Gold Creek Shoshone Silver Mill
Preliminary Assessment and Site Inspection Report
TDD: 01-01-0039

EPA Contract: 68-S0-01-02

26 April 2002

EPA Region X

START

Superfund Technical Assessment and Response Team

Roy F. Weston, Inc. · 190 Queen Anne Avenue North · Seattle, WA 98109-4926

PRELIMINARY ASSESSMENT AND SITE INSPECTION REPORT

Gold Creek Shoshone Silver Mill
Bonner County, Idaho

TDD: 01-01-0039

Submitted To:

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TABLE OF CONTENTS

TABLE OF CONTENTS *(Continued)*

Section Page

TABLE OF CONTENTS *(Continued)*

Section Page

TABLE OF CONTENTS *(Continued)*

Section Page

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

Acronym	Definition
AES	Atomic Emission Spectroscopy
AST	Aboveground Storage Tank
bgs	below ground surface
CCB	continuing calibration blank
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
CLPAS	Contract Laboratory Program Analytical Service
CRDL	Contract Required Detection Limit
CRQL	Contract Required Quantitation Limit
DQI	Data Quality Indicator
DQO	Data Quality Objectives
EPA	United States Environmental Protection Agency
FS	Forest Service
GIS	Geographic Information Systems
GPS	Global Positioning System
HASP	Health and Safety Plan
HRS	Hazard Ranking System
IATA	International Air Transport Association
ICP	Inductively Coupled Plasma
ICS	interference check samples
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
IDW	investigation derived waste

LIST OF ACRONYMS *(Continued)*

Acronym	Definition
IDWR	Idaho Department of Water Resources
IGS	Idaho Geological Survey
LCS	laboratory control sample
MEL	Manchester Environmental Laboratory
MSL	Mean Sea Level
NPL	National Priorities List
NWI	National Wetland Inventory
PA	Preliminary Assessment
PARCC	Precision, Accuracy, Representativeness, Comparability, and Completeness
PPE	probable point of entry
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
RSCC	Regional Sample Control Coordinator
SARA	Superfund Amendments and Reauthorization Act
SI	Site Inspection
SOPs	standard operating procedures
SOW	Statement of Work
SQAP	Sampling and Quality Assurance Plan
SQL	Sample Quantitation Limit
START	Superfund Technical Assessment and Response Team
TAL	target analyte list
TDD	Technical Direction Document

LIST OF ACRONYMS *(Continued)*

Acronym	Definition
TDL	Target Distance Limit
TM	Task Monitor
tpd	tons per day
USFS	United States Forest Service

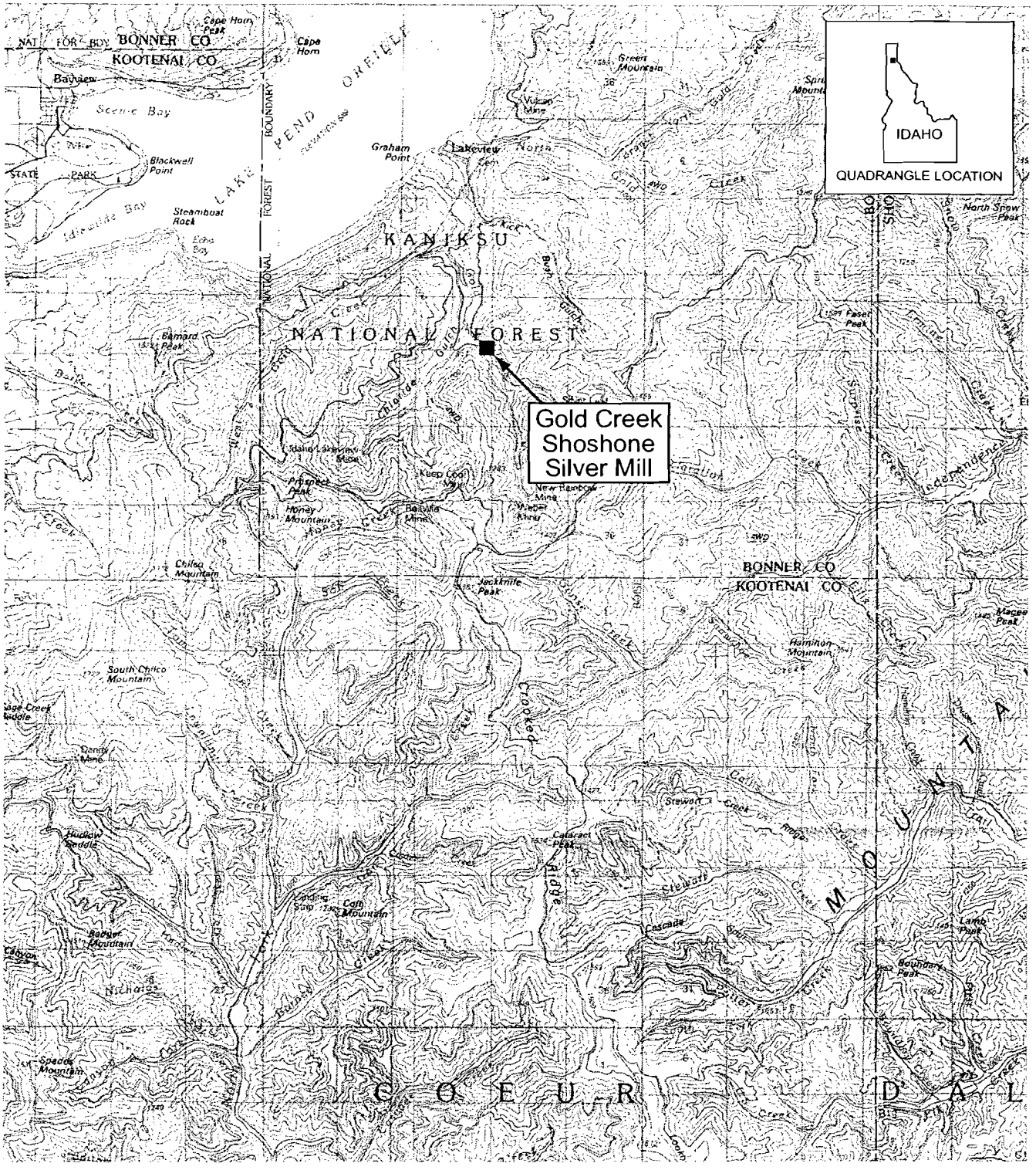
SECTION 1

INTRODUCTION

Under the authority of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) of 1980 and the 1986 Superfund Amendments and Reauthorization Act (SARA), Roy F. Weston, Inc. (WESTON®) has completed a Preliminary Assessment and Site Inspection (PA/SI) of the Gold Creek Shoshone Silver Mill site (the Mill site; CERCLIS ID No. IDN001002266) located in Bonner County, Idaho (Figure 1-1). The United States Environmental Protection Agency (EPA) Region 10 retained WESTON to complete this PA/SI pursuant to the EPA Superfund Technical Assessment Response Team (START) Contract No. 68-S0-01-02 and Technical Direction Document (TDD) No. 01-01-0039. This document represents the narrative report for the Gold Creek Shoshone Silver Mill PA/SI. The purpose of this report is to provide the EPA with the background information collected for the site, to discuss the sampling activities conducted and the data collected during the PA/SI, and to present the analytical results of the data obtained as part of the investigation.

PAs and SIs are generally the first and second screening investigations, respectively, in a series of assessments that EPA may complete at a known or potential hazardous waste site that is being investigated under CERCLA/SARA prior to its potential inclusion on the National Priorities List (NPL). The combined PA/SI Assessment integrates activities typically conducted during the PA (e.g., information gathering, site reconnaissance) with activities typically conducted during the SI [e.g., development of site-specific Sampling Quality and Analyses Plans (SQAP), field sampling, filling data gaps] to achieve one continuous site investigation. The main objectives for the PA/SI activities are to:

- Determine if the site is, has, or may have the potential to release hazardous substances to the environment, in order to differentiate between sites that pose little or no threat to human health or the environment from those that may warrant further investigation.
- Identify waste source areas at the site in an attempt to document the presence of hazardous waste substances in these areas.
- Evaluate the threat posed by migration of or exposure to hazardous substances from the site.
- Collect information that can be used to assess the site using EPA's Hazard Ranking System (HRS).
- Help determine whether further investigation of the site under CERCLA/SARA is warranted in order to pursue listing on the NPL.



Source: USGS 30'X60' Series Topo Map of Couer D'Alene, Idaho-Montana

Site Location Map
Gold Creek Shoshone Silver Mill PA/SI
Bonner County, Idaho

Figure
1-1

WESTON MANAGER DESIGNER /CONSULTANTS

02-0168 Fig1-1.ai

SECTION 2

SITE CHARACTERISTICS AND BACKGROUND

2.1 SITE DESCRIPTION AND BACKGROUND INFORMATION

Information presented in the following sections is based on a review of EPA CERCLA and Resource, Conservation, and Recovery Act (RCRA) records, Idaho Department of Environmental Quality (IDEQ) records, U.S. Forest Service (USFS) records, site background information, a video produced by the Idaho Geological Survey (IGS) during an inspection of the Mill site on 30 August 1996 (IGS 1997), interviews with the property owner and representatives obtained /conducted during WESTON's field effort on 3 August 2001, and a telephone conversation conducted on 30 October 2001 (Scheller 2001; Coon 2001).

This section describes the site location, site description, the site ownership history, and operational history of the Mill site. Photos of site features taken during the field effort are included in Appendix A. A site plan showing site features is presented in Figure 2-1.

2.1.1 Site Location

Site Name:	Gold Creek Shoshone Silver Mill
CERCLIS ID No.:	IDN001002266
Location:	The Mill site is located along Gold Creek within the Kaniksu National Forest; no physical address is available.
Latitude:	47° 55 '59" N
Longitude:	116° 26' 25.8" W
Legal Description:	NE ¼, NE ¼, Section 22, Township 53 North, Range 1 West, Boise Meridian
County:	Bonner, Idaho
Site Owner:	Mr. James I. Scheller Shoshone Silver Mining Company 4903 Industrial Drive Coeur d' Alene, ID 83814 (503) 632-4422
Site Operator:	Mr. James I. Scheller Shoshone Silver Mining Company 4903 Industrial Drive Coeur d' Alene, ID 83814 (503) 632-4422

2.1.2 Site Ownership History

The Mill site is owned and operated by the Shoshone Silver Mining Company of Coeur d'Alene, Idaho and has reportedly been in operation since 1980 (Mitchell 1998).

2.1.3 Site Description

The Gold Creek Shoshone Silver Mill is a mine milling operation located within the Kaniksu National Forest and the Lakeview Mining District in Bonner County Idaho (Figure 1-1). The Mill site is located along Gold Creek at an elevation of approximately 2,800 feet above Mean Sea Level (MSL) and can be accessed via State Road 54, Bunco Road (Forest Service [FS] Road 332), FS Road 1017, and FS Road 1078. The Mill site is not fenced and has no access controls; however, a caretaker lives adjacent to the site on the east side of the access road (Figure 2-1). According to Bonner County tax records, the Mill site property is 12.5 acres in size and Gold Creek runs along its east boundary, approximately 300 feet from the site access road. Site features observed during the field effort include: the Mill building, the caretaker's residence, site office trailer and sheds, a maintenance shop, four 10,000 gallon above-ground storage tanks (ASTs), a small diesel AST (2,000 gallons or less), a rock crusher, one tailings pond and associated borrow pit, three abandoned drum piles, various ore piles, a scrap metal pile, a burn pile, and the adjacent former Lakeview landfill (Figure 2-1).

The Mill building houses the machinery for the ore processing operation, which includes 60-ton-per-day (tpd) and 200-tpd ball mills (never used; Scheller 2001); two float cells (small rectangular tanks approximately 500 gallons or less), and a series of conveyor systems. A small diesel AST (2,000 gallons or less), equipped with a hose and dispenser nozzle, was observed south of the Mill building. The diesel AST appeared to be used to fuel the equipment at the site. A maintenance shop, an office trailer, several sheds, and heavy equipment, were observed east of the Mill building. According to the site caretaker, the maintenance shop was used to conduct maintenance on heavy equipment and vehicles.

Four steel ASTs, approximately 10,000-gallon capacity each, were observed on a concrete pad near the Mill building. Upon visual inspection, the exterior surface of the ASTs was partially rusted but not pitted, and they appeared to be empty. Heavily discolored soils were observed surrounding the concrete pad and the ASTs' pipe outlets by the northernmost tank.

A tailings pond measuring approximately 31,250 square feet with 5- to 15-foot sidewalls was observed near the northern boundary of the site. Two gradually-sloped fans of fine-grained sediment were observed in the southwest and northeast corners of the tailings pond separated by a vegetated low spot near the center of the pond. The material used to build the sidewalls of the tailings pond was removed from the borrow pit located immediately north of the tailings pond. According to the site owner, the borrow pit was not used for hazardous material storage and/or disposal (Scheller 2001) and no visual evidence of such was observed during the field effort.

Numerous unlabeled 55-gallon drums were observed in three areas of the site: on a platform immediately west of the Mill Building ASTs; in a large open area south of the maintenance shop, and along the site access road east of the south open area (Figure 2-1). Most of the drums observed in these three areas were in poor condition, heavily corroded, and some were lying on their sides. The drums observed on the platform west of the Mill Building ASTs contained

granular charcoal, which had spilled over bare soil through holes in the drums. One drum on the south open area was labeled "Red Bam Alcohol-190 Solvent-Thinner Fuel." One drum near the access road was labeled "Minerec Corporation Ore Floatation Reagent." Some of the drums observed in the south open area were plastic. According to the site caretaker, the plastic drums contained ore concentrate (Coon 2001).

The south open area was surrounded by a berm except on the side facing the Mill building. A scrap metal pile and a burn pile were observed within this area. A strong solvent-like odor and heavy discoloration (very dark red, orange, and yellow soil) were noted near these piles.

The bulk of the ore piles observed were located along the north boundary of the property, next to a rock crusher and the borrow pit. Two types of ore piles were observed: one dark gray in color and coarse grained; the other tan to orange in color and finer grained (Figure 2-1). According to the site owner (Scheller 2001), the darker ore originates from underground, inside the adits, and the lighter ore, called oxide ore, originates from surface workings. Additional gray and tan ore piles were observed in the south open area. A whitish crust was observed on muddy areas near the south open area ore piles where rainwater appeared to have accumulated recently but had since evaporated.

An outfall from the Mill into Gold Creek was identified by the IGS crew that visited the site in 1996. The site caretaker indicated this outfall was used to divert water from a natural seep around the site but had since then been removed. WESTON did not observe any outfall along the portion of Gold Creek adjacent to the site during the field effort, and did not find any evidence regarding the nature or location of the outfall in the site records reviewed.

The former Lakeview landfill, no longer active and located immediately south of the south open area, consists of a fairly level, cleared area used by the town of Lakeview for general household waste disposal. A short trail (100 to 200 feet) from the south open area to the landfill was observed. No visual evidence of dumping was observed during the field effort. It is unknown when the landfill was last used by the town of Lakeview.

