
I131		ND		9.3e-02 UJ	PCI/GDRY	10/24/2000
K40		8.76e-01	2.1e-01		PCI/GDRY	10/24/2000
Pa234m	*	2.70e+00 J	1.4e+00		PCI/GDRY	10/24/2000
Pb212		9.45e-02	2.7e-02		PCI/GDRY	10/24/2000
Pb214		1.39e+00	9.0e-02		PCI/GDRY	10/24/2000
Ra226	*	3.46e+00 J	4.4e-01		PCI/GDRY	10/24/2000
Ra228		6.92e-02	4.3e-02		PCI/GDRY	10/24/2000
Th234	*	1.76e+00 J	1.7e-01		PCI/GDRY	10/24/2000
Tl208		1.61e-02	1.7e-02		PCI/GDRY	10/24/2000
U235	*	2.08e-01 J	2.6e-02		PCI/GDRY	10/24/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

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SAMPLE ANALYSIS REPORT

Sample #:	A0.06039U	QC batch #:	0001825F
Matrix:	SOIL	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.600e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/09/2000 13:33	1000.0	GE09	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		1.7e-01 UJ	PCI/GDRY	10/24/2000
Bi212		2.71e-01	1.5e-01		PCI/GDRY	10/24/2000
Bi214		9.56e-01	6.8e-02		PCI/GDRY	10/24/2000
Co60		ND		2.5e-02 UJ	PCI/GDRY	10/24/2000
Cs137		ND		2.5e-02 UJ	PCI/GDRY	10/24/2000
I131		ND		8.1e-02 UJ	PCI/GDRY	10/24/2000
K40		1.40e+00 U	2.1e-01		PCI/GDRY	10/24/2000
Pa234m	*	1.46e+00 J	1.7e+00		PCI/GDRY	10/24/2000
Pb212		5.61e-02	2.3e-02		PCI/GDRY	10/24/2000
Pb214		1.06e+00	7.0e-02		PCI/GDRY	10/24/2000
Ra226	*	2.81e+00 J	3.6e-01		PCI/GDRY	10/24/2000
Ra228		ND		7.7e-02 UJ	PCI/GDRY	10/24/2000
Th234	*	2.04e+00 J	2.9e-01		PCI/GDRY	10/24/2000
Tl208		1.43e-02 U	1.5e-02		PCI/GDRY	10/24/2000
U235	*	1.69e-01 J	2.2e-02		PCI/GDRY	10/24/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000085

SAMPLE ANALYSIS REPORT

Sample #:	A0.06040L	QC batch #:	0001825F
Matrix:	SOIL	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.580e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/09/2000 13:33	1000.0	GE10	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.2e-01 UJ	PCI/GDRY	10/24/2000
Bi214		2.47e+00	1.5e-01		PCI/GDRY	10/24/2000
Co60		ND		3.5e-02 UJ	PCI/GDRY	10/24/2000
Cs137		2.13e-02	1.1e-02		PCI/GDRY	10/24/2000
I131		ND		9.9e-02 UJ	PCI/GDRY	10/24/2000
K40		1.14e+00	2.3e-01		PCI/GDRY	10/24/2000
Pa234m	*	6.20e+00 J	1.7e+00		PCI/GDRY	10/24/2000
Pb212		5.25e-02	2.4e-02		PCI/GDRY	10/24/2000
Pb214		2.78e+00	1.6e-01		PCI/GDRY	10/24/2000
Ra223		3.86e-01	9.5e-02		PCI/GDRY	10/24/2000
Ra226	*	3.25e+00 J	4.9e-01		PCI/GDRY	10/24/2000
Ra228		ND		9.9e-02 UJ	PCI/GDRY	10/24/2000
Th227		2.06e-01	8.6e-02		PCI/GDRY	10/24/2000
Th234	*	3.73e+00 J	3.7e-01		PCI/GDRY	10/24/2000
Tl208		1.78e-02	1.5e-02		PCI/GDRY	10/24/2000
U235	*	2.68e-01 J	3.0e-02		PCI/GDRY	10/24/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000085

SAMPLE ANALYSIS REPORT

Sample #:	A0.06041M	QC batch #:	0001825F
Matrix:	SOIL	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.760e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/09/2000 13:33	1000.0	GE11	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		1.4e-01 UJ	PCI/GDRY	10/24/2000
Bi214		1.67e+00	1.0e-01		PCI/GDRY	10/24/2000
Co60		ND		2.1e-02 UJ	PCI/GDRY	10/24/2000
Cs137		ND		2.1e-02	PCI/GDRY	10/24/2000
I131		ND		6.1e-02	PCI/GDRY	10/24/2000
K40		1.04e+00 U	1.6e-01		PCI/GDRY	10/24/2000
Pa234m	*	3.30e+00 J	1.3e+00		PCI/GDRY	10/24/2000
Pb212		6.66e-02	2.0e-02		PCI/GDRY	10/24/2000
Pb214		1.86e+00	1.1e-01		PCI/GDRY	10/24/2000
Ra226	*	1.54e+00 J	3.1e-01		PCI/GDRY	10/24/2000
Ra228		5.56e-02	2.6e-02		PCI/GDRY	10/24/2000
Th234	*	2.50e+00 J	2.5e-01		PCI/GDRY	10/24/2000
Tl208		1.15e-02 U	1.1e-02		PCI/GDRY	10/24/2000
U235	*	1.76e-01 J	2.0e-02		PCI/GDRY	10/24/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000085

SAMPLE ANALYSIS REPORT

Sample #:	A0.06047U	QC batch #:	0001825F
Matrix:	SOIL	Prep batch #:	0005056P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.420e+02 GDRY	Analysis procedure:	GAMMA
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/08/2000 13:50	1000.0	GE12	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		3.1e-01 UJ	PCI/GDRY	10/25/2000
Bi212	9.80e-01	2.5e-01		PCI/GDRY	10/25/2000
Bi214	7.99e-01	7.1e-02		PCI/GDRY	10/25/2000
Co60	ND		4.5e-02 UJ	PCI/GDRY	10/25/2000
Cs137	1.31e+00	8.5e-02		PCI/GDRY	10/25/2000
I131	ND		1.2e-01 UJ	PCI/GDRY	10/25/2000
K40	1.52e+01	1.0e+00		PCI/GDRY	10/25/2000
Pb212	9.74e-01	7.7e-02		PCI/GDRY	10/25/2000
Pb214	8.78e-01	7.0e-02		PCI/GDRY	10/25/2000
Ra224	6.05e-01	5.3e-01		PCI/GDRY	10/25/2000
Ra226 *	1.41e+00 J	4.9e-01		PCI/GDRY	10/25/2000
Ra228	9.10e-01	7.9e-02		PCI/GDRY	10/25/2000
Tl208	2.89e-01	3.2e-02		PCI/GDRY	10/25/2000

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0000085

QC BATCH SUMMARY

QC batch #: 0001825F
Preparation procedure: N/A
Analysis procedure: GAMMA

NAREL Sample #	QC Type	Yield (%)	± 2σ Uncertainty (%)	Analyst
A0.06031K		N/A		N/A
A0.06032L		N/A		N/A
A0.06033M		N/A		N/A
A0.06034N		N/A		N/A
A0.06035P		N/A		N/A
A0.06036Q		N/A		N/A
A0.06037R		N/A		N/A
A0.06037R	DUP	N/A		N/A
A0.06038T		N/A		N/A
A0.06039U		N/A		N/A
A0.06040L		N/A		N/A
A0.06041M		N/A		N/A
A0.06047U		N/A		N/A

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0001825F Analytical Procedure: GAMMA

LABORATORY DUPLICATES (PCI/GDRY)

Sample ID	Nuclide	Original ± 2σ	Duplicate ± 2σ	RPD	Z
A0.06037R	BA140				
A0.06037R	BI212	9.85e-01 ± 2.6e-01	8.68e-01 ± 2.7e-01	12.73	-0.60 OK
A0.06037R	BI214	1.48e+00 ± 1.0e-01	1.53e+00 ± 1.1e-01	3.32	0.39 OK
A0.06037R	CO60				
A0.06037R	CS137	2.95e-01 ± 2.9e-02	2.73e-01 ± 3.0e-02	7.75	-0.76 OK
A0.06037R	I131				
A0.06037R	K40	1.27e+01 ± 8.4e-01	1.15e+01 ± 8.2e-01	9.92	-1.16 OK
A0.06037R	PB212	9.18e-01 ± 6.6e-02	9.02e-01 ± 7.5e-02	1.76	-0.20 OK
A0.06037R	PB214	1.67e+00 ± 1.1e-01	1.75e+00 ± 1.2e-01	4.68	0.55 OK
A0.06037R	RA224	6.88e-01 ± 4.6e-01	7.92e-01 ± 5.6e-01	14.05	0.28 OK
A0.06037R	RA228	8.64e-01 ± 7.4e-02	8.68e-01 ± 8.5e-02	0.46	0.05 OK
A0.06037R	TL208	2.75e-01 ± 2.8e-02	2.79e-01 ± 3.3e-02	1.44	0.14 OK

Analyst: N/A

QA Officer: Kirk McClure 11/16/2000

ecology and environment, inc.
International Specialists in the Environment

1500 Wells Fargo Center , 999 Third Avenue
Seattle , Washington 98104
Tel: (206) 624-9537 , Fax: (206) 621-9832 **MEMORANDUM**

DATE: December 13, 2000

TO: Leatta Dahlhoff, Project Manager, E & E, Seattle, WA

FROM: Mark Woodke, START Chemist, E & E, Seattle, WA MW

SUBJ: **Inorganic Data Summary, Grandview Mine Site, Metaline Falls, Washington**

REF: TDD: 00-06-0001 PAN: EF-01-01-SI-DM

The data review of samples collected from the Grandview Mine site located in Metaline Falls, Washington, has been completed. Analysis for Semivolatile Organic Compounds and Polychlorinated Biphenyls were performed at the Manchester Environmental Laboratory.

All listed samples were present in the provided data validation packages.

The following additional qualifiers were applied when necessary to indicate potential bias of estimated quantities:

L - Low Bias

K - Unknown Bias

Q - The result is estimated because it is below the sample quantitation limit

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

November 30, 2000

MEMORANDUM

SUBJECT: Peer Review and Data Validation Report of Semivolatiles' Results for the Grandview Mine Project Samples 00434212, 00434213, 00434214, 00434215, 00434216, and 00434217

FROM: Gerald H. Dodo, Chemist
USEPA

TO: Joanne LaBaw
USEPA

CC: Leatta Dahlhoff, Mark Woodke, Tracy Trople
Ecology & Environment

The following is a peer review and data validation report of the semivolatiles analyses' results for soil samples collected for the Grandview Mine project. The samples were analyzed at the USEPA Region 10 Laboratory located in Manchester, WA using a modified USEPA Method OLM04.2. Lower level instrument calibration standards were used for these analyses. This report covers the samples listed above.

The project code for these samples is TEC-765A and the account number is 01T10P50102D10ZZLA00.

Data qualifications

The following comments refer to the laboratory performance in meeting the Quality Control specifications outlined in the USEPA Method OLM04.2 and the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99).

I. Holding Times: Acceptable

The recommended holding time for the extraction of soil samples is 14 days from the date of sampling. Extracts have a

holding time limit of 40 days from the time of preparation. All samples were extracted and analyzed within holding time maximums. No qualifiers were applied based on holding times.

II. GC/MS Tuning and Performance: Acceptable

The tuning summary agreed with the raw data. All decafluorotriphenylphosphine ion abundance met criteria. All sample analyses were preceded by a tune less than 12 hours prior to analysis. No qualifiers were applied on the basis of the tuning data.

III. Initial Calibration: Acceptable

A nine-point initial calibration was performed on 11/13/00. Correlation coefficients were ≥0.99. Average RRFs met the criteria of ≥0.05. %RSDs of the RRFs met the criteria of ≤30%. No qualifiers were applied based on the initial calibration results.

IV. Continuing Calibration:

The continuing calibration check standard met the criteria for frequency of analysis and RRT windows for all target compounds and surrogates. The RRFs were ≥0.05 and the accuracy for the target compounds met the criteria of 75-125% of the true value except for the following.

11/14/00 Samples 00434212, 00434213, 00434214, 00434216, and 00434217.

Benzaldehyde resulted with <75% of the true value. The associated results for this compound were qualified J if detected and UJ if non-detected.

11/15/00 Samples 00434215, Matrix Spikes 00434217S1, and 00434217S2.