2.1.4 Site Operational History

The Mill received ore from the Webber Mine, Keep Cool Mine, and Idaho Lakeview Mine. The ore from these mines consisted of limestone and quartzite containing galena, pyrite, and silver. The Mill was built as a 60 tpd mill and processed approximately 600 tons of ore during its first year in operation (Scheller 2001; Mitchell 1998). The Shoshone Silver Mining Company ceased operations at the Mill in 1981 due to declining metal prices. The company re-opened the Mill in 1982 to construct a carbon-in-pulp leach circuit and to process ore. During 1984, ore was crushed and stockpiled at the Mill, but the leach plant was reportedly never used (Mitchell 1998). The Shoshone Silver Mining Company continued development work on the Mill in 1985; activities included the construction of some buildings, and the installation of a 200-tpd ball mill that was purchased from another facility. Active mining was not conducted that year due to low metal prices; however, 10,000 tons of ore reportedly were stockpiled at the property by 1985 (Mitchell 1998). According to the site owner, this is the same ore observed at the site during the field effort. He indicated the ore was never processed. The Mill is the only operable mill remaining in the Lakeview Mining District today and was last used in full operations in 1992 (Scheller 2001; IGS 1997). According to the site owner, the site has been used periodically after

1992 to conduct tests of new processing methods. A bromide leaching system currently is being installed at the facility east of the maintenance shop and it will be used in conjunction with the ball mills and the Mill Building ASTs.

2.1.5 Site Regulatory Compliance History

As part of the PA/SI, WESTON conducted a review of available site records from the Idaho Department of Environmental Quality (IDEQ), RCRA, and CERCLA records available at the EPA Region 10 office in Seattle, Washington or the EPA Idaho office in Boise. No regulatory compliance records were identified for the Mill site from these sources. Background documents provided by the USFS and IDEQ did not contain information to indicate that any regulatory issues have been identified for the Mill site.

2.1.6 Nearby Land Use

The areas surrounding the Mill site are part of the Kaniksu National Forest and are managed by the USFS. Immediately adjacent to the Mill's south boundary is the former city of Lakeview landfill located in USFS land. The former landfill appeared to be capped and no evidence of the landfill is apparent other than the large flat open area south of the site. It is unknown when the landfill was last used. With exception of the mining claims nearby, the area is used primarily for recreational purposes such as hunting, camping, and logging. Gold Creek is closed to fishing due to the endangered status of the bull trout (*Salvelinus confluentus*). The town of Lakeview and Lake Pend Oreille are located approximately 2.5 miles north of the site. According to the 1990 census, Lakeview consist mostly of summer residences with a population of only three year-round residents. Lake Pend Oreille is a large recreational fishery in the area.

2.2 SUMMARY OF PREVIOUS INVESTIGATIONS

According to USFS and IDEQ records, two studies conducted by IGS for the USFS have included discussions regarding the site: *History of Selected Mines in the Lakeview Mining District, Bonner County Idaho* (Mitchell 1998), and *Site Inspection Report For The Abandoned Mines And Inactive Mines In Idaho on U.S. Forest Service Lands (Region I)* (Bennett and Mitchell 1998). In both of these reports, the Mill was included as part of a larger study conducted within the Lakeview Mining District. A short paragraph regarding the history of the Mill is presented in the 1998 Mitchell report, and the 1998 Bennett and Mitchell report briefly documented the IGS site visit with a video. According to USFS and IDEQ records, no sampling activities had been conducted specifically within the Mill site.

2.3 WASTE SOURCE AREAS AND SITE CONCERNS

Sampling for the PA/SI was conducted in those areas considered as potential hazardous waste sources and in areas that may have been contaminated through the migration of hazardous substances from on-site sources. A discussion of site operational processes, waste source areas, and site concerns is presented below.

2.3.1 Site Operations

According to the site owner, the Mill processed ore with a combination of ball milling and floatation milling (Scheller 2001). Ball milling entails crushing and grinding the ore to a desired particle size using solid steel balls and commonly is used in combination with other beneficiation processes (Taggart 1954). Floatation mills separate metalliferous minerals from the ore by using chemical reagents or surfactants in water. Chemical reagents include collectors, frothers, antifoams, activators, and depressants; the type of reagent used depends on the type of ore being processed. The reagents may contain calcium, lime, sulfur dioxide, sulfuric acid, cyanide compounds, creosols, petroleum hydrocarbons, hydrochloric acid, copper compounds, and zinc fume or dusts (EPA 1995).

According to the site owner, after the ore was crushed in the rock crusher located on the north end of the property (Figure 2-1), it was transported to the Mill building and was emptied from the top onto the conveyors. The ore went from the conveyors directly into the 60 tpd ball mill with a solution of calcium and lime to serve as the floatation reagent (Scheller 2001). After milling, the ore solution was pumped to the float cells in the lower level of the building where the mixture was aerated to force the minerals to float. It is possible that another reagent (xanthates) may have been used at this stage as evidenced by the drum label found near the south area of the site. "After aeration, the resulting froth was separated from the solution through a 'lease filter' resulting in a 'silver cake' or concentrate that was sent to the smelter. After removing the concentrate, the waste slurry was pumped to the tailings pond" (Scheller 2001). The Mill Building ASTs were used to temporarily store the ore and solution after milling the ore.

As mentioned above, records indicate a carbon-in-pulp leaching plant was added to the Mill in 1983. The property owner indicated that the carbon in pulp system was used only for a short period in 1993 while conducting tests on gold beneficiation. However, since gold is not prevalent in the ore in the area, the method was abandoned. Mr. Scheller further indicated that no cyanide was used with this system; rather, water, granulated carbon and the ore were mixed and electrically charged. The ore was removed by electrolysis, the carbon was consumed (melted), and the resulting wastewater went through piping into the tailings pond. He also stated the carbon drums observed by the ASTs was the unused carbon leftover from this experiment (Scheller 2001).

Mr. Scheller indicated that all the waste was pumped to the tailings pond. The pond has never been filled to capacity, and the water readily infiltrated/evaporated. According to Mr. Scheller, due to low use, tailings from the pond have never been excavated nor the sidewalls of the pond built up to accommodate more tailings.

2.3.2 Known and Potential Source Areas

Based on the information obtained during the investigation, potential contaminants of concern associated with the site operations include Target Analyte List (TAL) metals and cyanide. The areas and features identified as potential hazardous waste sources are presented below. Descriptions, capacities, and locations of these source areas are summarized in Table 2-1 and shown on Figure 2-1.

- **Mill Building ASTs**—Four ASTs, approximately 10,000 gallons capacity each, were observed near the main Mill building. The tanks were used temporarily to store milled ore

and the reagent solution while the floating process, which took longer, was conducted. According to the site owner, all the ore/reagent solution was processed and the tanks are currently empty. No evidence of secondary containment was observed around the ASTs during the field effort.

- **Tailings Pond**—The tailings pond located on the northern end of the site was used to dispose the end slurry after the ore was processed and the minerals were extracted. Very fine-grained deposits were observed in the dry tailings pond. No evidence of a liner or any containment feature was observed during the field effort.

  Based on the IGS video, the borrow pit initially was believed to be an additional tailings pond. However, upon conversations with the site owner after the field effort was conducted, it was discovered the borrow pit had been the location where earthen materials were extracted to construct the tailings pond. Since there was no visual evidence or records indicating the associated borrow pit was used to store or dispose of hazardous waste substances, the borrow pit is not considered a source for this PA/SI.

- **Northern Ore Piles**—Approximately 950 cubic yards of stockpiled ore were observed north of the tailings pond and borrow pit. All of the piles were uncovered and no containment features were observed beneath or around them. Evidence of surface runoff from the stockpiled ore was observed near the gray ore piles.

- **Southern Ore Piles**—Approximately 260 cubic yards of stockpiled ore were observed at an open area south of the Mill building and the maintenance shop. All of the piles were uncovered and no containment features were observed beneath or around them. No evidence of surface runoff outside this open area was observed; however, dry mud puddles were observed near the piles.

- **Carbon Drums**—Numerous 55-gallon drums of granulated carbon were observed on a platform beside the Mill Building ASTs. Most of these drums were heavily rusted, unlabeled, and lying on their sides. Some drums were open or rusted through, partially full, and in some cases the granulated carbon had spilled over bare soil. No secondary containment was observed near the drums observed in this area.

- **Southern Open Area Drums**— Numerous 55-gallon drums were observed in a pile near the ore piles at the open area south of the Mill building and the maintenance shop. Most of the drums were heavily rusted, unlabeled, and lying on their sides. Upon visual observation, these drums appeared to be empty. Several plastic drums, reportedly containing ore concentrate (Coon 2001), were also observed. No secondary containment was observed near the drums in this area.

- **Access Road Drums**—Several 55-gallon drums were observed in a pile along the access road east of the south open area. Most of the drums were rusted heavily, unlabeled, and lying on their sides. Upon visual observation, these drums appeared to be empty and no secondary containment was observed near them.

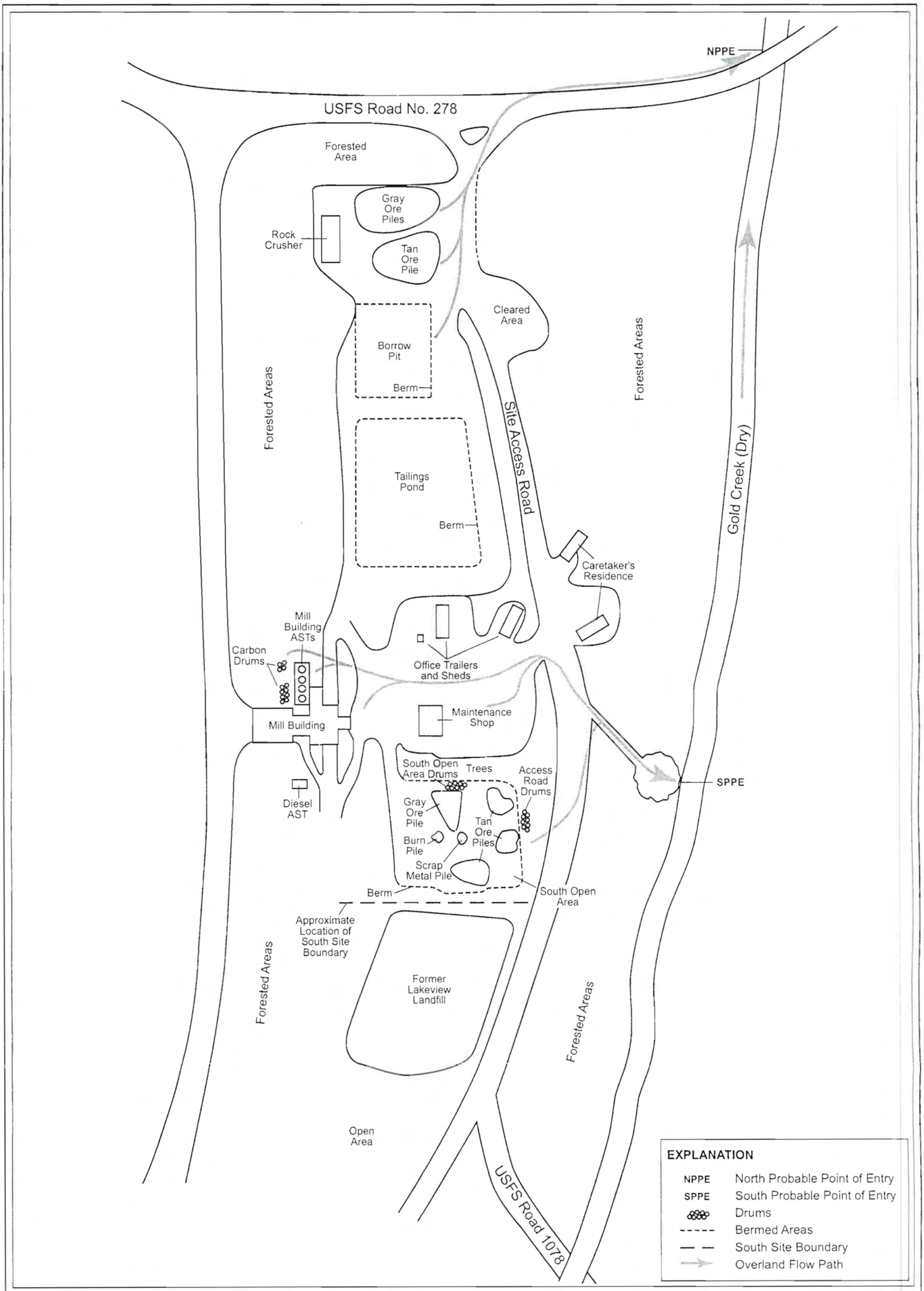
- **Burn Pile**—A burn pile consisting of cleared vegetation and wood was observed in the south open area. Heavily discolored soils were observed immediately adjacent to the burn pile and a strong solvent-like odor was noted.

- **Scrap Metal Pile**—A scrap metal pile consisting of steel planks, a crushed drum, and other metal equipment was observed in the south open area. Heavily discolored soils were

observed immediately adjacent to the scrap metal pile and a strong solvent-like odor was noted.

- **Lakeview Landfill**—The area of the former Lakeview landfill was observed off site at the end of a short trail (100 to 200 feet) immediately south of the south open area. The area was level, appeared to be capped and no visual evidence of dumping or disposal of hazardous waste was observed during the field effort.

In addition to the sources presented above, an outfall from the Mill into Gold Creek had been identified on the IGS video and was included in the SQAP as a potential source of contaminants from the site. However, upon field verification, no outfall was observed along the property limit between the Mill and Gold Creek and no records of the outfall were identified during this investigation. In addition, the diesel AST located south of the Mill building (Figure 2-1) was not considered a source based on the petroleum exclusion to CERCLA.



Not to Scale

Site Plan and Vicinity
Gold Creek Shoshone Silver Mill PA/SI
Bonner County, Idaho

Figure
2-1

WESTON MANAGERS DESIGNERS/CONSULTANTS

02-0019 Fig2-1.ai

Table 2-1—Known and Potential Source Areas—Gold Creek Shoshone Silver Mill PA/SI

Source Name	Source Type	Estimated Waste Quantity	Source Location	Source Description
Mill Building ASTs	Above Ground Storage Tank	40,000 gallons (4 ASTs, 10,000 gallons each)	Adjacent to and north of the Mill Building	ASTs used to temporarily store mixture of milled ore and reagent solution.
Tailings Pond	Surface Impoundment	157, 600 cubic feet (160 ft. x 197 ft. x 5 ft.)	North - northeast of the Mill Building	The pond was used to dispose of the waste solutions and waste rock slurry after silver beneficiation.
North Ore Piles	Pile	950 cubic yards	North - northeast of the Mill Building	Stockpiled ore.
South Ore Piles	Pile	260 cubic yards	South of the Maintenace Shop	Stockpiled ore.
Carbon Drums	Drums	100 square feet	Inmediately east of the Mill Bulding ASTs	Granulated carbon used for metal beneficiation at the Mill.
South Open Area Drums	Drums	100 square feet	South of the Maintenace Shop	Empty drum pile area.
Access Road Drums	Drums	25 square feet	Site access road east of the South Open Area	Empty drum pile area.
Burn Pile	Pile	7.5 cubic yards	South of the Maintenace Shop	Burn pile of cleared brush and wood.
Scrap Metal Pile	Pile	7.5 cubic yards	South of the Maintenace Shop	Pile of steel planks, a crushed drum, and equipment parts.
Former Lakeview Landfill	Potentially contaminated soil	32,000 square feet	Inmediately south of the South Open Area.	Location of the old Lakeview landfill.