Benzaldehyde resulted with <75% of the true value. The associated results for this compound were qualified J if detected and UJ if non-detected. Di-n-octylphthalate and 3B-coprostanol resulted with >125% of the true value. The associated detected results for these compounds were qualified J.

V. Blanks:

Method blanks were prepared and analyzed with the sample extraction batch. Target compounds detected in the samples were reported without qualification if the sample result area

integration exceeded ten times that of the blank for common contaminates (e.g., phthalates) or five times that of the blank for the other target compounds. Detected sample results were qualified U if the area integration was below these criteria. The sample concentration or the sample quantitation limit, whichever is greater, was reported as the qualified result. Tentatively identified compounds detected in the blanks were deleted from the sample results.

VI. Surrogates:

Method OLM04.2 and the Functional Guidelines specifications for surrogate recoveries were applied. A criterion of 50-150% recovery for pyrene-d10 was applied as well. The matrix spikes 00434217S1 and 00434217S2 were accidentally not spiked with the surrogates. The surrogate recoveries for all samples met the criteria. No qualifiers were applied based on the surrogates.

VII. Matrix Spike/Matrix Spike Duplicate (MS/MSD):

An MS/MSD analysis was performed using sample 00434217 (S1/S2). The MS/MSD criteria as described in the CLP Statement of Work and the Region 10 acceptance ranges (50-150% recovery, ≤50% relative percent difference, RPD) were applied. The following recoveries did not meet the applied criteria:

Compound	Recovery (S1/S2)
aniline	18/14
phenol	/95
hexachloroethane	47/
benzoic acid	33/30
4-chloroaniline	11/9
4-chloro-3-methylphenol	/105
hexachlorocyclopentadiene	0/0
3-nitroaniline	37/35
2,4-dinitrotoluene	/99
4-nitroaniline	45/34
3,3'-dichlorobenzidine	40/29

The compounds above were not detected in sample 00434217 except for phenol. No qualifiers were applied toward the phenol result for this sample since the above recovery was only slightly out of criteria and indicates good accuracy. The reported 4-chloroaniline and hexachlorocyclopentadiene results for this sample were qualified R due to the <10% recoveries. The reported aniline, hexachloroethane, benzoic acid, 3-nitroaniline, 4-nitroaniline, and 3,3'-dichlorobenzidine results for this sample were qualified UJ due to the low recoveries. No qualifiers were applied based on the 4-chloro-3-methylphenol and 2,4-dinitrotoluene recoveries since the high results do not indicate a problem with the reported sample quantitation limits.

VIII. Internal Standard Performance: Acceptable

The retention time variations of all internal standards were within 30 seconds of the continuing calibration standards. The %areas of all internal standards were within the specified 50% to 200% of the continuing calibration standards. No qualifiers were applied based on the internal standard.

IX. Target Compound Identification: Acceptable

All detected target compounds' relative retention times were within acceptable limits of the related standards in the continuing calibration standard. Criteria were met for mass spectral ion matching and ion abundance matching or the mass spectra were judged acceptable.

X. Compound Quantitation: Acceptable

Calculations were based on the initial calibration. Sample quantitation limits were adjusted appropriately as according to sample amounts and calibration data. Detected results below the sample quantitation limits were qualified J.

XI. Tentatively Identified Compounds: Acceptable

Spectra for all tentatively identified compounds (TICs) met criteria for mass spectral ion matching and ion abundance matching or the mass spectra were judged acceptable.

Overall Assessment for the Case

The usefulness of the data is based on the criteria outlined in the USEPA Method OLM04.2 and the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99). All requirements for data qualifiers from the preceding sections were accumulated. Each sample data summary sheet and each compound was checked for positive or negative results. From this overall need for data qualifiers for each analysis was determined. In cases where more than one of the preceding sections required data qualifiers, the most restrictive qualifier has been added to the data.

In general, all unqualified data can be used without restriction. The usefulness of qualified data should be treated according to the severity of the qualifier. Should questions arise regarding the qualification of data and its relation to the usefulness, the reader is encouraged to contact Gerald Dodo at the Region 10 laboratory, phone number (360) 871-8728.

DATA QUALIFIERS

U	-	The analyte was not detected at or above the reported result.
J	-	The analyte was positively identified. The associated numerical result is an estimate.
EXP	-	The result is equal to the number before EXP times 10 to the power of the number after EXP. As an example 3EXP6 equals 3×10^6.
R	-	The data are unusable for all purposes.
N	-	There is evidence the analyte is present in this sample.
NJ	-	There is evidence that the analyte is present. The associated numerical result is an estimate.
UJ	-	The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample.
NAF	-	Not analyzed for.
NAR	-	No analytical result.
*	-	The analyte was present in the sample. (Visual aid to locate detected compounds on the report sheet.)

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Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code:	TEC-765A	**Collected:**	10/23/00
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	00434212
Account Code:	01T10P50102D10ZZLA00	**Type:**	Reg sample
Station Description:	DA-01-SS		

GCMS

Parameter : Semi-volatiles
Method : 8270-M BNA
Prep Method : 3510M/3540

Analytes			Result	Units	Qlfr
	92524	1,1'-Biphenyl	59.3	ug/kg	U
	95954	2,4,5-Trichlorophenol	119	ug/kg	U
	88062	2,4,6-Trichlorophenol	296	ug/kg	U
	120832	2,4-Dichlorophenol	119	ug/kg	U
	105679	2,4-Dimethylphenol	59.3	ug/kg	U
	51285	2,4-Dinitrophenol	593	ug/kg	U
	121142	2,4-Dinitrotoluene	296	ug/kg	U
	606202	2,6-Dinitrotoluene	296	ug/kg	U
	91587	2-Chloronaphthalene	59.3	ug/kg	U
	95578	2-Chlorophenol	59.3	ug/kg	U
	88744	2-Nitroaniline	296	ug/kg	U
	88755	2-Nitrophenol	296	ug/kg	U
	91941	3,3'-Dichlorobenzidine	237	ug/kg	U
	99092	3-Nitroaniline	296	ug/kg	U
	360689	3B-Coprostanol	1190	ug/kg	U
	534521	4,6-Dinitro-2-methylphenol	296	ug/kg	U
	101553	4-Bromophenyl-Phenylether	59.3	ug/kg	U
	59507	4-Chloro-3-methylphenol	119	ug/kg	U
	106478	4-Chloroaniline	59.3	ug/kg	U
	7005723	4-Chlorophenyl-Phenylether	59.3	ug/kg	U
	106445	**4-Methylphenol**	**80.8**	**ug/kg**	**J** Q
	100016	4-Nitroaniline	296	ug/kg	U
	100027	4-Nitrophenol	59.3	ug/kg	U
	86748	9H-Carbazole	59.3	ug/kg	U
	86737	**9H-Fluorene**	**12.8**	**ug/kg**	**J** Q
	83329	Acenaphthene	59.3	ug/kg	U
	208968	Acenaphthylene	59.3	ug/kg	U
	62533	Aniline	59.3	ug/kg	U
	120127	**Anthracene**	**5.8**	**ug/kg**	**J** Q
	1912249	Atrazine	119	ug/kg	U
	100527	**Benzaldehyde**	**126**	**ug/kg**	**J** L
	100516	Benzenemethanol	59.3	ug/kg	U
	56553	Benzo(a)anthracene	59.3	ug/kg	U
	50328	Benzo(a)pyrene	296	ug/kg	U
	191242	Benzo(g,h,i)perylene	119	ug/kg	U
	205992	Benzo[b]Fluoranthene	119	ug/kg	U
	207089	Benzo[k]fluoranthene	59.3	ug/kg	U

Sent to:
Joanne Labaw
Leatta Dahlhoff
Mark Woodke
Tracy Trople

SH 11/1/00

SH 12/8/00

			Result	Units	Qlfr
Analytes :	**65850**	**Benzoic acid**	**614**	**ug/kg**	
	111444	bis(2-Chloroethyl)ether	59.3	ug/kg	U
	108601	BIS(2-CHLOROISOPROPYL)ETHER	59.3	ug/kg	U
	117817	Bis(2-ethylhexyl) phthalate	296	ug/kg	U
	85687	Butylbenzylphthalate	637	ug/kg	U
	58082	Caffeine	119	ug/kg	U
	105602	Caprolactam	59.3	ug/kg	U
	218019	Chrysene	59.3	ug/kg	U
	84742	Di-n-Butylphthalate	59.3	ug/kg	U
	117840	Di-n-octylphthalate	296	ug/kg	U
	53703	Dibenz[a,h]anthracene	59.3	ug/kg	U
	132649	Dibenzofuran	59.3	ug/kg	U
	84662	Diethyl phthalate	59.3	ug/kg	U
	131113	Dimethylphthalate	59.3	ug/kg	U
	98862	**Ethanone, 1-phenyl-**	**28.2**	**ug/kg**	**J** Q
	206440	**Fluoranthene**	**22.4**	**ug/kg**	**J** Q
	118741	Hexachlorobenzene	59.3	ug/kg	U
	87683	Hexachlorobutadiene	59.3	ug/kg	U
	77474	Hexachlorocyclopentadiene	59.3	ug/kg	U
	67721	Hexachloroethane	59.3	ug/kg	U
	193395	Indeno(1,2,3-cd)pyrene	296	ug/kg	U
	78591	Isophorone	59.3	ug/kg	U
	111911	Methane, bis(2-chloroethoxy)-	59.3	ug/kg	U
	62759	N-Nitrosodimethylamine	296	ug/kg	U
	621647	N-Nitrosodinpropylamine	59.3	ug/kg	U
	86306	n-Nitrosodiphenylamine	119	ug/kg	U
	91203	Naphthalene	59.3	ug/kg	U
	90120	**Naphthalene, 1-methyl-**	**10.0**	**ug/kg**	**J** Q
	91576	**Naphthalene, 2-methyl-**	**14.8**	**ug/kg**	**J** Q
	98953	Nitrobenzene	59.3	ug/kg	U
	87865	Pentachlorophenol	296	ug/kg	U
	85018	Phenanthrene	59.3	ug/kg	U
	108952	**Phenol**	**101**	**ug/kg**	
	95487	Phenol, 2-methyl-	59.3	ug/kg	U
	129000	Pyrene	59.3	ug/kg	U
	483658	**Retene**	**224**	**ug/kg**	
	321608	1,1'-Biphenyl, 2-fluoro-	89.9	%Rec	
	2199691	1,2-Dichlorobenzene-d4	71.0	%Rec	
	93951736	2-chlorophenol-d4	94.6	%Rec	
	1718521	D10-Pyrene	113	%Rec	
	4165600	Nitrobenzene-d5	84.7	%Rec	
	367124	Phenol, 2-fluoro-	93.2	%Rec	
	4165622	Phenol-d5	96.1	%Rec	
	1718510	Terphenyl-d14	102	%Rec	

Parameter : Semi-volatiles - Tentatives
Method : 8270-M BNA
Prep Method: 3510M/3540

Analytes :	**83476**	**.gamma.-Sitosterol**	**6020**	**ug/kg**	**NJ**

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

			Result	Units	Qlfr
Analytes :	489394	1H-Cycloprop[e]azulene, decahydro-1,1,7-	800	ug/kg	NJ
	489292	1H-Cyclopropa[a]naphthalene, 1a,2,3,3a,4	1120	ug/kg	NJ
	2091294	9-Hexadecenoic acid	726	ug/kg	NJ
	1898131	Cembrene	476	ug/kg	NJ
	475207	Junipene	12200	ug/kg	NJ
	109295	Oxacycloheptadecan-2-one	687	ug/kg	NJ
	1002842	Pentadecanoic acid	760	ug/kg	NJ
	19407284	Phenanthrene, 1,2,3,4,4a,9,10,10a-octahy	1390	ug/kg	NJ
	544638	Tetradecanoic acid	800	ug/kg	NJ
	511159	Totarol	2270	ug/kg	NJ
	*3008001	Unknown 01	3520	ug/kg	NJ
	*3008002	Unknown 02	1090	ug/kg	NJ
	*3008003	Unknown 03	4300	ug/kg	NJ
	*3008004	Unknown 04	1870	ug/kg	NJ
	*3008005	Unknown 05	1420	ug/kg	NJ
	*3008006	Unknown 06	753	ug/kg	NJ
	*3008007	Unknown 07	552	ug/kg	NJ
	*3008008	Unknown 08	278	ug/kg	NJ
	*3008009	Unknown 09	3050	ug/kg	NJ
	*3008010	Unknown 10	774	ug/kg	NJ
	*3008011	Unknown 11	572	ug/kg	NJ
	*3008012	Unknown 12	433	ug/kg	NJ
	*3008013	Unknown 13	2120	ug/kg	NJ
	*3005001	Unknown Hydrocarbon 01	695	ug/kg	NJ
	*3005002	Unknown Hydrocarbon 02	2660	ug/kg	NJ
	*3005003	Unknown Hydrocarbon 03	2300	ug/kg	NJ
	*3005004	Unknown Hydrocarbon 04	2300	ug/kg	NJ