SECTION 3

FIELD ACTIVITIES AND ANALYTICAL PROTOCOLS

WESTON prepared a SQAP (WESTON 2001b) based on site information available prior to conducting any field activities. The SQAP presented sampling objectives, logistics, sampling design and methodology, custody requirements, and analytical methods to be used for the collection and processing of samples during this investigation. In general, sampling activities were conducted in accordance with the site-specific SQAP. The following sections present a summary of sampling protocols and exceptions to the procedures outlined in the SQAP due to field conditions encountered during sampling. Sampling locations are presented in Figures 3-1, 3-2 and 3-3. Table 3-1 presents a detailed summary of the location, sampling information, and analyses conducted for each sample collected during the field effort. Sample coordinates are presented in Table 3-2.

3.1 SAMPLING DESIGN (TYPES, NUMBERS, AND RATIONALE)

Field activities were conducted during the week of 30 July to 4 August 2001 and included the collection of 55 samples as described below (Table 3-1):

- 15 source samples (ore and surface soil), collected from 0 to 1 foot below ground surface (bgs), including one sample at the Mill Building ASTs, two samples at the tailings pond, two samples at the North ore piles, four samples at the South ore piles, one sample adjacent to each of the three drum accumulation areas, one sample at the burn pile, one sample at the scrap metal pile, and one sample at the former Lakeview landfill.
- 31 sediment samples (from 0-10 cm), including four tributary samples, nine in-water segment samples from Gold Creek, 12 in-water segment samples at the delta, four background samples, and two field duplicates.
- Five surface soil samples (from 0 to 1 foot bgs), including two overland flow path samples, two designated background samples, and one field duplicate.
- Three Quality Assurance/Quality Control (QA/QC) equipment rinsate samples.
- One investigation-derived waste (IDW) sample.

The following sections present the rationale used in the selection of the PA/SI sample locations.

3.1.1 Source Characterization

Samples from areas where hazardous substances were suspected to be present were collected to characterize known and potential site sources. These source samples include (Figure 3-2): FT001 (Mill Building ASTs); TP001 and TP002 (tailings pond); OT001 and OT002 (north ore piles); OT003 to OT006 (south ore piles); DR001 (surface soils surrounding the carbon drums), DR002 (surface soils surrounding the south open area drums), DR003 (surface soils surrounding the access road drums); SS001 (stained surface soils adjacent to the burn pile) and SS002 (stained surface soils adjacent to the scrap metal pile) at the south open area, and SS003 (surface soil sample at the former landfill).

3.1.2 Attribution Samples

Two surface soil samples were collected for the purpose of documenting that hazardous substances identified at on-site sources might be migrating off-site to Gold Creek. These samples (OF001 and OF002) were collected along the suspected overland flow path from on-site sources to their probable points of entry (PPEs) into Gold Creek (Figure 3-2).

Sediment sample CS014, located above the Mill and below the upgradient mines, was collected to investigate potential impacts from the mine sites (Figure 3-1). In addition to CS014, four sediment samples were collected from various tributaries of Gold Creek to investigate potential impacts from other mining activities at the upper reaches of these tributaries. These samples were collected at the confluences of Gold Creek with Chloride Gulch (CS009), West Gold Creek (CS005 and CS006), and Kick Bush Gulch (CS004; Figure 3-2). Samples collected from these tributaries also were used as background for specific groups of samples within the data set.

3.1.3 Release Samples

Eight sediment samples (CS001, CS002, CS003, CS007, CS008, CS010, CS011, and CS013) were collected from Gold Creek downstream of the Mill site to document the presence or absence of hazardous substances released to the surface water pathway (Figure 3-1). In addition to these eight samples, twelve sediment samples were collected at Gold Creek's delta in Lake Pend Oreille (DS001 to DS012; Figure 3-3) to document the presence or absence of hazardous substances at the delta.

3.1.4 Background Samples

Four sediment samples (SD-BK001, SD-BK002, SD-BK003, SD-BK004) and two surface soil samples (SS-BK001 and SS-BK002) were collected from areas within the watershed having similar physical characteristics and (in the case of sediment samples) depositional environments to the release samples (Figures 3-1 and 3-2). These samples were collected to establish background levels for sediment and soil in the vicinity of the site.

The background sediment samples were collected above the mine sites in the uppermost reaches of the watershed (Figure 3-1). The background surface soil samples were collected from inactive stream terraces along Gold Creek, upstream of the Mill site and above the current stream channel (Figure 3-2).

Although attribution sample CS014 is likely influenced by the upgradient mines, it was also used as a background sample in order to differentiate between potential impacts to Gold Creek caused by the mine sites from potential impacts caused by the Mill site itself.

3.2 SAMPLE GLOBAL POSITIONING SYSTEM LOCATIONS

A Trimble GeoExplorer 2.2 global positioning system (GPS) unit with data logger was used to record the uncorrected location coordinates of every sample collected. The GPS position was recorded in the field forms and digitally in the unit's data logger. Upon return from the field the GPS unit was returned to the EPA for data download and differential correction, which increases the resolution of the data. According to the manufacturer, location accuracy with differential

correction is within 10 to 16 feet, and 33 to 99 feet without correction. Both corrected and uncorrected GPS coordinates are provided in Table 3-2.

3.3 SAMPLING METHODS

Field activities included the collection of surface soil samples at the site and vicinity and sediment samples along Gold Creek, its tributaries, and its delta. At the time of sampling, site-specific conditions (i.e., topography, accessibility issues, and visual evidence of contamination) were incorporated, when applicable, into the placement of sampling locations. Deviations from the planned sampling locations and numbers of samples to be collected during the field effort are discussed in Sections 3.4, 8, and 9. These deviations were discussed with the EPA Task Monitor (TM) before implementation and were documented in the Sample Plan Alteration forms included in Appendix C. This section presents a brief summary of field methods and procedures used during the Gold Creek Shoshone Silver Mill PA/ SI field effort. All samples were collected in accordance with WESTON's Standard Operating Procedures (SOPs) and site-specific SQAP (WESTON 2001b).

3.3.1 Ore and Surface Soil Samples

Ore and surface soil samples [0 to 1 foot below ground surface (bgs)] from the ore piles and other site sources were collected in accordance with WESTON's SOP RFW/R10-001 using decontaminated hand tools such as a shovel or stainless steel spoons and stainless steel bowls.

After sample collection, source samples were screened for pH by placing a small amount of soil into a resealable plastic bag, adding deionized water, and measuring the pH with a disposable pH strip.

3.3.2 Stream Sediment Sampling

In accordance with WESTON's SOP RFW/R10-003, stream sediment samples for bulk sediment chemistry were collected within 0 to 10 cm (4 inches) bgs using a decontaminated stainless steel spoon and placed into a decontaminated stainless steel bowl. To minimize cross-contamination, samples were collected from downstream to upstream.

3.3.3 Gold Creek Delta Sediment Sampling

Sediment sampling at the delta was conducted using a petit Ponar grab sampler in accordance with WESTON's SOP RFW/R10-003. The sampler was deployed manually from the 20-foot USFS fire reconnaissance boat. The descent of the grab sampler was controlled by WESTON's field crew to minimize wake and the probability of improper orientation upon contact with the bottom. Depth to sediment, station coordinates, and time were recorded at the moment the grab sampling device contacted the bottom. The grab sampler was retrieved slowly to minimize potential disturbance of the sediment surface within the sampler. Multiple grabs from the same location were necessary at several locations to collect sufficient volume for the analyses required.

Sample handling and acceptance was conducted in accordance with the criteria presented in the site-specific SQAP. Sediment penetration depth, physical characteristics of the sediment, and

physical characteristics of the vertical profile were noted in the appropriate field forms after the sample complied with acceptance criteria. Sediment was removed from the grab sampler using decontaminated stainless-steel spoons, placed in a stainless-steel bowl, and homogenized, and placed in pre-labeled, laboratory-cleaned sample jars. Leftover sediment from the grab sampler was returned to the sampling location.

Two sediment samples, DS005 and DS006, were collected in very shallow water (< 1 foot) near the mouth of Gold Creek. Because the locations were shallow and the boat could not reach them, the samples were collected on foot by wading in the water and submerging the bowl directly into the sediment. By submerging the bowl and digging the sediments directly into it, disturbance of the finer sediment fraction was minimized allowing for a more representative sample. Excess water was decanted from the bowl and the sample was homogenized, described, and jarred for analyses.

3.4 INVESTIGATION-DERIVED WASTES

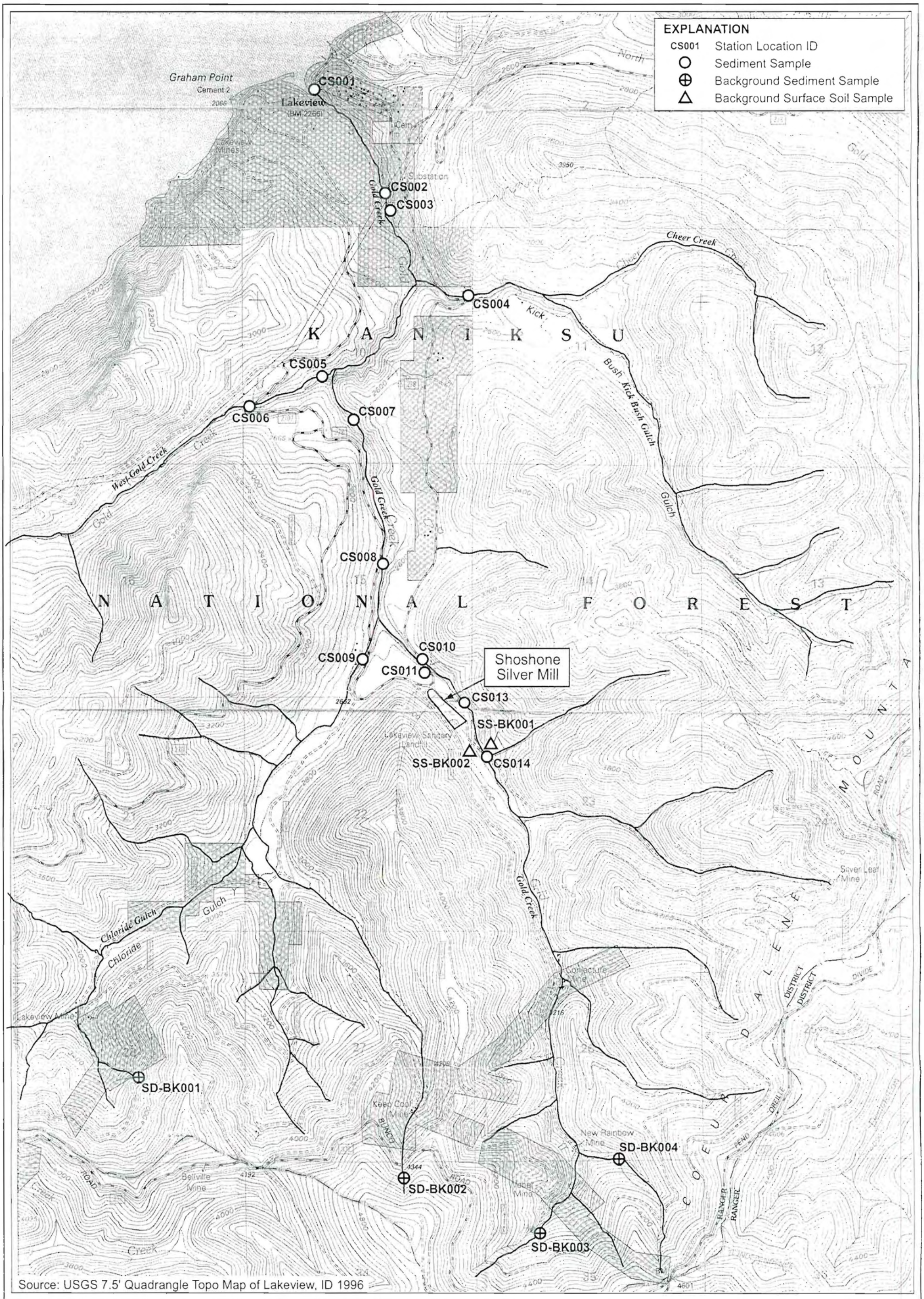
Wastewater from decontamination procedures that could not be evaporated and the rinsate from the nitric acid was contained in one labeled 5-gallon bucket. Due to the remote location of the site, the wastewater was neutralized in the field using sodium bicarbonate, brought back to WESTON's office, and sampled for disposal. The wastewater was disposed at a permitted facility by WESTON. Disposal of personal protective equipment and sampling equipment generated during field activities was double bagged in opaque plastic garbage bags and disposed as solid waste.

3.5 SAMPLE HANDLING AND CUSTODY

All chain-of-custody requirements complied with WESTON's SOPs for sample handling and sample control and chain-of-custody procedures followed the *User's Guide to the Contract Laboratory Program* (EPA 1991). Samples were identified using the regional tracking numbers assigned by the EPA Regional Sample Control Coordinator (RSCC) in addition to a unique WESTON identification code based on a consistent sample designation scheme presented in the SQAP. Only EPA and/or Contract Laboratory Program (CLP) sample numbers were used to identify samples in laboratory chain-of-custody forms. Information obtained during sampling was recorded in the appropriate field daily logs and data forms in accordance with the SQAP. Sampling events were also documented with photographs of sampling location and site features as deemed appropriate.

3.6 ANALYTICAL METHODS

All samples collected during the investigation were submitted for off-site, fixed laboratory analyses for Target Analyte List (TAL) metals and cyanide by the Contract Laboratory Program Analytical Services (CLPAS) Method ILM04.1. Sentinel Inc., a CLP laboratory located in Huntsville, Alabama, conducted the analyses of all samples collected during this PA/SI. Cyanide was added to the list of analytes during the field effort due to discussions between the USFS and the property caretaker regarding the use of cyanide leaching procedures at the site. Specific information regarding sample locations, analyses, and rationale is presented in Table 3-1.