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code:	TEC-765A	**Collected:**	10/23/00
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	00434213
Account Code:	01T10P50102D10ZZLA00	**Type:**	Reg sample
Station Description:	DA-02-SS		

GCMS

Parameter : Semi-volatiles
Method : 8270-M BNA
Prep Method : 3510M/3540

Analytes			Result	Units	Qlfr
	92524	1,1'-Biphenyl	72.3	ug/kg	U
	95954	2,4,5-Trichlorophenol	145	ug/kg	U
	88062	2,4,6-Trichlorophenol	361	ug/kg	U
	120832	2,4-Dichlorophenol	145	ug/kg	U
	105679	**2,4-Dimethylphenol**	**89.5**	**ug/kg**	
	51285	2,4-Dinitrophenol	723	ug/kg	U
	121142	2,4-Dinitrotoluene	361	ug/kg	U
	606202	2,6-Dinitrotoluene	361	ug/kg	U
	91587	2-Chloronaphthalene	72.3	ug/kg	U
	95578	2-Chlorophenol	72.3	ug/kg	U
	88744	2-Nitroaniline	361	ug/kg	U
	88755	2-Nitrophenol	361	ug/kg	U
	91941	3,3'-Dichlorobenzidine	289	ug/kg	U
	99092	3-Nitroaniline	361	ug/kg	U
	360689	3B-Coprostanol	1440	ug/kg	U
	534521	4,6-Dinitro-2-methylphenol	361	ug/kg	U
	101553	4-Bromophenyl-Phenylether	72.3	ug/kg	U
	59507	4-Chloro-3-methylphenol	145	ug/kg	U
	106478	4-Chloroaniline	72.3	ug/kg	U
	7005723	4-Chlorophenyl-Phenylether	72.3	ug/kg	U
	106445	**4-Methylphenol**	**101**	**ug/kg**	**J** Q
	100016	4-Nitroaniline	361	ug/kg	U
	100027	4-Nitrophenol	72.3	ug/kg	U
	86748	9H-Carbazole	72.3	ug/kg	U
	86737	9H-Fluorene	72.3	ug/kg	U
	83329	Acenaphthene	72.3	ug/kg	U
	208968	Acenaphthylene	72.3	ug/kg	U
	62533	Aniline	72.3	ug/kg	U
	120127	Anthracene	72.3	ug/kg	U
	1912249	Atrazine	145	ug/kg	U
	100527	**Benzaldehyde**	**135**	**ug/kg**	**J** L
	100516	Benzenemethanol	91.3	ug/kg	U
	56553	Benzo(a)anthracene	72.3	ug/kg	U
	50328	Benzo(a)pyrene	361	ug/kg	U
	191242	Benzo(g,h,i)perylene	145	ug/kg	U
	205992	Benzo[b]Fluoranthene	145	ug/kg	U
	207089	Benzo[k]fluoranthene	72.3	ug/kg	U

			Result	Units	Qlfr
Analytes :	**65850**	**Benzoic acid**	**794**	**ug/kg**	
	111444	bis(2-Chloroethyl)ether	72.3	ug/kg	U
	108601	BIS(2-CHLOROISOPROPYL)ETHER	72.3	ug/kg	U
	117817	Bis(2-ethylhexyl) phthalate	361	ug/kg	U
	85687	Butylbenzylphthalate	718	ug/kg	U
	58082	Caffeine	145	ug/kg	U
	105602	Caprolactam	72.3	ug/kg	U
	218019	Chrysene	72.3	ug/kg	U
	84742	Di-n-Butylphthalate	361	ug/kg	U
	117840	Di-n-octylphthalate	361	ug/kg	U
	53703	Dibenz[a,h]anthracene	72.3	ug/kg	U
	132649	Dibenzofuran	72.3	ug/kg	U
	84662	Diethyl phthalate	72.3	ug/kg	U
	131113	Dimethylphthalate	72.3	ug/kg	U
	98862	**Ethanone, 1-phenyl-**	**34.5**	**ug/kg**	**J** Q
	206440	Fluoranthene	72.3	ug/kg	U
	118741	Hexachlorobenzene	72.3	ug/kg	U
	87683	Hexachlorobutadiene	72.3	ug/kg	U
	77474	Hexachlorocyclopentadiene	72.3	ug/kg	U
	67721	Hexachloroethane	72.3	ug/kg	U
	193395	Indeno(1,2,3-cd)pyrene	361	ug/kg	U
	78591	Isophorone	72.3	ug/kg	U
	111911	Methane, bis(2-chloroethoxy)-	72.3	ug/kg	U
	62759	N-Nitrosodimethylamine	361	ug/kg	U
	621647	N-Nitrosodinpropylamine	72.3	ug/kg	U
	86306	n-Nitrosodiphenylamine	145	ug/kg	U
	91203	Naphthalene	72.3	ug/kg	U
	90120	**Naphthalene, 1-methyl-**	**15.4**	**ug/kg**	**J** Q
	91576	**Naphthalene, 2-methyl-**	**21.0**	**ug/kg**	**J** Q
	98953	Nitrobenzene	72.3	ug/kg	U
	87865	Pentachlorophenol	361	ug/kg	U
	85018	Phenanthrene	72.3	ug/kg	U
	108952	**Phenol**	**130**	**ug/kg**	
	95487	**Phenol, 2-methyl-**	**66.1**	**ug/kg**	**J** Q
	129000	**Pyrene**	**38.6**	**ug/kg**	**J** Q
	483658	**Retene**	**288**	**ug/kg**	
	321608	1,1'-Biphenyl, 2-fluoro-	87.8	%Rec	
	2199691	1,2-Dichlorobenzene-d4	67.5	%Rec	
	93951736	2-chlorophenol-d4	81.9	%Rec	
	1718521	D10-Pyrene	114	%Rec	
	4165600	Nitrobenzene-d5	81.6	%Rec	
	367124	Phenol, 2-fluoro-	80.6	%Rec	
	4165622	Phenol-d5	82.0	%Rec	
	1718510	Terphenyl-d14	98.3	%Rec	

Parameter : Semi-volatiles - Tentatives
Method : 8270-M BNA
Prep Method: 3510M/3540

Analytes :	**83476**	**.gamma.-Sitosterol**	**10100**	**ug/kg**	**NJ**

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

			Result	Units	Qlfr
Analytes :	119368	BENZOIC ACID, 2-HYDROXY-,MET	2850	ug/kg	NJ
	10219757	Naphthalene, 1,2,3,5,6,7,8,8a-octahydro-	22400	ug/kg	NJ
	17066670	Naphthalene, decahydro-4a-methyl-1-methy	1530	ug/kg	NJ
	109295	Oxacycloheptadecan-2-one	1140	ug/kg	NJ
	458355	Phenol, 4-(3-hydroxy-1-propenyl)-2-metho	2630	ug/kg	NJ
	2613890	Propanedioic acid, phenyl-	8740	ug/kg	NJ
	511159	Totarol	1400	ug/kg	NJ
	5989082	Tricyclo[5.4.0.02,8]undec-9	954	ug/kg	NJ
	*3008001	Unknown 01	7250	ug/kg	NJ
	*3008002	Unknown 02	2010	ug/kg	NJ
	*3008003	Unknown 03	1110	ug/kg	NJ
	*3008004	Unknown 04	3430	ug/kg	NJ
	*3008005	Unknown 05	1680	ug/kg	NJ
	*3008006	Unknown 06	5340	ug/kg	NJ
	*3008007	Unknown 07	759	ug/kg	NJ
	*3008008	Unknown 08	1380	ug/kg	NJ
	*3008009	Unknown 09	728	ug/kg	NJ
	*3008010	Unknown 10	332	ug/kg	NJ
	*3008011	Unknown 11	3520	ug/kg	NJ
	*3008012	Unknown 12	1040	ug/kg	NJ
	*3008013	Unknown 13	990	ug/kg	NJ
	*3008014	Unknown 14	3340	ug/kg	NJ
	*3008015	Unknown 15	3680	ug/kg	NJ
	*3008016	Unknown 16	1740	ug/kg	NJ
	*3008017	Unknown 17	2750	ug/kg	NJ
	*3008018	Unknown 18	1910	ug/kg	NJ

Project Code:	TEC-765A	**Collected:**	10/23/00
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	00434214
Account Code:	01T10P50102D10ZZLA00	**Type:**	Reg sample
Station Description:	DA-03-SS		

GCMS

Parameter : Semi-volatiles
Method : 8270-M BNA
Prep Method: 3510M/3540

Analytes		Result	Units	Qlfr
92524	1,1'-Biphenyl	53.2	ug/kg	U
95954	2,4,5-Trichlorophenol	106	ug/kg	U
88062	2,4,6-Trichlorophenol	266	ug/kg	U
120832	2,4-Dichlorophenol	106	ug/kg	U
105679	**2,4-Dimethylphenol**	**166**	**ug/kg**	
51285	2,4-Dinitrophenol	532	ug/kg	U
121142	2,4-Dinitrotoluene	266	ug/kg	U
606202	2,6-Dinitrotoluene	266	ug/kg	U
91587	2-Chloronaphthalene	53.2	ug/kg	U
95578	2-Chlorophenol	53.2	ug/kg	U
88744	2-Nitroaniline	266	ug/kg	U
88755	2-Nitrophenol	266	ug/kg	U
91941	3,3'-Dichlorobenzidine	213	ug/kg	U
99092	3-Nitroaniline	266	ug/kg	U
360689	**3B-Coprostanol**	**1170**	**ug/kg**	
534521	4,6-Dinitro-2-methylphenol	266	ug/kg	U
101553	4-Bromophenyl-Phenylether	53.2	ug/kg	U
59507	4-Chloro-3-methylphenol	106	ug/kg	U
106478	4-Chloroaniline	53.2	ug/kg	U
7005723	4-Chlorophenyl-Phenylether	53.2	ug/kg	U
106445	**4-Methylphenol**	**158**	**ug/kg**	
100016	4-Nitroaniline	266	ug/kg	U
100027	4-Nitrophenol	53.2	ug/kg	U
86748	9H-Carbazole	53.2	ug/kg	U
86737	9H-Fluorene	53.2	ug/kg	U
83329	Acenaphthene	53.2	ug/kg	U
208968	Acenaphthylene	53.2	ug/kg	U
62533	Aniline	53.2	ug/kg	U
120127	Anthracene	53.2	ug/kg	U
1912249	Atrazine	106	ug/kg	U
100527	**Benzaldehyde**	**37.4**	**ug/kg**	**J**
100516	Benzenemethanol	53.2	ug/kg	U
56553	Benzo(a)anthracene	53.2	ug/kg	U
50328	Benzo(a)pyrene	266	ug/kg	U
191242	Benzo(g,h,i)perylene	106	ug/kg	U
205992	Benzo[b]Fluoranthene	106	ug/kg	U
207089	Benzo[k]fluoranthene	53.2	ug/kg	U

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Report by Parameter for Project TEC-765A

			Result	Units	Qlfr
Analytes :	**65850**	**Benzoic acid**	**539**	**ug/kg**	
	111444	bis(2-Chloroethyl)ether	53.2	ug/kg	U
	108601	BIS(2-CHLOROISOPROPYL)ETHER	53.2	ug/kg	U
	117817	Bis(2-ethylhexyl) phthalate	296	ug/kg	U
	85687	Butylbenzylphthalate	266	ug/kg	U
	58082	Caffeine	106	ug/kg	U
	105602	Caprolactam	53.2	ug/kg	U
	218019	Chrysene	53.2	ug/kg	U
	84742	Di-n-Butylphthalate	266	ug/kg	U
	117840	Di-n-octylphthalate	266	ug/kg	U
	53703	Dibenz[a,h]anthracene	53.2	ug/kg	U
	132649	**Dibenzofuran**	**10.9**	**ug/kg**	J Q
	84662	Diethyl phthalate	53.2	ug/kg	U
	131113	Dimethylphthalate	53.2	ug/kg	U
	98862	**Ethanone, 1-phenyl-**	**10.1**	**ug/kg**	J Q
	206440	**Fluoranthene**	**21.3**	**ug/kg**	J Q
	118741	Hexachlorobenzene	53.2	ug/kg	U
	87683	Hexachlorobutadiene	53.2	ug/kg	U
	77474	Hexachlorocyclopentadiene	53.2	ug/kg	U
	67721	Hexachloroethane	53.2	ug/kg	U
	193395	**Indeno(1,2,3-cd)pyrene**	**186**	**ug/kg**	J Q
	78591	Isophorone	53.2	ug/kg	U
	111911	Methane, bis(2-chloroethoxy)-	53.2	ug/kg	U
	62759	N-Nitrosodimethylamine	266	ug/kg	U
	621647	N-Nitrosodinpropylamine	53.2	ug/kg	U
	86306	n-Nitrosodiphenylamine	106	ug/kg	U
	91203	Naphthalene	53.2	ug/kg	U
	90120	**Naphthalene, 1-methyl-**	**12.5**	**ug/kg**	J Q
	91576	**Naphthalene, 2-methyl-**	**22.8**	**ug/kg**	J Q
	98953	Nitrobenzene	53.2	ug/kg	U
	87865	Pentachlorophenol	266	ug/kg	U
	85018	Phenanthrene	53.2	ug/kg	U
	108952	**Phenol**	**70.1**	**ug/kg**	
	95487	**Phenol, 2-methyl-**	**51.1**	**ug/kg**	J Q
	129000	**Pyrene**	**19.2**	**ug/kg**	J Q
	483658	**Retene**	**160**	**ug/kg**	
	321608	1,1'-Biphenyl, 2-fluoro-	95.5	%Rec	
	2199691	1,2-Dichlorobenzene-d4	71.8	%Rec	
	93951736	2-chlorophenol-d4	84.4	%Rec	
	1718521	D10-Pyrene	111	%Rec	
	4165600	Nitrobenzene-d5	87.5	%Rec	
	367124	Phenol, 2-fluoro-	85.4	%Rec	
	4165622	Phenol-d5	85.8	%Rec	
	1718510	Terphenyl-d14	96.5	%Rec	

Parameter : *Semi-volatiles - Tentatives*
Method : 8270-M BNA
Prep Method : 3510M/3540

Analytes :	**81209**	**1,3-Dimethyl-Nitrobenzene**	**340**	**ug/kg**	**NJ**

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

			Result	Units	Qlfr
Analytes :	112185	1-Dodecanamine, N,N-dimethyl-	469	ug/kg	NJ
	112754	1-Tetradecanamine, N,N-dimethy l-	1170	ug/kg	NJ
	54576362	Benzene, 1-methyl-3-[(2-methyl propyl)thi	1840	ug/kg	NJ
	95169	Benzothiazole	552	ug/kg	NJ
	615225	Benzothiazole, 2-(methylthio)-	548	ug/kg	NJ
	1125128	Bicyclo[3.1.0]hexan-3-one, 4-m ethyl-1-(1	345	ug/kg	NJ
	475207	Junipene	7630	ug/kg	NJ
	544638	Tetradecanoic acid	486	ug/kg	NJ
	511159	Totarol	2140	ug/kg	NJ
	5989082	Tricyclo[5.4.0.02,8]undec-9	487	ug/kg	NJ
	*3008001	Unknown 01	1990	ug/kg	NJ
	*3008002	Unknown 02	568	ug/kg	NJ
	*3008003	Unknown 03	1890	ug/kg	NJ
	*3008004	Unknown 04	790	ug/kg	NJ
	*3008005	Unknown 05	2570	ug/kg	NJ
	*3008006	Unknown 06	514	ug/kg	NJ
	*3008007	Unknown 07	815	ug/kg	NJ
	*3008008	Unknown 08	535	ug/kg	NJ
	*3008009	Unknown 09	899	ug/kg	NJ
	*3008010	Unknown 10	886	ug/kg	NJ
	*3008011	Unknown 11	583	ug/kg	NJ
	*3008012	Unknown 12	5620	ug/kg	NJ
	*3008013	Unknown 13	1420	ug/kg	NJ
	*3008014	Unknown 14	363	ug/kg	NJ

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code:	TEC-765A	**Collected:**	10/23/00
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	00434215
Account Code:	01T10P50102D10ZZLA00	**Type:**	Reg sample
Station Description:	DA-04-SS		

GCMS

Parameter : Semi-volatiles
Method : 8270-M BNA
Prep Method: 3510M/3540
Analytes :

		Result	Units	Qlfr
92524	1;1'-Biphenyl	29.8	ug/kg	U
95954	2,4,5-Trichlorophenol	59.7	ug/kg	U
88062	2,4,6-Trichlorophenol	149	ug/kg	U
120832	2,4-Dichlorophenol	59.7	ug/kg	U
105679	**2,4-Dimethylphenol**	**778**	**ug/kg**	
51285	2,4-Dinitrophenol	298	ug/kg	U
121142	2,4-Dinitrotoluene	149	ug/kg	U
606202	2,6-Dinitrotoluene	149	ug/kg	U
91587	2-Chloronaphthalene	29.8	ug/kg	U
95578	2-Chlorophenol	29.8	ug/kg	U
88744	2-Nitroaniline	149	ug/kg	U
88755	2-Nitrophenol	149	ug/kg	U
91941	3,3'-Dichlorobenzidine	119	ug/kg	U
99092	3-Nitroaniline	149	ug/kg	U
360689	3B-Coprostanol	597	ug/kg	U
534521	4,6-Dinitro-2-methylphenol	149	ug/kg	U
101553	4-Bromophenyl-Phenylether	29.8	ug/kg	U
59507	4-Chloro-3-methylphenol	59.7	ug/kg	U
106478	4-Chloroaniline	29.8	ug/kg	U
7005723	4-Chlorophenyl-Phenylether	29.8	ug/kg	U
106445	**4-Methylphenol**	**277**	**ug/kg**	
100016	4-Nitroaniline	149	ug/kg	U
100027	4-Nitrophenol	29.8	ug/kg	U
86748	9H-Carbazole	29.8	ug/kg	U
86737	9H-Fluorene	29.8	ug/kg	U
83329	Acenaphthene	29.8	ug/kg	U
208968	Acenaphthylene	29.8	ug/kg	U
62533	Aniline	29.8	ug/kg	U
120127	**Anthracene**	**7.5**	**ug/kg**	**J** Q
1912249	Atrazine	59.7	ug/kg	U
100527	**Benzaldehyde**	**52.9**	**ug/kg**	**J** Q
100516	Benzenemethanol	29.8	ug/kg	U
56553	Benzo(a)anthracene	29.8	ug/kg	U
50328	Benzo(a)pyrene	149	ug/kg	U
191242	Benzo(g,h,i)perylene	59.7	ug/kg	U
205992	**Benzo[b]Fluoranthene**	**76.7**	**ug/kg**	
207089	Benzo[k]fluoranthene	29.8	ug/kg	U

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

			Result	Units	Qlfr
Analytes :	**65850**	**Benzoic acid**	**256**	**ug/kg**	**J** Q
	111444	bis(2-Chloroethyl)ether	29.8	ug/kg	U
	108601	BIS(2-CHLOROISOPROPYL)ETHER	29.8	ug/kg	U
	117817	Bis(2-ethylhexyl) phthalate	149	ug/kg	U
	85687	Butylbenzylphthalate	149	ug/kg	U
	58082	Caffeine	59.7	ug/kg	U
	105602	Caprolactam	29.8	ug/kg	U
	218019	**Chrysene**	**70.6**	**ug/kg**	
	84742	Di-n-Butylphthalate	149	ug/kg	U
	117840	Di-n-octylphthalate	149	ug/kg	U
	53703	Dibenz[a,h]anthracene	29.8	ug/kg	U
	132649	**Dibenzofuran**	**18.6**	**ug/kg**	**J** Q
	84662	Diethyl phthalate	29.8	ug/kg	U
	131113	Dimethylphthalate	29.8	ug/kg	U
	98862	**Ethanone, 1-phenyl-**	**16.3**	**ug/kg**	**J** Q
	206440	**Fluoranthene**	**24.3**	**ug/kg**	**J** Q
	118741	Hexachlorobenzene	29.8	ug/kg	U
	87683	Hexachlorobutadiene	29.8	ug/kg	U
	77474	Hexachlorocyclopentadiene	29.8	ug/kg	U
	67721	Hexachloroethane	29.8	ug/kg	U
	193395	Indeno(1,2,3-cd)pyrene	149	ug/kg	U
	78591	Isophorone	29.8	ug/kg	U
	111911	Methane, bis(2-chloroethoxy)-	29.8	ug/kg	U
	62759	N-Nitrosodimethylamine	149	ug/kg	U
	621647	N-Nitrosodinpropylamine	29.8	ug/kg	U
	86306	n-Nitrosodiphenylamine	59.7	ug/kg	U
	91203	**Naphthalene**	**31.0**	**ug/kg**	
	90120	**Naphthalene, 1-methyl-**	**31.5**	**ug/kg**	
	91576	**Naphthalene, 2-methyl-**	**51.1**	**ug/kg**	
	98953	Nitrobenzene	29.8	ug/kg	U
	87865	Pentachlorophenol	149	ug/kg	U
	85018	**Phenanthrene**	**33.3**	**ug/kg**	
	108952	**Phenol**	**41.1**	**ug/kg**	
	95487	**Phenol, 2-methyl-**	**196**	**ug/kg**	
	129000	**Pyrene**	**43.8**	**ug/kg**	
	483658	**Retene**	**358**	**ug/kg**	
	321608	1,1'-Biphenyl, 2-fluoro-	92.5	%Rec	
	2199691	1,2-Dichlorobenzene-d4	71.4	%Rec	
	93951736	2-chlorophenol-d4	91.6	%Rec	
	1718521	D10-Pyrene	115	%Rec	
	4165600	Nitrobenzene-d5	86.5	%Rec	
	367124	Phenol, 2-fluoro-	93.3	%Rec	
	4165622	Phenol-d5	95.9	%Rec	
	1718510	Terphenyl-d14	99.9	%Rec	

Parameter : Semi-volatiles - Tentatives
Method : 8270-M BNA
Prep Method : 3510M/3540

Analytes :	**83476**	**.gamma.-Sitosterol**	**1110**	**ug/kg**	**NJ**

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

			Result	Units	Qlfr
Analytes :	1515953	Benzene, 1-ethyl-4-methoxy-	130	ug/kg	NJ
	58037879	Bicyclo[3.1.0]hexane, 4-methyl -1-(1-meth	113	ug/kg	NJ
	122623	Decanedioic acid, bis(2-ethylh exyl) este	1860	ug/kg	NJ
	526750	Phenol, 2,3-dimethyl-	399	ug/kg	NJ
	1058613	Stigmast-4-en-3-one	684	ug/kg	NJ
	*3008001	Unknown 01	123	ug/kg	NJ
	*3008002	Unknown 02	961	ug/kg	NJ
	*3005001	Unknown Hydrocarbon 01	110	ug/kg	NJ
	*3005002	Unknown Hydrocarbon 02	136	ug/kg	NJ
	*3005003	Unknown Hydrocarbon 03	462	ug/kg	NJ
	*3005004	Unknown Hydrocarbon 04	109	ug/kg	NJ
	121335	Vanillin	267	ug/kg	NJ

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code:	TEC-765A	**Collected:**	10/23/00
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	00434216
Account Code:	01T10P50102D10ZZLA00	**Type:**	Reg sample
Station Description:	DA-05-SS		