0 1000 2000

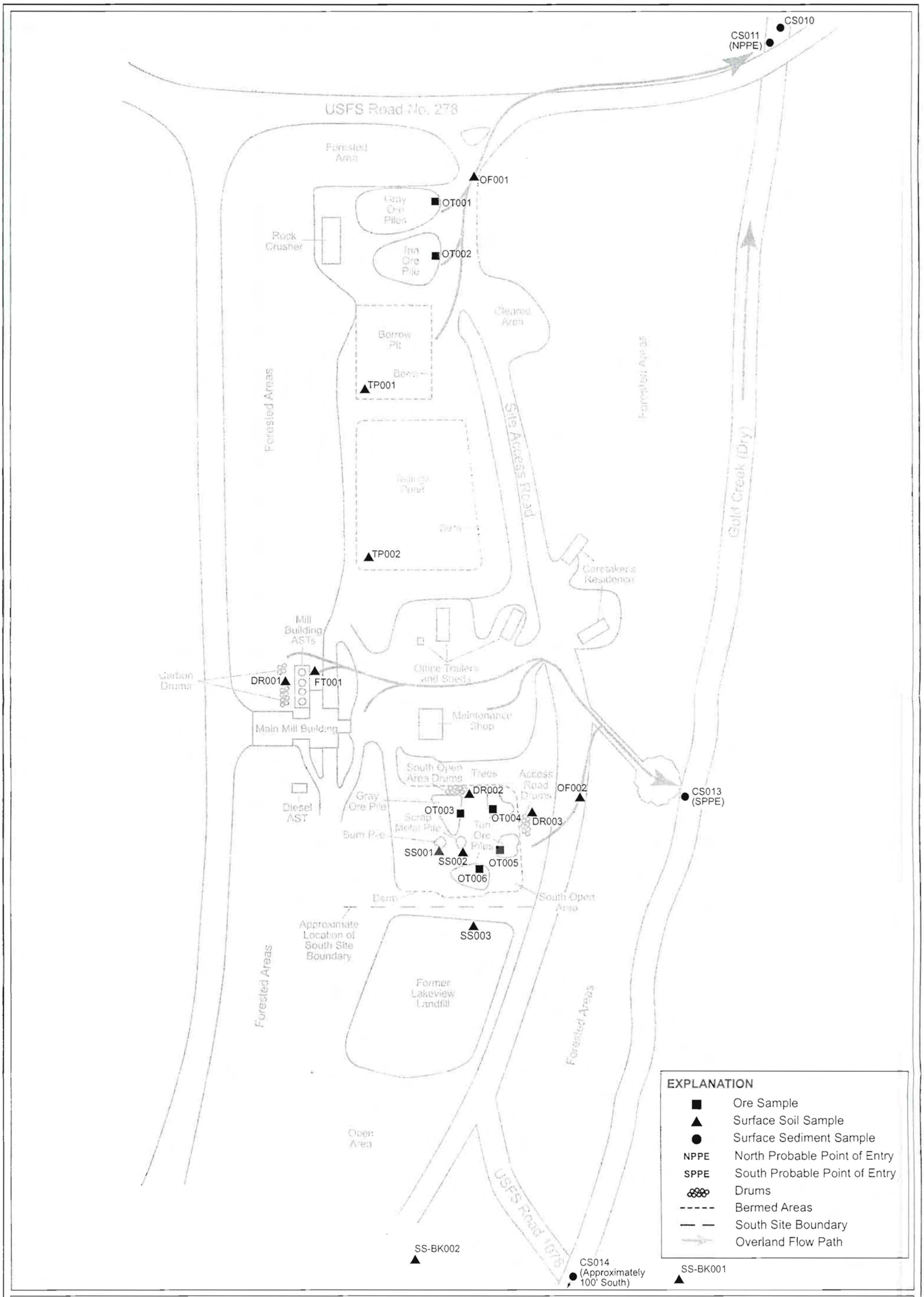
Scale in Feet

Gold Creek Watershed Sampling Locations
Gold Creek Shoshone Silver Mill PA/SI
Bonner County, Idaho

Figure

3-1

02-0168 Fig3-1.ai



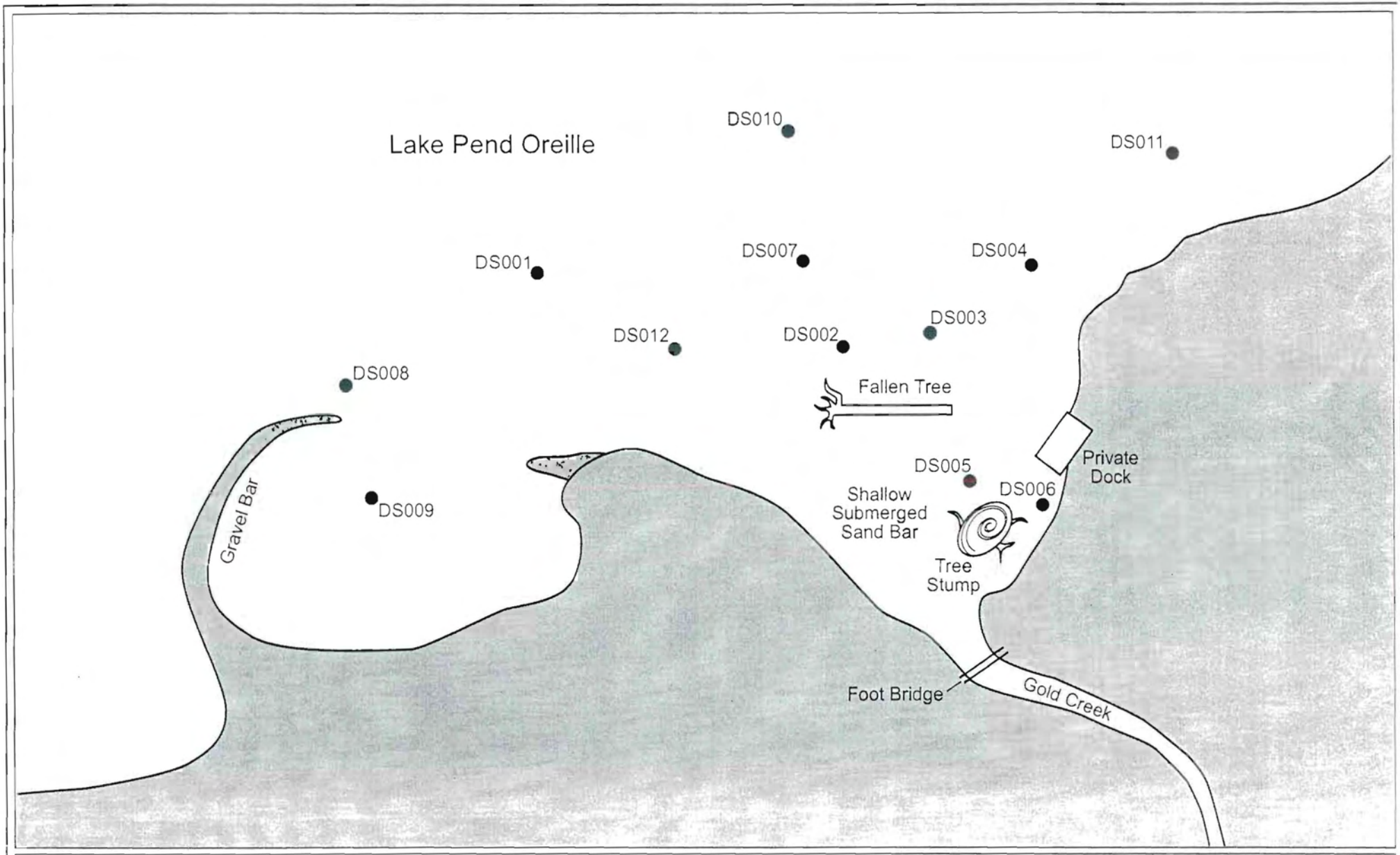
Not to Scale

Site and Vicinity Sampling Locations
Gold Creek Shoshone Silver Mill PA/SI
Bonner County, Idaho

Figure
3-2

WESTON® MANAGERS DESIGNERS/CONSULTANTS

02-0019 Fig3-2.ai



Gold Creek Delta Sediment Sampling Location Map
Gold Creek Shoshone Silver Mill PA/SI
Bonner County, Idaho

Not to Scale

● Surface Sediment Sample

DS001 Station Location ID

WESTON MANAGERS DESIGNERS/CONSULTANTS

Figure
3-3

02-0168 Fig3-3.ai

Table 3-1—Sampling Locations and Analyses Summary
Gold Creek Shoshone Silver Mill PA/SI

WESTON Field Sample Number	EPA Regional Tracking Number	CLP Number	Sample Date	Sample Time	Sample Depth	Analysis		Description[1]
						TAL Metals	Cyanide	
Gold Creek Delta Surface Sediment Samples								
GCSM-SD-DS001 - 0000	1314001	MJ0C02	30-Jul-01	1021	0-10 cm	X	X	Surface water pathway release sample.
GCSM-SD-DS002 - 0000	1314002	MJ0C03	30-Jul-01	1047	0-10 cm	X	X	Surface water pathway release sample.
GCSM-SD-DS003 - 0000	1314003	MJ0C04	30-Jul-01	1115	0-10 cm	X	X	Surface water pathway release sample.
GCSM-SD-DS004 - 0000	1314004	MJ0C05	30-Jul-01	1130	0-10 cm	X	X	Surface water pathway release sample.
GCSM-SD-DS005 - 0000	1314005	MJ0C06	30-Jul-01	1150	0-10 cm	X	X	Surface water pathway release sample.
GCSM-SD-DS005 - 1000	1314006	MJ0C07	30-Jul-01	1200	0-10 cm	X	X	Surface water pathway release sample. Field QA/QC sample
GCSM-SD-DS006 - 0000	1314007	MJ0C08	30-Jul-01	1210	0-10 cm	X	X	Surface water pathway release sample.
GCSM-SD-DS007 - 0000	1314008	MJ0C09	30-Jul-01	1330	0-10 cm	X	X	Surface water pathway release sample.
GCSM-SD-DS008 - 0000	1314009	MJ0C10	30-Jul-01	1425	0-10 cm	X	X	Surface water pathway release sample.
GCSM-SD-DS009 - 0000	1314010	MJ0C11	30-Jul-01	1445	0-10 cm	X	X	Surface water pathway release sample.
GCSM-SD-DS010 - 0000	1314011	MJ0C12	30-Jul-01	1510	0-10 cm	X	X	Surface water pathway release sample.
GCSM-SD-DS011 - 0000	1314012	MJ0C13	30-Jul-01	1535	0-10 cm	X	X	Surface water pathway release sample.
GCSM-SD-DS012 - 0000	1314013	MJ0C14	30-Jul-01	1602	0-10 cm	X	X	Surface water pathway release sample.
Gold Creek Surface Sediment Samples								
GCSM-SD-CS001 - 0000	1314014	MJ0C15	31-Jul-01	1240	0-10 cm	X	X	Surface water pathway release sample from Gold Creek in-water segment located upstream from the mouth of Gold Creek.
GCSM-SD-CS002 - 0000	1314015	MJ0C16	31-Jul-01	1430	0-10 cm	X	X	Surface water pathway release sample from Gold Creek in-water segment located near the substation.
GCSM-SD-CS003 - 0000	1314016	MJ0C17	31-Jul-01	1500	0-10 cm	X	X	Surface water pathway release sample from Gold Creek in-water segment located at south border of Section 3.
GCSM-SD-CS007 - 0000	1314021	MJ0C23	2-Aug-01	1000	0-10 cm	X	X	Surface water pathway release sample located upstream of the confluence with West Gold Creek.
GCSM-SD-CS008 - 0000	1314022	MJ0C24	2-Aug-01	1050	0-10 cm	X	X	Surface water pathway release sample located just downstream of the Chloride Gulch confluence with Gold Creek.
GCSM-SD-CS008 - 1000	01314024	MJ0C26	8/2/014	1100	0-10 cm	X	X	Surface water pathway release sample located just downstream of the Chloride Gulch confluence with Gold Creek. Field QA/QC Sample.
GCSM-SD-CS010 - 0000	1314046	MJ0C48	3-Aug-01	1130	0-10 cm	X	X	Surface water pathway release sample from Gold Creek in-water segment located just downstream from the Mill.
GCSM-SD-CS011 - 0000	1314045	MJ0C47	3-Aug-01	1125	0-10 cm	X	X	Surface water pathway release sample from Gold Creek in-water segment located at the North PPE.
GCSM-SD-CS013 - 0000	1314300	MJ0C52	4-Aug-01	1425	0-10 cm	X	X	Surface water pathway release sample from Gold Creek in-water segment located at the South PPE.
GCSM-SD-CS014 - 0000	01314047	MJ0C49	3-Aug-01	1320	0-10 cm	X	X	Surface water pathway attribution sample from Gold Creek in-water segment located just upstream from the Mill.
Gold Creek Tributary Surface Sediment Samples								
GCSM-SD-CS004 - 0000	1314017	MJ0C18	31-Jul-01	1730	0-10 cm	X	X	Surface water pathway attribution sample located in Kick Back Gulch upstream of the confluence with Gold Creek.
GCSM-SD-CS005 - 0000	1314019	MJ0C21	1-Aug-01	1010	0-10 cm	X	X	Surface water pathway attribution sample located in West Gold Creek just upstrean of the confluence with Gold Creek.
GCSM-SD-CS006 - 0000	1314020	MJ0C22	1-Aug-01	1050	0-10 cm	X	X	Surface water pathway attribution sample located in West Gold Creek upstream of the confluence with Gold Creek.
GCSM-SD-CS009 - 0000	1314023	MJ0C25	2-Aug-01	1115	0-10 cm	X	X	Surface water pathway attribution sample located in Chloride Gulch just upstream c the confluence with Gold Creek.

Table 3-1—Sampling Locations and Analyses Summary
Gold Creek Shoshone Silver Mill PA/SI

WESTON Field Sample Number	EPA Regional Tracking Number	CLP Number	Sample Date	Sample Time	Sample Depth	Analysis		Description[1]
						TAL Metals	Cyanide	
SHOSHONE SILVER MILL								
North Ore Piles								
GCSM-SS-OT001 - 0010	1314028	MJ0C30	3-Aug-01	940	NA	X	X	Source sample from gray ore piles.
GCSM-SS-OT002 - 0010	1314029	MJ0C31	3-Aug-01	1005	NA	X	X	Source sample collected from tan ore pile.
South Ore Piles								
GCSM-SS-OT003 - 0010	1314035	MJ0C37	3-Aug-01	1510	NA	X	X	Source sample from gray ore piles.
GCSM-SS-OT004 - 0010	1314303	MJ0C38	3-Aug-01	1540	NA	X	X	Source sample collected from northeast tan ore pile.
GCSM-SS-OT005 - 0010	1314036	MJ0C39	3-Aug-01	1600	NA	X	X	Source sample collected from east tan ore pile.
GCSM-SS-OT006 - 0010	1314037	MJ0C40	3-Aug-01	1615	NA	X	X	Source sample collected from south tan ore pile.
Tailings Pond (Surface Soil)								
GCSM-SS-TP001 - 0010	1314030	MJ0C32	3-Aug-01	1040	0-1 foot	X	X	Source sample collected from the borrw pit located north of the Tailings Pond.
GCSM-SS-TP002 - 0010	1314031	MJ0C33	3-Aug-01	1105	0-1 foot	X	X	Source sample collected from the Tailings Pond.
Mill Buildings ASTs (Surface Soil)								
GCSM-SS-FT001 - 0010	1314032	MJ0C34	3-Aug-01	1145	0-1 foot	X	X	Source sample collected from discolored soil near the northenmost Mill Building ASTs.
Carbon Drums								
GCSM-SS-DR001 - 0010	1314033	MJ0C35	3-Aug-01	1215	0-1 foot	X	X	Source sample collected from surface soil immediately adjacent to the Carbon Drums.
South Open Area Drums								
GCSM-SS-DR002 - 0010	1314034	MJ0C36	3-Aug-01	1455	0-1 foot	X	X	Source sample collected from surface soil immediately adjacent to the South Open Area Drums.
Access Road Drums								
GCSM-SS-DR003 - 0010	1314042	MJ0C44	4-Aug-01	955	0-1 foot	X	X	Source sample collected from surface soil immediately adjacent to the Access Road Dums.
Off-Site Lakeview Landfill								
GCSM-SS-SS003 - 0010	1314041	MJ0C43	3-Aug-01	1700	0-1 foot	X	X	Source sample collected from the former Lakeview landfill located south of the South Open Area.
Burn Pile								
GCSM-SS-SS001 - 0010	1314038	MJ0C41	3-Aug-01	1630	0-1 foot	X	X	Source sample collected from heavily discolored soil adjacent to the Burn Pile in the South Open Area.
GCSM-SS-SS001 - 1010	1314039	MJ0C42	3-Aug-01	1635	0-1 foot	X	X	Source sample collected from heavily discolored soil adjacent to the Burn Pile in the South Open Area. Field QA/QC sample.
Scrap Metal Pile								
GCSM-SS-SS002 - 0010	1314040	MJ0C55	3-Aug-01	1645	0-1 foot	X	X	Source sample collected from heavily discolored soil adjacent to the Scrap Metal Pile in the South Open Area.
Overland Flow Path								
GCSM-SS-OF001 - 0010	1314044	MJ0C46	4-Aug-01	1055	0-1 foot	X	X	Surface soil sample collected from the North Overland Flow Path.
GCSM-SS-OF002 - 0010	1314043	MJ0C45	4-Aug-01	1030	0-1 foot	X	X	Surface soil sample collected from the South Overland Flow Path.
Designated Background Sediment								
GCSM-SD-BK001 - 0000	1314025	MJ0C27	2-Aug-01	1630	0-10 cm	X	X	Upstream of Idaho Lakeview Mine
GCSM-SD-BK002 - 0000	1314026	MJ0C28	2-Aug-01	1710	0-10 cm	X	X	Upstream of Keep Cool Mine
GCSM-SD-BK003 - 0000	1314301	MJ0C53	4-Aug-01	1545	0-10 cm	X	X	Upstream of Webber mine
GCSM-SD-BK004 - 0000	1314302	MJ0C54	4-Aug-01	1645	0-10 cm	X	X	Upstream of New Rainbow and Conjecture Mines