GCMS

Parameter : Semi-volatiles
Method : 8270-M BNA
Prep Method: 3510M/3540

			Result	Units	Qlfr
Analytes :	92524	1,1'-Biphenyl	36.7	ug/kg	U
	95954	2,4,5-Trichlorophenol	73.4	ug/kg	U
	88062	2,4,6-Trichlorophenol	184	ug/kg	U
	120832	2,4-Dichlorophenol	73.4	ug/kg	U
	105679	**2,4-Dimethylphenol**	**161**	**ug/kg**	
	51285	2,4-Dinitrophenol	367	ug/kg	U
	121142	2,4-Dinitrotoluene	184	ug/kg	U
	606202	2,6-Dinitrotoluene	184	ug/kg	U
	91587	2-Chloronaphthalene	36.7	ug/kg	U
	95578	2-Chlorophenol	36.7	ug/kg	U
	88744	2-Nitroaniline	184	ug/kg	U
	88755	2-Nitrophenol	184	ug/kg	U
	91941	3,3'-Dichlorobenzidine	147	ug/kg	U
	99092	3-Nitroaniline	184	ug/kg	U
	360689	3B-Coprostanol	734	ug/kg	U
	534521	4,6-Dinitro-2-methylphenol	184	ug/kg	U
	101553	4-Bromophenyl-Phenylether	36.7	ug/kg	U
	59507	4-Chloro-3-methylphenol	73.4	ug/kg	U
	106478	4-Chloroaniline	36.7	ug/kg	U
	7005723	4-Chlorophenyl-Phenylether	36.7	ug/kg	U
	106445	**4-Methylphenol**	**124**	**ug/kg**	
	100016	4-Nitroaniline	184	ug/kg	U
	100027	4-Nitrophenol	36.7	ug/kg	U
	86748	9H-Carbazole	36.7	ug/kg	U
	86737	9H-Fluorene	36.7	ug/kg	U
	83329	Acenaphthene	36.7	ug/kg	U
	208968	Acenaphthylene	36.7	ug/kg	U
	62533	Aniline	36.7	ug/kg	U
	120127	Anthracene	36.7	ug/kg	U
	1912249	Atrazine	73.4	ug/kg	U
	100527	**Benzaldehyde**	**5.3**	**ug/kg**	**J Q**
	100516	Benzenemethanol	36.7	ug/kg	U
	56553	Benzo(a)anthracene	36.7	ug/kg	U
	50328	Benzo(a)pyrene	184	ug/kg	U
	191242	Benzo(g,h,i)perylene	73.4	ug/kg	U
	205992	Benzo[b]Fluoranthene	73.4	ug/kg	U
	207089	Benzo[k]fluoranthene	36.7	ug/kg	U

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

			Result	Units	Qlfr
Analytes :	65850	Benzoic acid	367	ug/kg	U
	111444	bis(2-Chloroethyl)ether	36.7	ug/kg	U
	108601	BIS(2-CHLOROISOPROPYL)ETHER	36.7	ug/kg	U
	117817	Bis(2-ethylhexyl) phthalate	184	ug/kg	U
	85687	Butylbenzylphthalate	184	ug/kg	U
	58082	Caffeine	73.4	ug/kg	U
	105602	Caprolactam	36.7	ug/kg	U
	218019	Chrysene	36.7	ug/kg	U
	84742	Di-n-Butylphthalate	184	ug/kg	U
	117840	Di-n-octylphthalate	184	ug/kg	U
	53703	Dibenz[a,h]anthracene	36.7	ug/kg	U
	132649	Dibenzofuran	36.7	ug/kg	U
	84662	Diethyl phthalate	36.7	ug/kg	U
	131113	Dimethylphthalate	36.7	ug/kg	U
	98862	Ethanone, 1-phenyl-	36.7	ug/kg	U
	206440	Fluoranthene	36.7	ug/kg	U
	118741	Hexachlorobenzene	36.7	ug/kg	U
	87683	Hexachlorobutadiene	36.7	ug/kg	U
	77474	Hexachlorocyclopentadiene	36.7	ug/kg	U
	67721	Hexachloroethane	36.7	ug/kg	U
	193395	Indeno(1,2,3-cd)pyrene	184	ug/kg	U
	78591	Isophorone	36.7	ug/kg	U
	111911	Methane, bis(2-chloroethoxy)-	36.7	ug/kg	U
	62759	N-Nitrosodimethylamine	184	ug/kg	U
	621647	N-Nitrosodinpropylamine	36.7	ug/kg	U
	86306	n-Nitrosodiphenylamine	73.4	ug/kg	U
	91203	Naphthalene	36.7	ug/kg	U
	90120	Naphthalene, 1-methyl-	36.7	ug/kg	U
	91576	Naphthalene, 2-methyl-	36.7	ug/kg	U
	98953	Nitrobenzene	36.7	ug/kg	U
	87865	Pentachlorophenol	184	ug/kg	U
	85018	Phenanthrene	36.7	ug/kg	U
	108952	**Phenol**	**43.3**	**ug/kg**	
	95487	**Phenol, 2-methyl-**	**25.6**	**ug/kg**	**J** Q
	129000	Pyrene	36.7	ug/kg	U
	483658	Retene	36.7	ug/kg	U
	321608	1,1'-Biphenyl, 2-fluoro-	89.5	%Rec	
	2199691	1,2-Dichlorobenzene-d4	66.4	%Rec	
	93951736	2-chlorophenol-d4	88.8	%Rec	
	1718521	D10-Pyrene	114	%Rec	
	4165600	Nitrobenzene-d5	85.4	%Rec	
	367124	Phenol, 2-fluoro-	94.4	%Rec	
	4165622	Phenol-d5	93.5	%Rec	
	1718510	Terphenyl-d14	99.5	%Rec	

Parameter : Semi-volatiles - Tentatives
Method : 8270-M BNA
Prep Method : 3510M/3540

Analytes :	**83476**	**.gamma.-Sitosterol**	**1560**	**ug/kg**	**NJ**

00434216 Reg sample

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

			Result	Units	Qlfr
Analytes	: 489394	1H-Cycloprop[e]azulene, decahydro-1,1,7-	460	ug/kg	NJ
	149304	2-Mercaptobenzothiazole	210	ug/kg	NJ
	95169	Benzothiazole	134	ug/kg	NJ
	511159	Totarol	151	ug/kg	NJ
	*3008001	Unknown 01	135	ug/kg	NJ
	*3008002	Unknown 02	1140	ug/kg	NJ
	*3008003	Unknown 03	618	ug/kg	NJ
	*3008004	Unknown 04	857	ug/kg	NJ

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code:	TEC-765A	**Collected:**	10/23/00
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	00434217
Account Code:	01T10P50102D10ZZLA00	**Type:**	Reg sample
Station Description:	DA-06-SS		

GCMS

Parameter : Semi-volatiles
Method : 8270-M BNA
Prep Method: 3510M/3540
Analytes :

		Result	Units	Qlfr
106478	4-Chloroaniline			R
77474	Hexachlorocyclopentadiene			R
92524	1,1'-Biphenyl	38.1	ug/kg	U
95954	2,4,5-Trichlorophenol	76.1	ug/kg	U
88062	2,4,6-Trichlorophenol	190	ug/kg	U
120832	2,4-Dichlorophenol	76.1	ug/kg	U
105679	**2,4-Dimethylphenol**	**278**	**ug/kg**	
51285	2,4-Dinitrophenol	381	ug/kg	U
121142	2,4-Dinitrotoluene	190	ug/kg	U
606202	2,6-Dinitrotoluene	190	ug/kg	U
91587	2-Chloronaphthalene	38.1	ug/kg	U
95578	2-Chlorophenol	38.1	ug/kg	U
88744	2-Nitroaniline	190	ug/kg	U
88755	2-Nitrophenol	190	ug/kg	U
91941	3,3'-Dichlorobenzidine	152	ug/kg	UJ K
99092	3-Nitroaniline	190	ug/kg	UJ K
360689	3B-Coprostanol	761	ug/kg	U
534521	4,6-Dinitro-2-methylphenol	190	ug/kg	U
101553	4-Bromophenyl-Phenylether	38.1	ug/kg	U
59507	4-Chloro-3-methylphenol	76.1	ug/kg	U
7005723	4-Chlorophenyl-Phenylether	38.1	ug/kg	U
106445	**4-Methylphenol**	**138**	**ug/kg**	
100016	4-Nitroaniline	190	ug/kg	UJ K
100027	4-Nitrophenol	38.1	ug/kg	U
86748	9H-Carbazole	38.1	ug/kg	U
86737	9H-Fluorene	38.1	ug/kg	U
83329	**Acenaphthene**	**30.3**	**ug/kg**	J Q
208968	Acenaphthylene	38.1	ug/kg	U
62533	Aniline	38.1	ug/kg	UJ K
120127	Anthracene	38.1	ug/kg	U
1912249	Atrazine	76.1	ug/kg	U
100527	**Benzaldehyde**	**26.2**	**ug/kg**	J Q
100516	Benzenemethanol	38.1	ug/kg	U
56553	Benzo(a)anthracene	38.1	ug/kg	U
50328	Benzo(a)pyrene	190	ug/kg	U
191242	Benzo(g,h,i)perylene	76.1	ug/kg	U
205992	Benzo[b]Fluoranthene	76.1	ug/kg	U

			Result	Units	Qlfr
Analytes :	207089	Benzo[k]fluoranthene	38.1	ug/kg	U
	65850	Benzoic acid	381	ug/kg	UJ K
	111444	bis(2-Chloroethyl)ether	38.1	ug/kg	U
	108601	BIS(2-CHLOROISOPROPYL)ETHER	38.1	ug/kg	U
	117817	Bis(2-ethylhexyl) phthalate	190	ug/kg	U
	85687	Butylbenzylphthalate	190	ug/kg	U
	58082	Caffeine	76.1	ug/kg	U
	105602	Caprolactam	38.1	ug/kg	U
	218019	Chrysene	38.1	ug/kg	U
	84742	Di-n-Butylphthalate	190	ug/kg	U
	117840	Di-n-octylphthalate	190	ug/kg	U
	53703	Dibenz[a,h]anthracene	38.1	ug/kg	U
	132649	**Dibenzofuran**	**41.8**	**ug/kg**	
	84662	Diethyl phthalate	38.1	ug/kg	U
	131113	Dimethylphthalate	38.1	ug/kg	U
	98862	**Ethanone, 1-phenyl-**	**10.9**	**ug/kg**	J Q
	206440	**Fluoranthene**	**11.2**	**ug/kg**	J Q
	118741	Hexachlorobenzene	38.1	ug/kg	U
	87683	Hexachlorobutadiene	38.1	ug/kg	U
	67721	Hexachloroethane	38.1	ug/kg	UJ K
	193395	Indeno(1,2,3-cd)pyrene	190	ug/kg	U
	78591	Isophorone	381	ug/kg	U
	111911	Methane, bis(2-chloroethoxy)-	38.1	ug/kg	U
	62759	N-Nitrosodimethylamine	190	ug/kg	U
	621647	N-Nitrosodinpropylamine	38.1	ug/kg	U
	86306	n-Nitrosodiphenylamine	76.1	ug/kg	U
	91203	Naphthalene	38.1	ug/kg	U
	90120	**Naphthalene, 1-methyl-**	**54.6**	**ug/kg**	
	91576	**Naphthalene, 2-methyl-**	**139**	**ug/kg**	
	98953	Nitrobenzene	38.1	ug/kg	U
	87865	Pentachlorophenol	190	ug/kg	U
	85018	**Phenanthrene**	**19.2**	**ug/kg**	J Q
	108952	**Phenol**	**46.3**	**ug/kg**	
	95487	**Phenol, 2-methyl-**	**56.5**	**ug/kg**	
	129000	**Pyrene**	**11.1**	**ug/kg**	J Q
	483658	**Retene**	**220**	**ug/kg**	
	321608	1,1'-Biphenyl, 2-fluoro-	89.2	%Rec	
	2199691	1,2-Dichlorobenzene-d4	73.9	%Rec	
	93951736	2-chlorophenol-d4	87.9	%Rec	
	1718521	D10-Pyrene	110	%Rec	
	4165600	Nitrobenzene-d5	89.4	%Rec	
	367124	Phenol, 2-fluoro-	93.8	%Rec	
	4165622	Phenol-d5	94.9	%Rec	
	1718510	Terphenyl-d14	101	%Rec	

Parameter : Semi-volatiles - Tentatives
Method : 8270-M BNA
Prep Method: 3510M/3540

Analytes :	**83476**	**.gamma.-Sitosterol**	**9180**	**ug/kg**	**NJ**

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

			Result	Units	Qlfr
Analytes	: 4914914	2-Pentene, 3,4-dimethyl-, (Z)-	31500	ug/kg	NJ
	1534083	Ethanethioic acid, S-methyl es ter	404	ug/kg	NJ
	2613890	Propanedioic acid, phenyl-	2190	ug/kg	NJ
	1058613	Stigmast-4-en-3-one	3480	ug/kg	NJ
	*3008001	Unknown 01	232	ug/kg	NJ
	*3008002	Unknown 02	282	ug/kg	NJ
	*3008003	Unknown 03	220	ug/kg	NJ
	*3008004	Unknown 04	250	ug/kg	NJ
	*3008005	Unknown 05	157	ug/kg	NJ
	*3008006	Unknown 06	192	ug/kg	NJ
	*3008007	Unknown 07	1440	ug/kg	NJ
	*3008008	Unknown 08	1930	ug/kg	NJ
	*3008009	Unknown 09	5510	ug/kg	NJ
	*3008010	Unknown 10	5440	ug/kg	NJ
	*3008011	Unknown 11	2640	ug/kg	NJ
	*3008012	Unknown 12	1060	ug/kg	NJ
	*3008013	Unknown 13	2030	ug/kg	NJ
	*3005001	Unknown Hydrocarbon 01	223	ug/kg	NJ
	*3005002	Unknown Hydrocarbon 02	279	ug/kg	NJ

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code: TEC-765A
Project Name: GRANDVIEW MINE
Project Officer: JOANNE LABAW
Account Code: 01T10P50102D10ZZLA00
Station Description:

Collected:
Matrix: Solid
Sample Number: 00434217
Type: Matrix Spike

GCMS

Parameter : Semi-volatiles
Method : 8270-M BNA
Prep Method: 3510M/3540

			Result	Units	Qlfr
Analytes :	321608	1,1'-Biphenyl, 2-fluoro-			NAR
	2199691	1,2-Dichlorobenzene-d4			NAR
	93951736	2-chlorophenol-d4			NAR
	1718521	D10-Pyrene			NAR
	4165600	Nitrobenzene-d5			NAR
	367124	Phenol, 2-fluoro-			NAR
	4165622	Phenol-d5			NAR
	1718510	Terphenyl-d14			NAR
	95954	2,4,5-Trichlorophenol	84.1	%Rec	
	88062	2,4,6-Trichlorophenol	85.3	%Rec	
	120832	2,4-Dichlorophenol	87.9	%Rec	
	105679	2,4-Dimethylphenol	79.9	%Rec	
	51285	2,4-Dinitrophenol	63.4	%Rec	
	121142	2,4-Dinitrotoluene	82.5	%Rec	
	606202	2,6-Dinitrotoluene	79.4	%Rec	
	91587	2-Chloronaphthalene	78.3	%Rec	
	95578	2-Chlorophenol	84.5	%Rec	
	88744	2-Nitroaniline	90.2	%Rec	
	88755	2-Nitrophenol	80.0	%Rec	
	91941	3,3'-Dichlorobenzidine	39.6	%Rec	
	99092	3-Nitroaniline	36.5	%Rec	
	534521	4,6-Dinitro-2-methylphenol	75.4	%Rec	
	101553	4-Bromophenyl-Phenylether	86.1	%Rec	
	59507	4-Chloro-3-methylphenol	89.2	%Rec	
	106478	4-Chloroaniline	10.6	%Rec	
	7005723	4-Chlorophenyl-Phenylether	77.7	%Rec	
	106445	4-Methylphenol	99.8	%Rec	
	100016	4-Nitroaniline	44.5	%Rec	
	100027	4-Nitrophenol	92.5	%Rec	
	86748	9H-Carbazole	94.5	%Rec	
	86737	9H-Fluorene	83.8	%Rec	
	83329	Acenaphthene	82.5	%Rec	
	208968	Acenaphthylene	82.9	%Rec	
	62533	Aniline	18.1	%Rec	
	120127	Anthracene	81.5	%Rec	
	100516	Benzenemethanol	92.0	%Rec	
	56553	Benzo(a)anthracene	91.8	%Rec	

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

			Result	Units	Qlfr
Analytes :	50328	Benzo(a)pyrene	86.8	%Rec	
	191242	Benzo(g,h,i)perylene	83.7	%Rec	
	205992	Benzo[b]Fluoranthene	91.0	%Rec	
	207089	Benzo[k]fluoranthene	86.9	%Rec	
	65850	Benzoic acid	32.5	%Rec	
	111444	bis(2-Chloroethyl)ether	67.7	%Rec	
	108601	BIS(2-CHLOROISOPROPYL)ETHER	66.5	%Rec	
	117817	Bis(2-ethylhexyl) phthalate	76.5	%Rec	
	85687	Butylbenzylphthalate	80.4	%Rec	
	218019	Chrysene	86.4	%Rec	
	84742	Di-n-Butylphthalate	91.7	%Rec	
	117840	Di-n-octylphthalate	87.6	%Rec	J
	53703	Dibenz[a,h]anthracene	83.6	%Rec	
	132649	Dibenzofuran	80.4	%Rec	
	84662	Diethyl phthalate	81.1	%Rec	
	131113	Dimethylphthalate	83.9	%Rec	
	206440	Fluoranthene	88.5	%Rec	
	118741	Hexachlorobenzene	83.9	%Rec	
	87683	Hexachlorobutadiene	62.5	%Rec	
	77474	Hexachlorocyclopentadiene	0.0	%Rec	
	67721	Hexachloroethane	46.5	%Rec	
	193395	Indeno(1,2,3-cd)pyrene	83.0	%Rec	
	78591	Isophorone	56.5	%Rec	
	111911	Methane, bis(2-chloroethoxy)-	78.2	%Rec	
	62759	N-Nitrosodimethylamine	58.2	%Rec	
	621647	N-Nitrosodinpropylamine	81.6	%Rec	
	86306	n-Nitrosodiphenylamine	90.8	%Rec	
	91203	Naphthalene	73.0	%Rec	
	91576	Naphthalene, 2-methyl-	78.5	%Rec	
	98953	Nitrobenzene	71.9	%Rec	
	87865	Pentachlorophenol	87.2	%Rec	
	85018	Phenanthrene	87.4	%Rec	
	108952	Phenol	79.7	%Rec	
	95487	Phenol, 2-methyl-	81.4	%Rec	
	129000	Pyrene	85.2	%Rec	

Project Code: TEC-765A
Project Name: GRANDVIEW MINE
Project Officer: JOANNE LABAW
Account Code: 01T10P50102D10ZZLA00
Station Description:

Collected:
Matrix: Solid
Sample Number: 00434217
Type: Matrix Spike Dupl

GCMS

Parameter : Semi-volatiles
Method : 8270-M BNA
Prep Method: 3510M/3540

Analytes		Result	Units	Qlfr
321608	1,1'-Biphenyl, 2-fluoro-			NAR
2199691	1,2-Dichlorobenzene-d4			NAR
93951736	2-chlorophenol-d4			NAR
1718521	D10-Pyrene			NAR
4165600	Nitrobenzene-d5			NAR
367124	Phenol, 2-fluoro-			NAR
4165622	Phenol-d5			NAR
1718510	Terphenyl-d14			NAR
95954	2,4,5-Trichlorophenol	98.6	%Rec	
88062	2,4,6-Trichlorophenol	100	%Rec	
120832	2,4-Dichlorophenol	99.2	%Rec	
105679	2,4-Dimethylphenol	91.9	%Rec	
51285	2,4-Dinitrophenol	68.2	%Rec	
121142	2,4-Dinitrotoluene	98.8	%Rec	
606202	2,6-Dinitrotoluene	94.0	%Rec	
91587	2-Chloronaphthalene	91.3	%Rec	
95578	2-Chlorophenol	96.9	%Rec	
88744	2-Nitroaniline	99.6	%Rec	
88755	2-Nitrophenol	93.7	%Rec	
91941	3,3'-Dichlorobenzidine	28.7	%Rec	
99092	3-Nitroaniline	35.2	%Rec	
534521	4,6-Dinitro-2-methylphenol	82.1	%Rec	
101553	4-Bromophenyl-Phenylether	100	%Rec	
59507	4-Chloro-3-methylphenol	105	%Rec	
106478	4-Chloroaniline	8.5	%Rec	
7005723	4-Chlorophenyl-Phenylether	92.2	%Rec	
106445	4-Methylphenol	115	%Rec	
100016	4-Nitroaniline	34.3	%Rec	
100027	4-Nitrophenol	107	%Rec	
86748	9H-Carbazole	109	%Rec	
86737	9H-Fluorene	100	%Rec	
83329	Acenaphthene	95.2	%Rec	
208968	Acenaphthylene	93.4	%Rec	
62533	Aniline	14.1	%Rec	
120127	Anthracene	91.5	%Rec	
100516	Benzenemethanol	104	%Rec	
56553	Benzo(a)anthracene	96.2	%Rec	

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

			Result	Units	Qlfr
Analytes	: 50328	Benzo(a)pyrene	93.0	%Rec	
	191242	Benzo(g,h,i)perylene	89.8	%Rec	
	205992	Benzo[b]Fluoranthene	107	%Rec	
	207089	Benzo[k]fluoranthene	86.7	%Rec	
	65850	Benzoic acid	30.3	%Rec	
	111444	bis(2-Chloroethyl)ether	75.0	%Rec	
	108601	BIS(2-CHLOROISOPROPYL)ETHER	73.4	%Rec	
	117817	Bis(2-ethylhexyl) phthalate	85.2	%Rec	
	85687	Butylbenzylphthalate	92.1	%Rec	
	218019	Chrysene	96.7	%Rec	
	84742	Di-n-Butylphthalate	103	%Rec	
	117840	Di-n-octylphthalate	94.8	%Rec	J
	53703	Dibenz[a,h]anthracene	88.3	%Rec	
	132649	Dibenzofuran	87.9	%Rec	
	84662	Diethyl phthalate	95.7	%Rec	
	131113	Dimethylphthalate	95.0	%Rec	
	206440	Fluoranthene	99.2	%Rec	
	118741	Hexachlorobenzene	96.5	%Rec	
	87683	Hexachlorobutadiene	74.4	%Rec	
	77474	Hexachlorocyclopentadiene	0.0	%Rec	
	67721	Hexachloroethane	52.6	%Rec	
	193395	Indeno(1,2,3-cd)pyrene	90.2	%Rec	
	78591	Isophorone	65.1	%Rec	
	111911	Methane, bis(2-chloroethoxy)-	88.3	%Rec	
	62759	N-Nitrosodimethylamine	65.5	%Rec	
	621647	N-Nitrosodinpropylamine	96.2	%Rec	
	86306	n-Nitrosodiphenylamine	103	%Rec	
	91203	Naphthalene	82.6	%Rec	
	91576	Naphthalene, 2-methyl-	87.4	%Rec	
	98953	Nitrobenzene	81.8	%Rec	
	87865	Pentachlorophenol	99.3	%Rec	
	85018	Phenanthrene	98.8	%Rec	
	108952	Phenol	94.8	%Rec	
	95487	Phenol, 2-methyl-	94.9	%Rec	
	129000	Pyrene	95.5	%Rec	

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code: TEC-765A
Project Name: GRANDVIEW MINE
Project Officer: JOANNE LABAW
Account Code: 01T10P50102D10ZZLA00
Station Description:

Collected:
Matrix: Solid
Sample Number: BS0305A1
Type: Blank

GCMS

Parameter : Semi-volatiles
Method : 8270-M BNA
Prep Method : 3510M/3540
Analytes :

		Result	Units	Qlfr
92524	1,1'-Biphenyl	32.0	ug/kg	U
95954	2,4,5-Trichlorophenol	64.0	ug/kg	U
88062	2,4,6-Trichlorophenol	160	ug/kg	U
120832	2,4-Dichlorophenol	64.0	ug/kg	U
105679	2,4-Dimethylphenol	32.0	ug/kg	U
51285	2,4-Dinitrophenol	320	ug/kg	U
121142	2,4-Dinitrotoluene	160	ug/kg	U
606202	2,6-Dinitrotoluene	160	ug/kg	U
91587	2-Chloronaphthalene	32.0	ug/kg	U
95578	2-Chlorophenol	32.0	ug/kg	U
88744	2-Nitroaniline	160	ug/kg	U
88755	2-Nitrophenol	160	ug/kg	U
91941	3,3'-Dichlorobenzidine	128	ug/kg	U
99092	3-Nitroaniline	160	ug/kg	U
360689	3B-Coprostanol	640	ug/kg	U
534521	4,6-Dinitro-2-methylphenol	160	ug/kg	U
101553	4-Bromophenyl-Phenylether	32.0	ug/kg	U
59507	4-Chloro-3-methylphenol	64.0	ug/kg	U
106478	4-Chloroaniline	32.0	ug/kg	U
7005723	4-Chlorophenyl-Phenylether	32.0	ug/kg	U
106445	4-Methylphenol	64.0	ug/kg	U
100016	4-Nitroaniline	160	ug/kg	U
100027	4-Nitrophenol	32.0	ug/kg	U
86748	9H-Carbazole	32.0	ug/kg	U
86737	9H-Fluorene	32.0	ug/kg	U
83329	Acenaphthene	32.0	ug/kg	U
208968	Acenaphthylene	32.0	ug/kg	U
62533	Aniline	32.0	ug/kg	U
120127	Anthracene	32.0	ug/kg	U
1912249	Atrazine	64.0	ug/kg	U
100527	Benzaldehyde	32.0	ug/kg	U
100516	Benzenemethanol	32.0	ug/kg	U
56553	Benzo(a)anthracene	32.0	ug/kg	U
50328	Benzo(a)pyrene	160	ug/kg	U
191242	Benzo(g,h,i)perylene	64.0	ug/kg	U
205992	Benzo[b]Fluoranthene	64.0	ug/kg	U
207089	Benzo[k]fluoranthene	32.0	ug/kg	U