Table 3-1—Sampling Locations and Analyses Summary
Gold Creek Shoshone Silver Mill PA/SI

WESTON Field Sample Number	EPA Regional Tracking Number	CLP Number	Sample Date	Sample Time	Sample Depth	Analysis		Description[1]
						TAL Metals	Cyanide	
Designated Background Surface Soil								
GCSM-SS-BK001 - 0010	1314048	MJ0C50	4-Aug-01	1345	0-1 foot	X	X	Designated surface soil background collected east of Gold Creek and the former Lakeview landfill.
GCSM-SS-BK002 - 0010	1314049	MJ0C51	4-Aug-01	1400	0-1 foot	X	X	+
Rinsate Blanks								
GCSM-SD-CS001 - 0000	1314000	MJ0C19	30-Jul-01	948	NA	X	X	Field QA/QC sample.
GCSM-SD-CS005 - 0000	1314018	MJ0C20	1-Aug-01	935	NA	X	X	Field QA/QC sample.
GCSM-SS-OT001 - 0000	1314027	MJ0C29	3-Aug-01	650	NA	X	X	Field QA/QC sample.
IDW								
GCSM-WA-IDW1 - 0000	1314304	MJ0C56	6-Aug-01	1200	NA	X	X	Investigation Derived Waste sample.
					Total	55	55	

Notes:

[1] Sediment samples designated as "attribution" were collected to investigate sediment concentations in tributaries to Gold Creek and from areas upgradient of the Mill. These samples serve to evaluate potential contributions from surrounding mining activities to Gold Creek's sediment concentration levels.

NA = Not Applicable

TAL = Target Analyte List

Table 3-2—Field Uncorrected and Corrected GPS* Sample Coordinates
Gold Creek Shoshone Silver Mill PA/SI

Station ID	EPA Regional Tracking Number	Corrected GPS Coordinates		Field Uncorrected GPS Coordinates	
		Latitude	Longitude	Latitude	Longitude
Gold Creek Delta Sediment Samples					
GCSM-SD-DS001	1314001	N 47 58' 14.175"	W 116 27' 38.21160"	N 47 58' 20.79"	W 116 27' 23.24"
GCSM-SD-DS002	1314002	N 47 58' 11.16905"	W 116 27' 33.30479"	N 47 58' 18.76"	W 116 27' 20.03"
GCSM-SD-DS003	1314003	N 47 58' 11.29079"	W 116 27' 32.03519"	N 47 58' 18.89"	W 116 27' 19.26"
GCSM-SD-DS004	1314004	NA	NA	NA	NA
GCSM-SD-DS005	1314005	N 47 58' 9.456780"	W 116 27' 31.14599"	N 47 58' 17.98"	W 116 27' 18.99"
GCSM-SD-DS006	1314006	N 47 58' 35.17740"	W 116 27' 30.09540"	N 47 58' 18.18"	W 116 27' 18.17"
GCSM-SD-DS007	1314007	N 47 58' 14.758740"	W 116 27' 35.99219"	N 47 58' 21.11"	W 116 27' 21.27"
GCSM-SD-DS008	1314008	N 47 58' 12.42377"	W 116 27' 37.61099"	N 47 58' 19.21"	W 116 27' 22.42"
GCSM-SD-DS009	1314009	N 47 58' 10.71606"	W 116 27' 37.91880"	N 47 58' 18.56"	W 116 27' 22.58"
GCSM-SD-DS010	1314010	N 47 58' 15.643799"	W 116 27' 37.61939"	N 47 58' 21.81"	W 116 27' 22.56"
GCSM-SD-DS011	1314011	N 47 58' 14.943720"	W 116 27' 29.79899"	N 47 58' 20.84"	W 116 27' 18.87"
GCSM-SD-DS012	1314012	N 47 58' 10.714799"	W 116 27' 35.51519"	N 47 58' 18.56"	W 116 27' 21.56"
Gold Creek Sediment Samples					
GCSM-SD-CS001	1314014	N 47 58' 7.098239"	W 116 27' 23.60400"	N 47 58' 16.33"	W 116 27' 14.30"
GCSM-SD-CS002	1314015	NA	NA	NA	NA
GCSM-SD-CS003	1314016	N 47 57' 18.76842"	W 116 27' 43.95720"	N 47 57' 47.27"	W 116 26' 50.17"
GCSM-SD-CS007	1314021	N 47 57' 7.162920"	W 116 27' 2.214600"	N 47 57' 4.56"	W 116 27' 1.28"
GCSM-SD-CS008	1314022	N 47 56' 4.799520"	W 116 26' 46.82400"	N 47 56' 27.06"	W 116 26' 52.52"
GCSM-SD-CS010	1314046	N 47 56' 34.71575"	W 116 26' 23.80860"	N 47 56' 8.87"	W 116 26' 38.19"
GCSM-SD-CS011	1314045	N 47 56' 33.76542"	W 116 26' 22.46699"	N 47 56' 8.37"	W 116 26' 37.26"
GCSM-SD-CS013	1314300	N 47 55' 15.476400"	W 116 26' 55.58939"	N 47 55' 57.35"	W 116 26' 21.52"
GCSM-SD-CS014	01314047	N 47 55' 3.667800"	W 116 26' 50.75580"	N 47 55' 50.15"	W 116 26' 18.56"
Tributary Sediment Samples					
GCSM-SD-CS004	1314017	NA	NA	NA	NA
GCSM-SD-CS005	1314019	N 47 57' 20.377860"	W 116 27' 21.19319"	N 47 57' 12.16"	W 116 27' 12.66"
GCSM-SD-CS006	1314020	N 47 57' 9.388920"	W 116 27' 59.82299"	N 47 57' 4.50"	W 116 27' 35.86"
GCSM-SD-CS009	1314023	N 47 56' 34.51439"	W 116 26' 58.89660"	N 47 56' 8.76"	W 116 26' 59.32"
SHOSHONE SILVER MILL					
North Ore Piles					
GCSM-SS-OT001	1314028	NA	NA	NA	NA
GCSM-SS-OT002	1314029	NA	NA	NA	NA
South Ore Piles					
GCSM-SS-OT003	1314035	N 47 55' 13.86815"	W 116 26' 2.587200"	N 47 55' 56.03"	W 116 26' 25.06"
GCSM-SS-OT004	1314303	N 47 55' 14.23830"	W 116 26' 0.723600"	N 47 55' 56.57"	W 116 26' 24.42"
GCSM-SS-OT005	1314036	NA	NA	NA	NA
GCSM-SS-OT006	1314037	N 47 55' 12.90684"	W 116 26' 0.968399"	N 47 55' 56.12"	W 116 26' 24.72"
Tailings Pond (Surface Soil)					
GCSM-SS-TP001	1314030	N 47 56' 20.69717"	W 116 26' 13.98179"	N 47 56' 0.78"	W 166 26' 32.32"
GCSM-SS-TP002	1314031	N 47 55' 17.09921"	W 116 26' 10.21260"	N 47 55' 58.28"	W 116 26' 30.25"
Mill Building ASTs (Surface Soil)					
GCSM-SS-FT001	1314032	N 47 55' 14.06358"	W 116 26' 9.084600"	N 47 55' 56.55"	W 116 26' 29.54"
Carbon Drums					
GCSM-SS-DR001	1314033	N 47 55' 13.220045"	W 116 26' 8.740799"	N 47 55' 56.01"	W 116 26' 29.39"
South Open Area Drums					
GCSM-SS-DR002	1314034	N 47 55' 13.60265"	W 116 26' 2.731139"	N 47 55' 56.33"	W 116 26' 25.52"
Access Road Drums					
GCSM-SS-DR003	1314042	NA	NA	NA	NA

Table 3-2—Field Uncorrected and Corrected GPS* Sample Coordinates
Gold Creek Shoshone Silver Mill PA/SI

Station ID	EPA Regional Tracking Number	Corrected GPS Coordinates		Field Uncorrected GPS Coordinates	
		Latitude	Longitude	Latitude	Longitude
Overland Flow Path					
GCSM-SS-OF001	1314044	N 47 56' 24.91877"	W 116 26' 15.78419"	N 47 56' 3.15"	W 116 26' 23.41"
GCSM-SS-OF002	1314043	4-Aug-01	1030	NA	NA
Burn Pile (Surface Soil)					
GCSM-SS-SS001	1314038	N 47 55' 13.10718"	W 116 26' 1.876800"	N 47 55" 56.31"	W 166 26" 25.26"
Scrap Metal Pile (Surface Soil)					
GCSM-SS-SS002	1314040	N 47 55' 10.51313"	W 116 26' 56.74019"	N 47 55' 56.05"	W 116 26' 25.29"
Former Lakeview Landfill					
GCSM-SS-SS003	1314041	N 47 55' 10.51313"	W 116 26' 56.74019"	N 47 55' 54.52"	W 116 26' 23.83"
Designated Sediment Background					
GCSM-SD-BK001	1314025	NA	NA	NA	NA
GCSM-SD-BK002	1314026	N 47 54' 27.67907"	W 116 26' 35.50380"	N 47 54' 16.30"	W 116 26' 45.45"
GCSM-SD-BK003	1314301	NA	NA	NA	NA
GCSM-SD-BK004	1314302	NA	NA	NA	NA
Designated Surface Soil Background					
GCSM-SS-BK001	1314048	N 47 55' 3.225479"	W 116 26' 48.27659"	N 47 55' 49.90"	116 26' 17.08"
GCSM-SS-BK002	1314049	N 47 55' 2.966639"	W 116 26' 53.64479"	N 47 55' 49.54"	W 116 26' 20.55"

Notes:

NA = Not Available. Field unit was unable to provide a location within the accuracy parameters established for the investigation.

* Horizontal datum used for GPS measurements is North American Datum (NAD) 83 with a geographical projection.

SECTION 4

QUALITY ASSURANCE/QUALITY CONTROL

In order to ensure data quality objectives are met, data quality indicators are evaluated to determine sample and laboratory performance. These data, known as QA/QC data, are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination of sampling equipment, glassware, and reagents due to sample collection, preparation, and analysis activities. Specific QC requirements for laboratory analyses are incorporated in the *USEPA Contract Laboratory Program Statement or Work for Inorganic Analyses, Multi-Media, Multi Concentration* (EPA 2000). These QC requirements or equivalent requirements were followed for all analytical work conducted on the *Gold Creek Shoshone Silver Mill PA/SI*. This section describes the QA/QC measures taken for work associated with the PA/SI and provides evaluation for the end user regarding usability of the data presented in this report.

All samples were collected following the procedures outlined in the site-specific SQAP (WESTON 2001b). Soil, sediment, and water analyses were performed by Sentinel, Inc. located in Huntsville, Alabama, following the *USEPA Contract Laboratory Program Statement or Work for Inorganic Analyses, Multi-Media, Multi Concentration ILM04.1* (EPA 2000).

4.1 SATISFACTION OF DATA QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

The project data quality objectives for the field effort were designed to produce data of known and documented quality in order to characterize sources, determine off-site migration of contaminants, determine whether the site is eligible for placement on the NPL, and to document threat(s) or potential threat(s) to public health or the environment posed by the site. The Data Quality Objective (DQO) process applied to this project followed that described in the EPA document, *Guidance for the Data Quality Objectives Process* (EPA 1994).

All samples collected during this PA/SI investigation were analyzed using definitive analytical methods, and all analytical methods employed for this project were accepted by EPA. The data generated for this project met or exceeded requirements for the definitive data category as defined in *Data Quality Objective Process for Superfund* (EPA 540/G-93/71). A detailed discussion of the objectives achieved during the PA/SI is presented in the following sections.

4.2 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Quality control checks for sample collection were evaluated by a combination of Chain-of-Custody protocols and laboratory quality assurance as prescribed in the sampling or analytical methods. Quality control samples (i.e., matrix spike/duplicate samples, rinsate samples) at a frequency of one per 20 samples per media were collected during the PA/SI field effort. Results from these samples were compared to each method's criteria.

All of the analyses conducted during this project produced definitive data. Data quality indicator targets for this project are specified below—DQOs are summarized in the SQAP. Bias on estimated, flagged data was determined through the validation process. The laboratories' DQOs for completeness and the field team's ability to meet the DQO for representativeness were set at 90%. Precision and accuracy requirements are outlined also in the SQAP.

4.3 PROJECT-SPECIFIC DATA QUALITY OBJECTIVES

Data quality indicator (DQI) goals: precision, accuracy, representativeness, comparability, and completeness (PARCC) for this project were developed following guidelines presented in EPA *Guidance for Quality Assurance Project Plans*, EPA QA/G-5 Final, Appendix D. The basis for assessing each of the elements of data quality is discussed in the following subsections. Quality Assurance objectives for measurement of analytical data and QC guidelines for precision and accuracy are presented in the SQAP. Other DQI goals are included in the individual Standard Operating Procedures (SOPs) and in the CLP Statement of Work (SOW), ILM04.1.

The laboratory and field team were able to meet all project DQOs.

4.3.1 Precision

Precision measures the reproducibility of measurements. It is strictly defined as the degree of mutual agreement among independent measurements as the result of repeated application of the same process under similar conditions.

Analytical precision is the measurement of the variability associated with duplicate (two) or replicate (more than two) analyses. When recovery results between different analytical batches are compared, the laboratory control sample (LCS) may be used to determine the precision of the analytical method. In this case, the comparison is not between a sample and a duplicate sample analyzed in the same batch. Rather, the comparison is between the sample and samples analyzed in previous batches. A LCS may be prepared and analyzed within a given batch; in this case, the analytical precision is associated with a particular preparation and analysis sequence.