			Result	Units	Qlfr
Analytes :	65850	Benzoic acid	320	ug/kg	U
	111444	bis(2-Chloroethyl)ether	32.0	ug/kg	U
	108601	BIS(2-CHLOROISOPROPYL)ETHER	32.0	ug/kg	U
	117817	Bis(2-ethylhexyl) phthalate	160	ug/kg	U
	85687	Butylbenzylphthalate	160	ug/kg	U
	58082	Caffeine	64.0	ug/kg	U
	105602	Caprolactam	32.0	ug/kg	U
	218019	Chrysene	32.0	ug/kg	U
	84742	Di-n-Butylphthalate	160	ug/kg	U
	117840	Di-n-octylphthalate	160	ug/kg	U
	53703	Dibenz[a,h]anthracene	32.0	ug/kg	U
	132649	Dibenzofuran	32.0	ug/kg	U
	84662	Diethyl phthalate	32.0	ug/kg	U
	131113	Dimethylphthalate	32.0	ug/kg	U
	98862	Ethanone, 1-phenyl-	32.0	ug/kg	U
	206440	Fluoranthene	32.0	ug/kg	U
	118741	Hexachlorobenzene	32.0	ug/kg	U
	87683	Hexachlorobutadiene	32.0	ug/kg	U
	77474	Hexachlorocyclopentadiene	32.0	ug/kg	U
	67721	Hexachloroethane	32.0	ug/kg	U
	193395	Indeno(1,2,3-cd)pyrene	160	ug/kg	U
	78591	Isophorone	32.0	ug/kg	U
	111911	Methane, bis(2-chloroethoxy)-	32.0	ug/kg	U
	62759	N-Nitrosodimethylamine	160	ug/kg	U
	621647	N-Nitrosodinpropylamine	32.0	ug/kg	U
	86306	n-Nitrosodiphenylamine	64.0	ug/kg	U
	91203	Naphthalene	32.0	ug/kg	U
	90120	Naphthalene, 1-methyl-	32.0	ug/kg	U
	91576	Naphthalene, 2-methyl-	32.0	ug/kg	U
	98953	Nitrobenzene	32.0	ug/kg	U
	87865	Pentachlorophenol	160	ug/kg	U
	85018	Phenanthrene	32.0	ug/kg	U
	108952	Phenol	32.0	ug/kg	U
	95487	Phenol, 2-methyl-	32.0	ug/kg	U
	129000	Pyrene	32.0	ug/kg	U
	483658	Retene	32.0	ug/kg	U
	321608	1,1'-Biphenyl, 2-fluoro-	88.7	%Rec	
	2199691	1,2-Dichlorobenzene-d4	86.0	%Rec	
	93951736	2-chlorophenol-d4	89.5	%Rec	
	1718521	D10-Pyrene	118	%Rec	
	4165600	Nitrobenzene-d5	83.3	%Rec	
	367124	Phenol, 2-fluoro-	90.7	%Rec	
	4165622	Phenol-d5	94.0	%Rec	
	1718510	Terphenyl-d14	100	%Rec	

Parameter : Semi-volatiles - Tentatives
Method : 8270-M BNA
Prep Method: 3510M/3540

Analytes :	**110134**	**2,5-Hexanedione**	**328**	**ug/kg**	**NJ**

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

			Result	Units	Qlfr
Analytes :	123422	2-Pentanone, 4-hydroxy-4-methy l-	169000	ug/kg	NJ
	4914925	2-Pentene, 3,4-dimethyl-, (E)-	328	ug/kg	NJ
	872504	2-Pyrrolidinone, 1-methyl-	248	ug/kg	NJ
	79345	Ethane, 1,1,2,2-tetrachloro-	137	ug/kg	NJ
	115866	Triphenyl Phosphate	91.1	ug/kg	NJ
	*3008001	Unknown 01	116	ug/kg	NJ
	*3008002	Unknown 02	361	ug/kg	NJ
	*3008003	Unknown 03	169000	ug/kg	NJ
	*3008004	Unknown 04	196	ug/kg	NJ
	*3008005	Unknown 05	2340	ug/kg	NJ
	*3008006	Unknown 06	421	ug/kg	NJ
	*3008007	Unknown 07	784	ug/kg	NJ
	*3008008	Unknown 08	824	ug/kg	NJ

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code:	TEC-765A	**Collected:**	
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	BS0305A2
Account Code:	01T10P50102D10ZZLA00	**Type:**	Blank
Station Description:			

GCMS

Parameter : Semi-volatiles
Method : 8270-M BNA
Prep Method : 3510M/3540
Analytes :

		Result	Units	Qlfr
92524	1,1'-Biphenyl	32.0	ug/kg	U
95954	2,4,5-Trichlorophenol	64.0	ug/kg	U
88062	2,4,6-Trichlorophenol	160	ug/kg	U
120832	2,4-Dichlorophenol	64.0	ug/kg	U
105679	2,4-Dimethylphenol	32.0	ug/kg	U
51285	2,4-Dinitrophenol	320	ug/kg	U
121142	2,4-Dinitrotoluene	160	ug/kg	U
606202	2,6-Dinitrotoluene	160	ug/kg	U
91587	2-Chloronaphthalene	32.0	ug/kg	U
95578	2-Chlorophenol	32.0	ug/kg	U
88744	2-Nitroaniline	160	ug/kg	U
88755	2-Nitrophenol	160	ug/kg	U
91941	3,3'-Dichlorobenzidine	128	ug/kg	U
99092	3-Nitroaniline	160	ug/kg	U
360689	3B-Coprostanol	640	ug/kg	U
534521	4,6-Dinitro-2-methylphenol	160	ug/kg	U
101553	4-Bromophenyl-Phenylether	32.0	ug/kg	U
59507	4-Chloro-3-methylphenol	64.0	ug/kg	U
106478	4-Chloroaniline	32.0	ug/kg	U
7005723	4-Chlorophenyl-Phenylether	32.0	ug/kg	U
106445	4-Methylphenol	64.0	ug/kg	U
100016	4-Nitroaniline	160	ug/kg	U
100027	4-Nitrophenol	32.0	ug/kg	U
86748	9H-Carbazole	32.0	ug/kg	U
86737	9H-Fluorene	32.0	ug/kg	U
83329	Acenaphthene	32.0	ug/kg	U
208968	Acenaphthylene	32.0	ug/kg	U
62533	Aniline	32.0	ug/kg	U
120127	Anthracene	32.0	ug/kg	U
1912249	Atrazine	64.0	ug/kg	U
100527	Benzaldehyde	32.0	ug/kg	U
100516	Benzenemethanol	32.0	ug/kg	U
56553	Benzo(a)anthracene	32.0	ug/kg	U
50328	Benzo(a)pyrene	160	ug/kg	U
191242	Benzo(g,h,i)perylene	64.0	ug/kg	U
205992	Benzo[b]Fluoranthene	64.0	ug/kg	U
207089	Benzo[k]fluoranthene	32.0	ug/kg	U

			Result	Units	Qlfr
Analytes :	65850	Benzoic acid	320	ug/kg	U
	111444	bis(2-Chloroethyl)ether	32.0	ug/kg	U
	108601	BIS(2-CHLOROISOPROPYL)ETHER	32.0	ug/kg	U
	117817	Bis(2-ethylhexyl) phthalate	160	ug/kg	U
	85687	Butylbenzylphthalate	160	ug/kg	U
	58082	Caffeine	64.0	ug/kg	U
	105602	Caprolactam	32.0	ug/kg	U
	218019	Chrysene	32.0	ug/kg	U
	84742	Di-n-Butylphthalate	160	ug/kg	U
	117840	Di-n-octylphthalate	160	ug/kg	U
	53703	Dibenz[a,h]anthracene	32.0	ug/kg	U
	132649	Dibenzofuran	32.0	ug/kg	U
	84662	Diethyl phthalate	32.0	ug/kg	U
	131113	Dimethylphthalate	32.0	ug/kg	U
	98862	Ethanone, 1-phenyl-	32.0	ug/kg	U
	206440	Fluoranthene	32.0	ug/kg	U
	118741	Hexachlorobenzene	32.0	ug/kg	U
	87683	Hexachlorobutadiene	32.0	ug/kg	U
	77474	Hexachlorocyclopentadiene	32.0	ug/kg	U
	67721	Hexachloroethane	32.0	ug/kg	U
	193395	Indeno(1,2,3-cd)pyrene	160	ug/kg	U
	78591	Isophorone	32.0	ug/kg	U
	111911	Methane, bis(2-chloroethoxy)-	32.0	ug/kg	U
	62759	N-Nitrosodimethylamine	160	ug/kg	U
	621647	N-Nitrosodinpropylamine	32.0	ug/kg	U
	86306	n-Nitrosodiphenylamine	64.0	ug/kg	U
	91203	Naphthalene	32.0	ug/kg	U
	90120	Naphthalene, 1-methyl-	32.0	ug/kg	U
	91576	Naphthalene, 2-methyl-	32.0	ug/kg	U
	98953	Nitrobenzene	32.0	ug/kg	U
	87865	Pentachlorophenol	160	ug/kg	U
	85018	Phenanthrene	32.0	ug/kg	U
	108952	Phenol	32.0	ug/kg	U
	95487	Phenol, 2-methyl-	32.0	ug/kg	U
	129000	Pyrene	32.0	ug/kg	U
	483658	Retene	32.0	ug/kg	U
	321608	1,1'-Biphenyl, 2-fluoro-	87.9	%Rec	
	2199691	1,2-Dichlorobenzene-d4	81.9	%Rec	
	93951736	2-chlorophenol-d4	84.5	%Rec	
	1718521	D10-Pyrene	116	%Rec	
	4165600	Nitrobenzene-d5	81.8	%Rec	
	367124	Phenol, 2-fluoro-	85.7	%Rec	
	4165622	Phenol-d5	95.0	%Rec	
	1718510	Terphenyl-d14	103	%Rec	

Parameter : Semi-volatiles - Tentatives
Method : 8270-M BNA
Prep Method: 3510M/3540

Analytes :	**110134**	**2,5-Hexanedione**	**504**	**ug/kg**	**NJ**

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

			Result	Units	Qlfr
Analytes	: 123422	2-Pentanone, 4-hydroxy-4-methy l-	179000	ug/kg	NJ
	4914914	2-Pentene, 3,4-dimethyl-, (Z)-	322	ug/kg	NJ
	872504	2-Pyrrolidinone, 1-methyl-	297	ug/kg	NJ
	79345	Ethane, 1,1,2,2-tetrachloro-	146	ug/kg	NJ
	115866	Triphenyl Phosphate	99.7	ug/kg	NJ
	*3008001	Unknown 01	124	ug/kg	NJ
	*3008002	Unknown 02	535	ug/kg	NJ
	*3008003	Unknown 03	3940	ug/kg	NJ
	*3008004	Unknown 04	198	ug/kg	NJ
	*3008005	Unknown 05	2520	ug/kg	NJ
	*3008006	Unknown 06	450	ug/kg	NJ
	*3008007	Unknown 07	822	ug/kg	NJ
	*3008008	Unknown 08	138	ug/kg	NJ
	*3008009	Unknown 09	1090	ug/kg	NJ
	*3008010	Unknown 10	134	ug/kg	NJ

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

November 22, 2000

MEMORANDUM

SUBJECT: Case Narrative with Peer Review and Validation Memo for Grandview Mine Project for PCB Analysis of Soil Samples

FROM: R. H. Rieck R. H. Rieck
Chemist

Peer Reviewed and Validated by: SReiner

TO: J. Labaw
Project Officer

cc: Leatta Dahlhoff

The Case Narrative with Peer Review and Validation Memo Quality Assurance narrative for six soil samples from Grandview Mine Project for PCBs has been completed. Extraction and analysis of the samples were performed by EPA Methods 3540B Modified and 8082 respectively. The samples included in this memo are #'s 00434212-00434217.