Total precision is the measurement of the variability associated with the entire sampling and analysis process for one sampling event. It is determined by analysis of duplicate or replicate field samples and measures variability introduced by both the laboratory and field operations. Field duplicate samples and matrix duplicate spiked samples were analyzed to assess field and analytical precision, and the precision measurement is determined using the relative percent difference (RPD) between the duplicate sample results.

The laboratory was able to meet project DQOs, with the exceptions listed in Section 4.4.

4.3.2 Accuracy

Accuracy is a statistical measurement of correctness and includes components of random error (variability due to imprecision) and systemic error. It reflects the total error associated with a measurement. A measurement is accurate when the value reported does not differ from the true value or known concentration of the spike or standard. Analytical accuracy is measured by

comparing the percent recovery of analytes spiked into an LCS or into a field sample (to prepare a matrix-spiked sample or matrix-spiked duplicate sample) to a control limit.

The laboratory was able to meet project DQOs, with the exceptions listed in Section 4.4.

4.3.3 Representativeness

Representativeness is a measure of the degree to which data accurately and precisely represent a population, including a sampling point, a process condition, or an environmental condition. Representativeness is the qualitative term that should be evaluated to determine that measurements are made and physical samples collected at locations and in a manner resulting in characterizing a matrix or media. Subsequently, representativeness is used to ensure that a sampled population represents the target population and an aliquot represents a sampling unit.

The field team was able to meet project DQOs.

4.3.4 Comparability

Comparability is the qualitative term that expresses the measure of confidence that two data sets or batches can contribute to a common analysis and evaluation. Comparability with respect to laboratory analyses pertains to method type comparison, holding times, stability issues, and aspects of overall analytical quantitation. The following items are evaluated when assessing data comparability:

- Determining if two data sets or batches contain the same set of parameters.
- Determining if the units used for each data set are convertible to a common metric.
- Determining if similar analytical procedures and quality assurance were used to collect data for both data sets.
- Determining if the analytical instruments used for both data sets have approximately similar detection levels.
- Determining if samples within data sets were selected and collected in a similar manner.

To ensure comparability of data collected during this investigation to other data that may have been or may be collected for the site, standard collection and measurement techniques were used.

The field team was able to meet project DQOs.

4.3.5 Completeness

Completeness is calculated for the aggregation of data for each analyte measured for any particular sampling event or other defined set of samples. Completeness is calculated and reported for each method, matrix, and analyte combination. The number of valid results divided by the number of possible individual analyte results, expressed as a percentage, determines the completeness of the data set. For completeness requirements, valid results are all results not rejected through data validation. The requirement for completeness for this project is 90% for aqueous samples and 90% for soil/sediment samples.

The following formula is used to calculate completeness:

$$\% \text{ completeness} = \frac{\text{number of valid results}}{\text{number of possible results}}$$

For this investigation, all samples are considered critical. Therefore, standard collection and measurement methods were used to achieve the completeness goal. All laboratory data were reviewed for usability, and 99.4% were determined to be useable.

The project DQO of 90% for completeness was met.

4.4 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL PARAMETERS

The laboratory data also were reviewed for technical holding time compliance, blank samples contamination, laboratory control sample recovery, ICP-AES interference check sample performance, duplicate sample analysis, matrix spike sample analysis, and serial dilution performance. These parameters are described below in more detail, and sample-specific detail is provided in the data validation memoranda (Appendix B).

4.4.1 Holding Times

All analyses were completed within the technical holding times with the exception of several cyanide in soil/sediment analyses. These analyses were completed within the contractual holding time limits established in the CLP program. The associated data were qualified as estimated (J), possible low bias, due to technical holding time exceedance.

4.4.2 Laboratory Blanks

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

- Aluminum, antimony, chromium, cobalt, cyanide, iron, magnesium, potassium, silver, vanadium, and zinc recoveries exhibited negative results whose absolute values were greater than the Contract Required Detection Limits (CRDLs) in one or more soil/sediment preparation blanks.
- Potassium was detected in both a water and soil/sediment preparation blanks.
- Cadmium, calcium, chromium, iron, manganese, potassium, sodium, and zinc were detected in one or more soil/sediment preparation blanks.
- Aluminum, barium, cadmium, calcium, chromium, copper, iron, magnesium, manganese, potassium, silver, vanadium and zinc were detected in one or more water preparation blanks.
- Aluminum, antimony, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, potassium, silver, and thallium were detected in one or more continuing calibration blanks (CCBs).

Any associated sample result less than five-times the blank level was qualified as non-detected (U). Associated sample results were qualified as estimated concentrations (J or UJ) if the sample result was less than five-times the absolute value of the negative blank concentration.

4.4.3 Laboratory Control Samples

All laboratory control samples analyzed met frequency and recovery criteria.

4.4.4 ICP-AES Interference Check Samples

All analytical sequences met frequency and recovery criteria for interference check sample (ICS) analysis. Inspection of the field sample data yielded the following observation:

- Although recovery criteria were met, interfering levels of iron were present in three samples. Based on the levels of iron, bias may be present in the associated cadmium (high bias) and selenium (low bias) results. All associated data were qualified as estimated concentrations (J).

4.4.5 Duplicate Sample Analysis

Duplicate sample precision and frequency criteria were met, with the following:

- Relative percent difference measurements failed acceptance criteria for arsenic, calcium, lead, magnesium, and manganese in one or more soil/sediment samples. Associated results were qualified as estimated concentrations (J), unknown bias.

4.4.6 Matrix Spike Sample Analysis

Matrix spike analysis met recovery requirements, with the following exceptions:

- Antimony and cyanide exhibited low matrix spike recoveries in one or more soil/sediment samples. All associated data were qualified as estimated concentrations (J), low bias.
- Arsenic and zinc exhibited high matrix spike recoveries in one or more soil/sediment samples. All associated detected sample results were qualified as estimated (J), high bias; non-detected sample results were not qualified.

4.4.7 Serial Dilutions

All serial dilutions met the frequency criteria. The following analytes exceeded serial dilution QC limits:

- Calcium, copper, magnesium, and zinc exceeded the recovery criterion in one or more soil/sediment samples. All associated data were qualified as estimated concentrations (J), unknown bias.

4.4.8 Other Data Assessment

Two field samples contained low total solids (<23%). Since the sample aliquot normally prepared for mercury (0.2 gram) and cyanide and metals analyses (1 gram) is measured on a wet-weight basis, the amount of dry solid actually prepared may not be representative of the bulk site

sample. Mercury was not detected in the two samples analyzed and were therefore rejected for all use (R) based on the exceedingly small sample weight prepared. All other metals and cyanide results for these two samples were qualified as estimated concentrations (J).

SECTION 5

ANALYTICAL RESULT REPORTING AND BACKGROUND SAMPLES

The following sections present the reporting criteria and reporting methods applied to the PA/SI data set. This section also presents the locations, analyses conducted, and analytical results of designated background samples collected during this PA/SI. Sampling locations are presented in Figures 3-1, 3-2, and 3-3. Tables 5-1 and 5-2 present the analytical results for designated surface soil background samples and sediment background samples collected. Data validation memoranda and Form I Analytical Results are included in Appendix B.

5.1 EVALUATION CRITERIA AND RATIONALE

Analytical results of samples collected during this PA/SI are presented in summary tables in Sections 5, 6, and 8. The first columns of each analytical summary table present background sample concentrations by medium followed by the analytical results of samples collected for that particular medium. The background sample concentrations were used for comparison purposes to determine detections at or above background and significantly above background within the data set. For release sample locations, only those analytes that also were detected in a source at the site were evaluated to determine whether their concentrations were elevated. For the purposes of this investigation, an analytical concentration is considered significantly above background if the reported concentration is:

- Equal to or greater than the sample's Contract-Required Quantitation Limit/Contract-Required Detection Limit (CRQL/CRDL) if the analyte was not detected in the background samples collected for that media.
- Equal to or greater than the background sample's sample quantitation limit (SQL) when background concentrations were detected below the CRQL/CRDL.
- At least three times greater than the background concentration when the background concentration equals or exceeds the CRQL/CRDL.

Since multiple background samples were collected for each media, the background concentration used to determine significance in each table is presented in italic typeface. Concentrations of analytes detected above background samples are presented in bold typeface. For those release sample analytical results considered significantly above background based on the criteria described above, the concentrations are presented in bold typeface and underlined.

For analytical results qualified by the reporting laboratory as estimated concentrations (J-flagged), the sample concentrations were adjusted prior to determining significance above background, in accordance with the guidance provided in the EPA fact sheet *Using Qualified Data to Document an Observed Release and Observed Contamination* (EPA 1996).

Release samples qualified with a JK or JH were adjusted by dividing the concentration reported by the laboratory by an analyte-specific factor obtained from the EPA fact sheet *Using Qualified Data to Document an Observed Release and Observed Contamination* (EPA 1996). Analytical concentrations with J, JL or no qualifier were used as reported. For those release samples

qualified as R, N, NJ, U, UJ, B, UJL, UJK, UJH, BJ, BJL, BJK, and BJH; the sample concentration was not used to determine significance above background.

Background concentrations were only adjusted if usable release data were available. For background concentrations with a U, J, UJH, or no qualifier; the background concentration was used as reported. For those background concentrations qualified as UJ, JK, UJL, UJK, JL, and JK; the background concentration was multiplied by an analyte-specific factor provided in the EPA fact sheet *Using Qualified Data to Document an Observed Release and Observed Contamination* (EPA 1996). For those background concentrations qualified as B, BJ, BJL, BJK, BJH; the reported concentration is replaced with the SQL to determine its significance above background. Background samples qualified as R, N, or NJ were not used to determine significance above background.

In all cases, the adjusted concentration is included within parenthesis with an "AC" qualifier in the summary tables below the reported laboratory concentration and data qualifier.

5.2 ANALYTICAL RESULTS REPORTING

Analytical results in Sections 5, 6, and 8 will be presented by listing the number of samples for each analyte detected and those that were detected significantly above background. Analytical result ranges for analytes detected significantly above background are also presented. As presented in Section 5.1, concentrations exceeding background will be presented in bold typeface in data summary tables. Concentrations significantly exceeding background will be in bold typeface and underlined. The data summary tables will reflect the reported concentration and original qualifiers as well as the adjusted concentration values for J-flagged data using the criteria presented in Section 5.1. Adjusted data will be qualified with an "AC" to differentiate adjusted concentrations from originally reported results. The background analytical result used for the comparison will be marked in italics on all data summary tables. Data evaluation memoranda and Form I analytical results are included in Appendix B. Based on EPA Region 10 policy, aluminum, calcium, iron, magnesium, potassium, and sodium (common earth crust elements) will be listed if detected; however, concentrations will not be evaluated or discussed in the text.

5.3 BACKGROUND SAMPLES

A total of six designated background samples: two surface soil and four sediment, were collected in areas believed to represent background environmental conditions in the site vicinity. Due to the mineralized nature of the geologic formations in the upper Gold Creek watershed, metal concentrations in the background samples collected during this study are high relative to other (non-mineralized) areas; however, such results are not unexpected within a mining district. Background samples collected during other studies conducted within the Gold Creek watershed and having lower levels of the same metals may also be used to evaluate the impacts of the Mill on Gold Creek.

In addition to the four designated background sediment samples, one sediment sample collected within Gold Creek upgradient of the Mill site (CS014) and four sediment samples collected from Gold Creek tributaries (CS004, CS005, CS006, and CS009) were also used as background for

specific groups of samples. Furthermore, the location of sediment sample CS014 upgradient of the Mill but downgradient of the mine sites helps to differentiate between potential impacts to Gold Creek caused by the mine sites from potential impacts caused by the Mill site.

Due to its high organic content, designated sediment background sample SD-BK002 was not considered comparable to the release samples collected. The physical characteristics and analytical results of this sample are presented below; however, the analytical results were not used to compare and determine significance above background for release samples collected during this PA/SI. The following sections present sampling locations and results of designated and non-designated background samples.

5.3.1 Sampling Locations

5.3.1.1 Designated Surface Soil Background Samples

Two surface soil background samples were collected on 4 August 2001 in the near vicinity of the Mill and upgradient of the site (Figure 3-2). Sample SS-BK001 was collected east of Gold Creek in an open area near the access road to Silver Leaf Mine and consisted of tan fine to medium-grained sand with silt and gravel. The other surface soil background sample (SS-BK002) was collected at the end of the site access road upgradient of the site sources and the landfill and consisted of red to tan fine-grained sand with silt and gravel. Both samples were collected from an inactive stream terrace above the channel, at approximately the same elevation as the Mill site.

5.3.1.2 Designated Sediment Background Samples

Four designated sediment background samples were collected in the upper reaches of Chloride Gulch and Gold Creek, upgradient from the Idaho Lakeview (SD-BK001), the Keep Cool (SD-BK002), the Webber (SD-BK003), and the New Rainbow (SD-BK004) mines (Figure 3-1). The locations of SD-BK001, SD-BK003, and SD-BK004 were altered slightly from locations presented in the SQAP in order to accommodate accessibility issues encountered during the field effort. Samples SD-BK001 and SD-BK002 were both collected on 2 August 2001 and consisted, respectively, of dark brown sand with silt and gravel, and a highly organic soil with silt and clay. Samples SD-BK003 and SD-BK004 were both collected on 4 August 2001 and consisted of dark brown silt with some sand and organics.

5.3.1.3 Sediment Sample Upgradient From Mill

In addition to the designated background samples, one sediment sample, CS014 (Figure 3-1), was collected in Gold Creek upgradient of the Mill site and all identified sources. This sample also was used as an attribution/background sample for all the sediment samples collected along Gold Creek and its delta (DS001 to DS012, CS001 to CS003, CS007, CS008, and CS010 to CS013). This sample was collected on 3 August 2001 and consisted of reddish brown medium to coarse-grained sand and pea-sized gravel.

5.3.1.4 Tributary Sediment Samples

Four sediment samples were collected from tributaries of Gold Creek. The samples were collected above the tributaries' confluences with Gold Creek in Chloride Gulch (CS009), West

Gold Creek (CS005 and CS006), and Kick Bush Gulch (CS004; Figure 3-1). The locations of some samples were adjusted in the field based on accessibility. Sample CS005 was originally planned to be collected within Gold Creek, just below the confluence with West Gold Creek (WESTON 2001), but the confluence was inaccessible; therefore, the sample was collected at the farthest downstream point reached in West Gold Creek. Sample CS006 was collected further upstream on West Gold Creek in case the confluence was misplaced.

The tributary samples collected also were used as attribution/background to specific subsets of the Gold Creek sediment data. For the purpose of this investigation, sample CS009 also was used as background for sediment samples collected within Gold Creek downgradient from the confluence with Chloride Gulch (DS001 to DS012, CS001 to CS003, CS007, and CS008). Samples CS004, CS005, CS006, and CS009 was used as background for sediment samples collected in Gold Creek downgradient from the confluences with West Gold Creek and Kick Bush Gulch (CS001 to CS003, and DS001 to DS012).

The tributary sediment samples were collected between 31 July and 2 August 2001 and consisted of dark brown silt and clay (CS004), dark brown fine to medium grained sand with silt and gravel (CS005), dark brown gravel with sand and silt (CS006), and tan fine to medium grained sand with silt (CS009).

5.3.2 Analytical Results

5.3.2.1 Designated Surface Soil Background Samples

Thirteen inorganics constituents were detected in both surface soil background samples collected including aluminum, arsenic, barium, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, vanadium, and zinc (Table 5-1).

5.3.2.2 Designated Sediment Background Samples

Up to fifteen inorganic constituents were detected in the four designated background sediment samples collected including aluminum, arsenic, barium, cadmium, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, potassium, vanadium, and zinc (Table 5-2). Aluminum, arsenic, chromium, copper, iron, lead, manganese, nickel, potassium, and zinc were detected in sediment sample SD-BK001. Aluminum arsenic, barium, cadmium, calcium, chromium, copper, iron, lead, magnesium, manganese, vanadium, and zinc were detected in background sediment sample SD-BK002. Aluminum, arsenic, calcium, chromium, iron, lead, manganese, and zinc were detected in background sediment sample SD-BK003. Aluminum, arsenic, calcium, chromium, copper, iron, lead, manganese, and zinc were detected in background sediment sample SD-BK004.

5.3.2.3 Sediment Sample Upgradient From Mill

Eleven inorganic constituents were detected in sediment sample CS014 consisting of aluminum, arsenic, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, and zinc. The sample also was compared to designated sediment background samples SD-BK003 and SD-BK004 (Table 5-3) to determine if any of the detected constituents could be attributed to the upgradient mines. Analytical results of CS014 compared to background indicated that concentrations of arsenic (129 mg/kg), cadmium (1.3 mg/kg), and lead (137 mg/kg) were

detected above background (but not significantly above background) and potentially could be attributed to the mine sites located upgradient from the Mill site.

5.3.2.4 Tributary Sediment Samples

Up to fourteen inorganic constituents were detected in the four tributary sediment samples collected during this PA/SI including aluminum, arsenic, barium, cadmium, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, silver, and zinc (Table 5-4). Aluminum, arsenic, calcium, chromium, copper, iron, lead, magnesium, manganese, and zinc were detected in sediment sample CS004. Aluminum, arsenic, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, and zinc were detected in sediment sample CS005. Aluminum, arsenic, chromium, copper, iron, lead, magnesium, manganese, and zinc were detected in sediment sample CS006. Aluminum, arsenic, barium, cadmium, chromium, copper, iron, lead, magnesium, manganese, nickel, silver, and zinc were detected in sediment sample CS009. When the tributary samples were compared to background, only three inorganic constituents, all in sample CS009 (Chloride Gulch), were detected above background: arsenic (601 mg/kg), cadmium (2.1 mg/kg), and lead (172 mg/kg). The arsenic concentration in CS009 was detected significantly above background.

Table 5-1—Designated Surface Soil Background Samples Analytical Results Summary
Gold Creek Shoshone Silver Mill PA/SI

CLP Number	MJ0C50	MJ0C51
EPA Sample Number	1314048	1314049
WESTON Sample ID	GCSM-SS-BK001-0000	GCSM-SS-BK002-0000
Sample Location	BK001	BK002
Depth (feet bgs)	0 - 1	0 - 1
Inorganics (mg/kg)		
Aluminum	11,000	31,000
Antimony	1.4 BJK	1.2 BJK
Arsenic	44.5	36
Barium	93.3	349
Beryllium	0.47 B	0.65 B
Cadmium	0.04 U	0.05 U
Calcium	734 BJK	2,290 JK
Chromium	9.8	8
Cobalt	7.3 B	6.2 B
Copper	14 JK	18.6 JK
Cyanide	0.06 UJK	0.08 UJK
Iron	17,900	20,300
Lead	29.1	16.7
Magnesium	4,740	1,990
Manganese	454	1,230
Mercury	0.1 U	0.07 U
Nickel	11.1	12
Potassium	675 B	855 B
Selenium	0.72 U	0.89 U
Silver	1.1 BJK	1.3 BJK
Sodium	120 U	205 U
Thallium	1.1 U	1.3 U
Vanadium	13.1	26.2
Zinc	95.7	104

Notes:
B: The reported concentration is greater than the instrument detection limit, but less than the sample quantitation limit.
J: The analyte was positively identified. The reported concentration is an estimate.
K: Unknown bias
mg/kg: Milligrams per kilogram
U: The analyte was not detected at or above the instrument detection limit given.

Table 5-2—Sediment Background Samples Analytical Results Summary
Gold Creek Shoshone Silver Mill PA/SI

CLP Number	MJ0C27	MJ0C28	MJ0C53	MJ0C54	MJ0C49
EPA Sample Number	1314025	1314026	1314301	1314302	1314047
WESTON Sample ID	GCSM-SD-BK001-0000	GCSM-SD-BK002-0000	GCSM-SD-BK003-0000	GCSM-SD-BK004-0000	GCSM-SD-CS014-0000
Sample Location	BK001	BK002	BK003	BK004	CS014
Depth (feet)	0	0	0	0	0
Inorganics (mg/kg)					
Aluminum	8,780	11,000	15,600 JK	15,600 JK	6,470
Antimony	2.60 BJL	1.1 UJL	7.6 BJK	3.1 BJK	1.7 B
Arsenic	114 JH	7.5 JH	38.8 JK	18.7 JK	50.8 JK
Barium	43.80 B	355	133 BJK	102 BJK	37.8 B
Beryllium	0.43 B	0.25 B	0.48 UJK	0.41 BJK	0.4 B
Cadmium	0.18 U	2	0.78 UJK	0.46 UJK	0.32 U
Calcium	390 BJK	4,850 JK	17,900 JK	7,440 JK	15,600 JK
Chromium	6	9.3	19.8 JK	15.8 JK	8
Cobalt	10.8 B	7 B	5.3 BJK	4.4 BJK	4.6 B
Copper	18.9	16.7	26 BJK	26.3 JK	12.9 JK
Cyanide	0.07 U	0.27 B	0.52 UJK	0.26 UJK	0.07 UJL
Iron	10,000	16,200	16,500 JK	14,700 JK	15,500
Lead	15.1	72.1	49.6 JK	18.4 JK	30.6 JK
Magnesium	1,150 JK	2,480 JK	4,530 BJK	2,830 BJK	10,700 JK
Manganese	231	1,650	1,050 JK	476 JK	343 JK
Mercury	0.06 U	0.15 B	0.43 UR	0.22 UR	0.06 U
Nickel	21.5	9.6 B	18 BJK	14.3 BJK	9.9
Potassium	1,940	1,470 B	1,130 BJK	900 BJK	1,120 B
Selenium	0.78 U	1.3 U	5.9 UJK	3 UJK	0.83 U
Silver	2.2 B	1.4 B	2.7 BJK	1.2 BJK	0.89 B
Sodium	156 U	279 U	868 UJK	538 UJK	161 B
Thallium	1.2 U	1.9 U	8.8 UJK	4.5 UJK	1.2 U
Vanadium	10.1 B	25.5	13.1 BJK	12.4 BJK	8 B
Zinc	165 JK	145 JK	173 JK	114 JK	183 JH

Notes:
B: The reported concentration is greater than the instrument detection limit, but less than the sample quantitation limit.
H: High bias
J: The analyte was positively identified. The reported concentration is an estimate.
K: Unknown bias
L: Low bias
mg/kg: Milligrams per kilogram
U: The analyte was not detected at or above the instrument detection limit given.

Table 5-3—Comparison of Background Sediment Sample Results from Upstream and Downstream of New Rainbow and Conjecture Mines
Gold Creek Shoshone Silver Mill PA/SI

Description	Background		
CLP Number	MJ0C53	MJ0C54	MJ0C49
EPA Sample Number	1314301	1314302	1314047
WESTON Sample ID	GCSM-SD-BK003-0000	GCSM-SD-BK004-0000	GCSM-SD-CS014-0000
Sample Location	BK003	BK004	CS014
Depth (feet)	0	0	0
Inorganics (mg/kg)			
Aluminum (EC)	15,600 JK	15,600 JK	7,660
Antimony	7.6 BJK SQL= *103.44*	3.1 BJK SQL = 52.40	8.9 BJL
Arsenic	38.8 JK *(67.51 AC)*	18.7 JK (35.54 AC)	**129**
Barium	133 BJK SQL= *344.82*	102 BJK SQL = 174.67	43.6
Beryllium	0.48 UJK	0.41 BJK	0.44 B
Cadmium	0.78 UJK *(1.1 AC)*	0.46 UJK (0.65 AC)	**1.3**
Calcium (EC)	17,900 JK	7,440 JK	4,110 JK
Chromium	19.8 JK *(25.54 AC)*	15.8 JK (20.38 AC)	8.4
Cobalt	5.3 BJK	4.4 BJK	5.4 B
Copper	26 BJK SQL = *43.1*	26.3 JK (32.09 AC)	28.9 JK (23.69 AC)
Cyanide	0.52 UJK	0.26 UJK	0.06 UJK
Iron (EC)	16,500 JK	14,700 JK	16,400
Lead	49.6 JK *(71.42 AC)*	18.4 JK (26.5 AC)	**137**
Magnesium (EC)	4,530 BJK	2,830 BJK	8,620
Manganese	1,050 JK *(1,302 AC)*	476 JK (590.24 AC)	802
Mercury	0.43 UR	0.22 UR	0.05 U
Nickel	18 BJK SQL = *68.96*	14.3 BJK SQL = 34.93	13.6
Potassium (EC)	1,130 BJK	900 BJK	520 B
Selenium	5.9 UJK	3 UJK	0.71 U
Silver	2.7 BJK SQL = *17.24*	1.2 BJK SQL = 8.73	8.9
Sodium (EC)	868 UJK	538 UJK	103 U
Thallium	8.8 UJK	4.5 UJK	1.1 U
Vanadium	13.1 BJK	12.4 BJK	8.3 B
Zinc	173 JK *(259.5 AC)*	114 JK (171 AC)	**557**

Notes:

Bold: The reported concentration is above background.

Bold and Underlined: The reported concentration is significantly elevated and was attributed to source (see Section 5 for detailed explanation).

Italics: Background value used for comparison to release sample concentrations

AC: Adjusted Concentration

B: The reported concentration is greater than the instrument detection limit, but less than the sample quantitation limit.

EC: Earth Crust Metal

H: High bias

J: The analyte was positively identified. The reported concentration is an estimate.

K: Unknown bias

L: Low bias

mg/kg: milligrams per kilogram

SQL: Sample Quantitation Limit

U: The analyte was not detected at or above the instrument detection limit given.

Table 5-4—Tributary Sediment Samples Analytical Results Summary
Gold Creek Shoshone Silver Mill PA/SI

CLP Number	MJ0C18	MJ0C21	MJ0C22	MJ0C25
EPA Sample Number	1314017	1314019	1314020	1214023
WESTON Sample ID	GCSM-SD-CS004-0000	GCSM-SD-CS005-0000	GCSM-SD-CS006-0000	GCSM-SD-CS009-0000
Sample Location	CS004	CS005	CS006	CS009
Depth (feet)	0	0	0	0
Inorganics (mg/kg)				
Aluminum (EC)	11,000	7,550	3,640	5,750
Antimony	1.1 UJL	1.6 B	0.98 B	8.9 BJL
Arsenic	23 JH	27.9 JK	15.3 JK	601 JH
Barium	64.8 B	55.3 B	27.9 B	54.1
Beryllium	0.51 B	0.71 B	0.28 B	0.56 B
Cadmium	0.08 U	0.06 U	0.28 U	2.1
Calcium (EC)	7,100 JK	1,530 JK	736 BJK	999 BJK
Chromium	13.3	8.9	3.6	7.7
Cobalt	5.7 B	6.2 B	2.2 B	6.6 B
Copper	16	14.6 JK	14.2 JK	36.8
Cyanide	0.12 U	0.09 UJL	0.08 UJL	0.21 B
Iron (EC)	17,400	22,200	10,400	16,700
Lead	14.4	11.2 JK	5.6 JK	172
Magnesium (EC)	7,960 JK	3,300 JK	2,130 JK	3,120 JK
Manganese	309	332 JK	157 JK	1,290
Mercury	0.1 U	0.07 U	0.06 U	0.05 U
Nickel	12.9 B	13.2	5.5 B	11.1
Potassium (EC)	1,000 B	1,050 B	709 B	1,040 B
Selenium	1.3 U	0.96 U	0.85 U	0.71 U
Silver	0.82 B	0.98 B	0.47 B	4.7
Sodium (EC)	226 U	184 B	155 B	78.6 U
Thallium	2 U	1.4 U	1.3 U	1.1 U
Vanadium	12 B	10.7 B	4.5 B	8 B
Zinc	40.5 JK	40.5 JH	33 JH	795 JK

Notes:
B: The reported concentration is greater than the instrument detection limit, but less than the sample quantitation limit.
EC: Earth Crust Metal
H: High bias
J: The analyte was positively identified. The reported concentration is an estimate.
K: Unknown bias
L: Low bias
mg/kg: Milligrams per kilogram
U: The analyte was not detected at or above the instrument detection limit given.

SECTION 6

WASTE SOURCE CHARACTERIZATION

The following section presents the locations, analyses conducted, and analytical results of samples collected from potential site sources identified during this PA/SI, as well as comparisons to background. Source sampling locations are presented in Figure 3-2. Table 6-1 presents the analytical results of the source samples collected and a comparison to background concentrations. Data validation memoranda and Form I Analytical Results are included in Appendix B.

6.1 WASTE SOURCE SAMPLING LOCATIONS

As discussed in Section 2.3.2, samples for waste characterization and attribution purposes were collected from ten sources identified at the Mill site. These sources consist of: 1) the Mill Building ASTs, 2) the tailings pond, 3) the north and 4) south ore piles, the drum piles 5) near the main Mill building ASTs, 6) at the south open area, and 7) along the access road, 8) the burn and scrap metal piles in the south open area, and 10) the Lakeview landfill. These samples were collected on 3 and 4 August 2001.

Sampling locations were selected at those places most likely to contain detectable concentrations of hazardous substances (e. g., discolored soils near the AST pipe outlets, soil adjacent to the drums) and were representative of the source. The following sections present the location and analytical results of samples collected from these sources.

6.1.1 Mill Building ASTs

One surface soil sample (FT001) was collected near one of the pipe outlets of the northernmost AST observed near the Mill building (Figure 3-2). The sample location was selected based on the presence of heavily discolored soils similar to deposits observed at the tailings pond. The soil consisted of reddish to orange brown very fine-grained sand with silt.

6.1.2 Tailings Pond

One surface soil sample (TP002) was collected from the fan-like deposits observed at the southwest corner of the tailings pond (Figure 3-2). Sample TP002 consisted of reddish brown very fine-grained sand with silt. Since the borrow pit was previously believed to be another tailings pond, one surface soil sample (TP001) was also collected at the southwest corner of the borrow pit; this sample consisted of tan silt with sand and gravel.

6.1.3 North Ore Piles

Two ore samples, OT001 and OT002, were collected from the ore piles observed at the north boundary of the site (Figure 3-2). Sample OT001 was collected from the dark gray ore piles. Sample OT002 was collected from a tan ore pile. The ore samples were collected to characterize the composition of the ore and to identify which contaminants potentially could be released into

the environment. The ore samples were collected from the bottom of the piles near areas where evidence from runoff was observed during the field effort.