I. Holding Times:

Acceptable. The samples were collected October 23, 2000. The soil samples with associated blanks were extracted October 31, 2000. The sample extracts were analyzed November 21, 2000. All holding times until analysis were within the allowable 40 days. With all holding times being acceptable no qualifiers were assigned on this basis.

II. Instrument Performance:

A Tracor 585 gas chromatograph (GC) using dual electron capture (EC) detectors with Restek Rtx-CLPEST and Rtx-CLPEST2 mega-bore capillary columns (0.53mm ID x 30m) was used for this analysis.

A. DDT Retention Time: Not required for this analysis.

B. Retention Time Windows: Acceptable. Retention times for the standards were within the windows set by the initial calibration. The retention time windows used were 1.0% of the initial retention time.

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C. DDT/Endrin Degradation: Not required for this analysis.

D. Surrogate Retention Times: Acceptable. All samples had retention time percent differences less than 1.5% for the surrogates Tetra-m-xylene (TMX), 4,4'-Dibromooctafluorobiphenyl (DBOB), and Decachlorobiphenyl (DCB).

III. Calibration:

A. Initial Calibration: Acceptable. For all samples covered by this memo, a seven-point calibration was used for Aroclors 1221, 1242, 1254 and 1260. Calibration curves were generated using either a quadratic equation and had correlation coefficients of 0.995 or better. Furthermore, a single point was injected for Aroclors 1016, 1232, and 1248 which was used for the determination of Practical Quantitation Limit (PQL) and pattern recognition.

B. Analytical Sequence: Acceptable.

C. Continuing Calibration: Acceptable. The continuing calibration standards were within the 20 percent difference criteria for both columns. Therefore, no qualifiers were assigned on this basis.

IV. Method Blank Analysis:

Acceptable: Two method blanks, OBS00305A1 and OBS0305A2, were extracted and analyzed with the soil samples. No peaks occurred at or above the quantitation limit in any blank. Therefore, no qualifiers were assigned on this basis.

V. Surrogate Recoveries:

Acceptable. The TMX recoveries ranged from 74% to 99% with an average of 88.0% and a standard deviation of ± 10.0%. The DBOB recoveries ranged from 80% to 105% with an average of 94.4% and a standard deviation of ± 9.3%. The DCB recoveries ranged from 84% to 99% with an average of 94.7% and a standard deviation of ± 4.6%.

No qualifiers were assigned on this basis for any of the samples in this set.

VI. Matrix Spike/Matrix Spike Duplicate:

Acceptable. Sample 00434212 was spiked in duplicate with Aroclors 1242 and 1260. The recoveries for Aroclor 1242 were 101% and 102%; Aroclor 1260 recoveries were 100% and 102%. The recoveries and precision were within the expected range and considered acceptable. No qualifiers were assigned on this basis for any of the samples in this set.

VII. Compound Identification/Quantitation:

PCBs were not detected in any of the samples at the reporting limit.

VIII. Overall Assessment/Data Use:

Acceptable for use with the qualifiers as assigned in the sections above. The data was evaluated using the guidelines set out in the "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (Dec. '94).

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Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code:	TEC-765A	**Collected:**	10/23/00
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	00434212
Account Code:	01T10P50102D10ZZLA00	**Type:**	Reg sample
Station Description:	DA-01-SS		

			Result	Units	Qlfr
GC					
Parameter :	Polychlorinated Biphenyl				
Method :	8082	Polychlorinated Biphenyls (PCBs/congeners) by GC			
Prep Method:	3540B				
Analytes :	12674112	PCB-1016	37	ug/kg	U
	11104282	PCB-1221	37	ug/kg	U
	11141165	PCB-1232	37	ug/kg	U
	53469219	PCB-1242	37	ug/kg	U
	12672296	PCB-1248	37	ug/kg	U
	11097691	PCB-1254	37	ug/kg	U
	11096825	PCB-1260	37	ug/kg	U
	10386842	4,4-Dibromooctafluorobiphenyl	80	%Rec	
	*2051243	Decachlorobiphenyl	90	%Rec	
	*300105	Tetrachlorometaxylene	80	%Rec	

Sent to:
Joanne Labaw
Leatta Daninoff
Mark Woodke
Tracy Trople
11/30/00
PO

SA 11/30/00

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code:	TEC-765A	**Collected:**	
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	00434212
Account Code:	01T10P50102D10ZZLA00	**Type:**	Matrix Spike
Station Description:			

			Result	Units	Qlfr
GC					
Parameter	: Polychlorinated Biphenyl				
Method	: 8082	Polychlorinated Biphenyls (PCBs/congeners) by GC			
Prep Method	: 3540B				
Analytes	: 10386842	4,4-Dibromooctafluorobiphenyl	101	%Rec	
	*2051243	Decachlorobiphenyl	99	%Rec	
	53469219	PCB-1242	101	%Rec	
	11096825	PCB-1260	102	%Rec	
	*300105	Tetrachlorometaxylene	96	%Rec	

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code:	TEC-765A	**Collected:**	
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	00434212
Account Code:	01T10P50102D10ZZLA00	**Type:**	Matrix Spike Dupl
Station Description:			

			Result	Units	Qlfr
GC					
Parameter	: Polychlorinated Biphenyl				
Method	: 8082	Polychlorinated Biphenyls (PCBs/congeners) by GC			
Prep Method	: 3540B				
Analytes	: 10386842	4,4-Dibromooctafluorobiphenyl	104	%Rec	
	*2051243	Decachlorobiphenyl	96	%Rec	
	53469219	PCB-1242	102	%Rec	
	11096825	PCB-1260	100	%Rec	
	*300105	Tetrachlorometaxylene	99	%Rec	

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code:	TEC-765A	**Collected:**	10/23/00
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	00434213
Account Code:	01T10P50102D10ZZLA00	**Type:**	Reg sample
Station Description:	DA-02-SS		

GC

Parameter : Polychlorinated Biphenyl
Method : 8082 Polychlorinated Biphenyls (PCBs/congeners) by GC
Prep Method: 3540B

		Result	Units	Qlfr
Analytes : 12674112	PCB-1016	45	ug/kg	U
11104282	PCB-1221	45	ug/kg	U
11141165	PCB-1232	45	ug/kg	U
53469219	PCB-1242	45	ug/kg	U
12672296	PCB-1248	45	ug/kg	U
11097691	PCB-1254	45	ug/kg	U
11096825	PCB-1260	45	ug/kg	U
10386842	4,4-Dibromooctafluorobiphenyl	88	%Rec	
*2051243	Decachlorobiphenyl	84	%Rec	
*300105	Tetrachlorometaxylene	79	%Rec	

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code:	TEC-765A	**Collected:**	10/23/00
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	00434214
Account Code:	01T10P50102D10ZZLA00	**Type:**	Reg sample
Station Description:	DA-03-SS		

GC

Parameter : Polychlorinated Biphenyl
Method : 8082 Polychlorinated Biphenyls (PCBs/congeners) by GC
Prep Method: 3540B

			Result	Units	Qlfr
Analytes :	12674112	PCB-1016	33	ug/kg	U
	11104282	PCB-1221	33	ug/kg	U
	11141165	PCB-1232	33	ug/kg	U
	53469219	PCB-1242	33	ug/kg	U
	12672296	PCB-1248	33	ug/kg	U
	11097691	PCB-1254	33	ug/kg	U
	11096825	PCB-1260	33	ug/kg	U
	10386842	4,4-Dibromooctafluorobiphenyl	101	%Rec	
	*2051243	Decachlorobiphenyl	99	%Rec	
	*300105	Tetrachlorometaxylene	90	%Rec	

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code:	TEC-765A	**Collected:**	10/23/00
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	00434215
Account Code:	01T10P50102D10ZZLA00	**Type:**	Reg sample
Station Description:	DA-04-SS		

GC

Parameter : Polychlorinated Biphenyl
Method : 8082 Polychlorinated Biphenyls (PCBs/congeners) by GC
Prep Method: 3540B

			Result	Units	Qlfr
Analytes :	12674112	PCB-1016	19	ug/kg	U
	11104282	PCB-1221	19	ug/kg	U
	11141165	PCB-1232	19	ug/kg	U
	53469219	PCB-1242	19	ug/kg	U
	12672296	PCB-1248	19	ug/kg	U
	11097691	PCB-1254	19	ug/kg	U
	11096825	PCB-1260	19	ug/kg	U
	10386842	4,4-Dibromooctafluorobiphenyl	102	%Rec	
	*2051243	Decachlorobiphenyl	94	%Rec	
	*300105	Tetrachlorometaxylene	98	%Rec	

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code:	TEC-765A	**Collected:**	10/23/00
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	00434216
Account Code:	01T10P50102D10ZZLA00	**Type:**	Reg sample
Station Description:	DA-05-SS		

GC

Parameter : Polychlorinated Biphenyl
Method : 8082 Polychlorinated Biphenyls (PCBs/congeners) by GC
Prep Method: 3540B

		Result	Units	Qlfr
Analytes : 12674112	PCB-1016	23	ug/kg	U
11104282	PCB-1221	23	ug/kg	U
11141165	PCB-1232	23	ug/kg	U
53469219	PCB-1242	23	ug/kg	U
12672296	PCB-1248	23	ug/kg	U
11097691	PCB-1254	23	ug/kg	U
11096825	PCB-1260	23	ug/kg	U
10386842	4,4-Dibromooctafluorobiphenyl	93	%Rec	
*2051243	Decachlorobiphenyl	98	%Rec	
*300105	Tetrachlorometaxylene	89	%Rec	

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code:	TEC-765A	**Collected:**	10/23/00
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	00434217
Account Code:	01T10P50102D10ZZLA00	**Type:**	Reg sample
Station Description:	DA-06-SS		

GC

Parameter : Polychlorinated Biphenyl
Method : 8082 Polychlorinated Biphenyls (PCBs/congeners) by GC
Prep Method: 3540B

		Result	Units	Qlfr
Analytes : 12674112	PCB-1016	24	ug/kg	U
11104282	PCB-1221	24	ug/kg	U
11141165	PCB-1232	24	ug/kg	U
53469219	PCB-1242	24	ug/kg	U
12672296	PCB-1248	24	ug/kg	U
11097691	PCB-1254	24	ug/kg	U
11096825	PCB-1260	24	ug/kg	U
10386842	4,4-Dibromooctafluorobiphenyl	105	%Rec	
*2051243	Decachlorobiphenyl	94	%Rec	
*300105	Tetrachlorometaxylene	99	%Rec	

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code:	TEC-765A	**Collected:**	
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	OBS0305A1
Account Code:	01T10P50102D10ZZLA00	**Type:**	Blank
Station Description:			

			Result	Units	Qlfr
GC					
Parameter	: Polychlorinated Biphenyl				
Method	: 8082	Polychlorinated Biphenyls (PCBs/congeners) by GC			
Prep Method	: 3540B				
Analytes	: 12674112	PCB-1016			ND
	11104282	PCB-1221			ND
	11141165	PCB-1232			ND
	53469219	PCB-1242			ND
	12672296	PCB-1248			ND
	11097691	PCB-1254			ND
	11096825	PCB-1260			ND
	10386842	4,4-Dibromooctafluorobiphenyl	85	%Rec	
	*2051243	Decachlorobiphenyl	97	%Rec	
	*300105	Tetrachlorometaxylene	74	%Rec	

Manchester Environmental Laboratory
Report by Parameter for Project TEC-765A

Project Code:	TEC-765A	**Collected:**	
Project Name:	GRANDVIEW MINE	**Matrix:**	Solid
Project Officer:	JOANNE LABAW	**Sample Number:**	OBS0305A2
Account Code:	01T10P50102D10ZZLA00	**Type:**	Blank
Station Description:			

			Result	Units	Qlfr
GC					
Parameter	: Polychlorinated Biphenyl				
Method	: 8082	Polychlorinated Biphenyls (PCBs/congeners) by GC			
Prep Method	: 3540B				
Analytes	: 12674112	PCB-1016			ND
	11104282	PCB-1221			ND
	11141165	PCB-1232			ND
	53469219	PCB-1242			ND
	12672296	PCB-1248			ND
	11097691	PCB-1254			ND
	11096825	PCB-1260			ND
	10386842	4,4-Dibromooctafluorobiphenyl	85	%Rec	
	*2051243	Decachlorobiphenyl	96	%Rec	
	*300105	Tetrachlorometaxylene	76	%Rec	