The dark gray ore consisted mainly of silt with sand and gravel oxidized in places. The tan ore consisted of oxidized silt and pea-sized gravel.

6.1.4 South Ore Piles

Samples OT003, OT004, OT005, and OT006 were collected from the ore piles accumulated at the south open area (Figure 3-2). The ore samples were collected to characterize the composition of the ore and to identify which contaminants could be potentially released into the environment. Sample OT003 was collected from the gray ore piles. Samples OT004, OT005, and OT006 were collected, respectively, from the tan ore piles at the northeast corner, east side, and south side of the south open area. The ore samples were collected from the bottom of the piles.

The dark gray ore consisted mainly of silt with sand and gravel oxidized in places. The tan ore consisted of oxidized silt and pea-sized gravel.

6.1.5 Carbon Drums

One surface soil sample (DR001) was collected immediately adjacent to the carbon drums near the Mill Building ASTs (Figure 3-2). This sample consisted of reddish brown fine to medium grained sand with silt and a trace of pea-sized gravel. Some granulated carbon also was observed within the sample.

6.1.6 South Open Area Drums

One surface soil sample (DR002) was collected near the drum pile located in the south open area (Figure 3-2). This sample consisted of orange brown fine-grained sand with silt.

6.1.7 Access Road Drums

One surface soil sample (DR003) was collected immediately adjacent to the drum pile located along the site access road east of the south open area (Figure 3-2). This sample consisted of tan to yellowish brown fine-grained sand with silt and a trace of pea-sized gravel.

6.1.8 Burn Pile

One surface soil sample (SS001) was collected from heavily discolored soil immediately adjacent to the burn pile (Figure 3-2) and consisted of red fine-grained sand with silt. This sample was collected in addition to the samples outlined in the SQAP based on field observations.

6.1.9 Scrap Metal Pile

One surface soil sample (SS002) was collected from heavily discolored soil immediately adjacent to the scrap metal pile (Figure 3-2) and consisted of yellowish fine-grained sand with silt. This sample was collected in addition to the samples outlined in the SQAP based on field observations.

6.1.10 Former Lakeview Landfill

One surface soil sample (SS003) was collected at the former landfill immediately adjacent to the southern Mill site boundary. The sample consisted of fine-grained sand with silt and medium grained gravel. The landfill cover material was sampled due to its proximity to the site and the possibility of its use as a disposal area for the Mill.

6.2 WASTE SOURCE ANALYTICAL RESULTS

The following sections present the analytical results of samples collected at the potential site sources. Tables 6-1 to 6-10 present the analytical results compared to background samples collected in the vicinity of the site.

6.2.1 Mill Building ASTs

Source sample FT001 was the only sample collected in the vicinity of the Mill Building ASTs. Aluminum, antimony, arsenic, barium, chromium, copper, iron, lead, and magnesium, manganese, mercury, silver, vanadium, and zinc were detected in the surface soil samples collected from heavily discolored soils near the ASTs. From these inorganic constituents, six were detected at concentrations significantly above background: antimony (96.8 mg/kg), arsenic (823 mg/kg), copper (74.2 mg/kg), lead (968 mg/kg), mercury (0.15 mg/kg), and silver (77.6 mg/kg).

Field pH screening results indicated acidic soils with a pH of 3.

6.2.2 Tailings Pond

Nineteen inorganic constituents were detected in sample TP002 collected at the tailings pond. These constituents were aluminum, antimony, arsenic, barium, cadmium, chromium, copper, cyanide, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, vanadium, and zinc. Analytical results indicated the following constituents were detected significantly above background at the tailings pond (TP002): antimony (270 mg/kg), arsenic (1,100 mg/kg), cadmium (8 mg/kg), chromium (13.9 mg/kg), copper (546 mg/kg), cyanide (2.8 mg/kg), lead (9,480 mg/kg), manganese (3,840 mg/kg), mercury (0.33 mg/kg), selenium (1.2 mg/kg), silver (39.9 mg/kg), and zinc (2,230 mg/kg).

Since initially it was believed to be another tailings pond, one sample (TP001) was collected from the borrow pit. Thirteen inorganic constituents were detected in sample TP001 including aluminum, arsenic, barium, chromium, copper, iron, lead, magnesium, manganese, nickel, silver, vanadium, and zinc. Only lead (341 mg/kg) and silver (3.2 mg/kg) were detected significantly above background in this sample.

Field screening indicated slightly acidic soils with a pH of 5 for both TP001 and TP002.

6.2.3 North Ore Piles

With the exception of cyanide, selenium, sodium, and thallium, all of the TAL metals analyzed were detected in samples OT001 and OT002, collected from the ore piles at the north boundary

of the site (Figure 3-2). The following inorganic constituents were detected at concentrations significantly above background in both of these samples: antimony (105-202 mg/kg), arsenic (368-1,530 mg/kg), cadmium (9.3-32.5 mg/kg), copper (759-915 mg/kg), lead (5,580-9,550 mg/kg), mercury (0.17-0.46 mg/kg), silver (44.8-111 mg/kg), and zinc (3,850-14,700 mg/kg). Beryllium (1.5 mg/kg) and manganese (8,440 mg/kg) were detected significantly above background only in OT001 (gray north ore pile).

Field pH screening results indicated the ore was slightly acidic with pH of 6 (OT001) and 5 (OT002).

6.2.4 South Ore Piles

Up to eighteen inorganic constituents were detected in samples OT003 to OT006 collected from the ore piles at the south open area (Figure 3-2). Detected constituents consisted of aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, selenium, silver, thallium, and zinc.

Concentrations of antimony (147-641 mg/kg), arsenic (908-55,500 mg/kg), copper (80.9-154 mg/kg), lead (1,360-5,650 mg/kg), mercury (0.12-3.6 mg/kg), and silver (89.3-236 mg/kg) were detected significantly above background in all four south ore pile samples collected. In addition to these, cadmium (33.3 mg/kg), cobalt (46.5 mg/kg), nickel (51.6 mg/kg), selenium (2.4 mg/kg), and zinc (9,940 mg/kg) were detected at concentrations significantly above background only in sample OT003.

Field pH screening results indicated the ore was highly acidic with a pH of 2 for ore sample OT003. A pH of 3 was recorded for ore samples OT004 and OT006, and a pH of 4 was recorded for ore sample OT006.

6.2.5 Carbon Drums

Fourteen inorganic constituents were detected in surface soil sample DR001 collected by the carbon drums near the Mill Building ASTs. These constituents consisted of aluminum, arsenic, barium, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, silver, vanadium, and zinc. Analytical results of this sample indicated that only lead (305 mg/kg) and silver (8.7 mg/kg) were detected at concentrations significantly above background.

Field pH screening results indicated the surface soil surrounding the carbon drums was slightly acidic with a pH of 5 for sample DR001.

6.2.6 South Open Area Drums

Sixteen inorganic constituents were detected in surface soil sample DR002 collected by the drums in the south open area. These constituents consisted of aluminum, antimony, arsenic, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, silver, thallium, vanadium, and zinc. Analytical results of this sample indicated that antimony (63.8 mg/kg), arsenic (816.09 mg/kg), cadmium (1.2 mg/kg), lead (659 mg/kg), mercury (0.13 mg/kg), silver (89.4 mg/kg), and zinc (407.33 mg/kg) were detected at concentrations significantly above background.

Field pH screening results indicated the surface soil surrounding the south open area drums was highly acidic with a pH of 3 for sample DR002.

6.2.7 Access Road Drums

Fourteen inorganic constituents were detected in surface soil sample DR003 collected by the drums along the access road east of the south open area. These constituents consisted of aluminum, arsenic, barium, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, silver, vanadium, and zinc. Analytical results of surface soil sample DR003 indicated there were no detected concentrations significantly above background.

Field pH screening results indicated the surface soil surrounding the drums along the access road east of the south open area was moderately acidic with a pH of 4 for sample DR003.

6.2.8 Burn Pile

Twelve inorganic constituents were detected in sample SS001 collected from stained surface soil surrounding the burn pile in the south open area. These constituents were aluminum, antimony, arsenic, chromium, copper, iron, lead, magnesium, manganese, mercury, silver, and zinc. Analytical results of this sample indicated antimony (155 mg/kg), arsenic (1,310 mg/kg), lead (920 mg/kg), mercury (0.13 mg/kg), and silver (71.9 mg/kg) were detected at concentrations significantly above background.

Field pH screening results indicated the surface soil surrounding the burn pile in the south open area was highly acidic with a pH of 3 for sample SS001.

6.2.9 Scrap Metal Pile

Eleven inorganic constituents were detected in sample SS002 collected from stained surface soil surrounding the scrap metal pile in the south open area. These constituents were aluminum, arsenic, barium, chromium, copper, iron, lead, magnesium, manganese, silver, and zinc. Analytical results of this sample indicated arsenic (254 mg/kg), lead (161 mg/kg), and silver (12.5 mg/kg) were detected at concentrations significantly above background.

Field pH screening results indicated the surface soil surrounding the scrap metal pile at the south open area was moderately to slightly acidic with a pH of 4 to 5 for sample SS002.

6.2.10 Former Lakeview Landfill

Fourteen inorganic constituents were detected in sample SS003 collected at the former Lakeview landfill. These constituents were aluminum, antimony, arsenic, barium, cadmium, chromium, copper, iron, lead, magnesium, manganese, nickel, silver, and zinc. Analytical results of this sample indicated antimony (17.4 mg/kg), cadmium (1.4 mg/kg), copper (96.2 mg/kg), lead (1,080 mg/kg), silver (16.3 mg/kg), and zinc (749 mg/kg) were detected at concentrations significantly above background.

Field pH screening results indicated the surface soil sample collected at the former Lakeview landfill was slightly acidic with a pH of 5 for sample SS003.

Table 6-1—Source Surface Soil Sample Analytical Results Summary
Gold Creek Shoshone Silver Mill PA/SI

Description	Background		Sources								
Source Location			Mill Building ASTs	Tailings Pond		North Ore Piles		South Ore Piles			
CLP Number	MJ0C50	MJ0C51	MJ0C34	MJ0C32	MJ0C33	MJ0C30	MJ0C31	MJ0C37	MJ0C38	MJ0C39	MJ0C40
EPA Sample Number	1314048	1314049	1314032	1314030	1314031	1314028	1314029	1314035	1314303	1314036	1314037
WESTON Sample ID	GCSM-SS-BK001-0000	GCSM-SS-BK002-0000	GCSM-SS-FT001-0000	GCSM-SS-TP001-0000	GCSM-SS-TP002-0000	GCSM-SS-OT001-0000	GCSM-SS-OT002-0000	GCSM-SS-OT003-0000	GCSM-SS-OT004-0000	GCSM-SS-OT005-0000	GCSM-SS-OT006-0000
Sample Location	BK001	BK002	FT001	TP001	TP002	OT001	OT002	OT003	OT004	OT005	OT006
Depth (feet)	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
Inorganics (mg/kg)											
Aluminum (EC)	11,000	*31,000*	7,490	9,720	6,330	11,100	12,200	414	4,180	3,520	2,720
Antimony	1.4 BJK SQL = 12.8	1.2 BJK SQL = *15.72*	**96.8 JL**	4.8 BJL	**270 JL**	**105 JL**	**202 JL**	**641 JL**	**276 JL**	**169 JL**	**147 JL**
Arsenic	*44.5*	36	823 JH **(472.99 AC)**	51.7 JH (29.41 AC)	1,100 JH **(632.18 AC)**	368 JH **(211.49 AC)**	1,530 JH **(879.3 AC)**	55,500 JH **(31,896.5 AC)**	1,300 JH **(747.13 AC)**	1,160 JH **(666.67 AC)**	908 JH **(521.84 AC)**
Barium	93.3	*349*	108	67.6	85.5	71.2	86.5	104	72.2	43.6 B	38.7 B
Beryllium	0.47 B SQL = 1.06	0.65 B SQL = *1.31*	0.19 B	0.42 B	0.54 B	**1.5**	0.73 B	0.02 U	0.14 B	0.12 B	0.09 B
Cadmium	0.04 U	*0.05 U*	0.05 U	1 B	**8**	**32.5**	**9.3**	**33.3**	0.05 U	0.05 U	0.05 U
Calcium (EC)	734 BJK	*2,290 JK*	705 BJK	890 BJK	353 BJK	8,390	1,990 JK	142 BJK	369 BJK	117 BJK	83.9 UJK
Chromium	*9.8*	8	**11.1**	8.9	**13.9**	6.7	**11.4**	2.7	9.2	7.9	5.4
Cobalt	7.3 B SQL = 10.65	6.2 B SQL = *13.11*	0.79 B	4.5 B	4.4 B	12.4	5 B	**46.5**	0.27 U	0.25 U	0.25 U
Copper	14 JK (17.08 AC)	18.6 JK *(22.69 AC)*	**74.2**	**34.4**	**546**	**915**	**759**	**154**	**102**	**97.8**	**80.9**
Cyanide	0.06 UJK (0.093 AC)	0.08 UJK *(0.124 AC)*	0.06 U	0.15 B	**2.8**	0.09 B	0.17 B	0.07 U	0.07 U	0.1 B	0.07 U
Iron (EC)	17,900	*20,300*	41,300	17,000	35,100	28,600	34,900	201,000	41,600	39,700	36,500
Lead	*29.1*	16.7	**968**	**341**	**9,480**	**5,580**	**9,550**	**5,650**	**2,770**	**1,360**	**1,190**
Magnesium (EC)	*4,740*	1,990	4,060 JK	5,810 JK	4,510 JK	17,600	7,330 JK	78.9 UJK	3,300 JK	2,840 JK	2,040 JK
Manganese	454	*1,230*	295	456	**3,840**	**8,440**	**2,600**	17.2	77.7	101	96.5
Mercury	0.05 U	*0.07 U*	**0.15**	0.05 U	**0.33**	**0.17**	**0.46**	**3.6**	**0.22**	**0.18**	**0.12**
Nickel	11.1	*12*	7.8 B	10.3	11.3	**15.4**	**14.2**	**51.6**	4.1 B	4.3 B	3.2 B
Potassium (EC)	675 B	*855 B*	845 B	737 B	1,210	1,990	1,190	1,050 B	895 B	699 B	724 B
Selenium	0.72 U	*0.89 U*	0.73 U	0.72 U	**1.2**	0.69 U	0.72 U	**2.4**	0.82 U	0.78 U	0.76 U
Silver	1.1 BJK SQL = 2.13	1.3 BJK SQL = *2.62*	**77.6**	**3.2**	**39.9**	**44.8**	**111**	**236**	**225**	**113**	**89.3**
Sodium (EC)	120 U	*205 U*	167 U	102 U	96.2 U	153 U	121 U	26.2 UJK	134 U	159 U	150 U
Thallium	1.1 U	*1.3 U*	1.1 U	1.1 U	1.1 U	1 U	1.1 U	**5.8**	1.2 U	1.2 U	1.1 U
Vanadium	13.1	*26.2*	16.9	11.1	11.7	9.5 B	14.7	0.52 U	10.2 B	10.4 B	8.5 B
Zinc	95.7	*104*	208 JK **(138.66 AC)**	293 JK **(195.33 AC)**	2,230 JK **(1,486.66 AC)**	14,700 JK **(9,800 AC)**	3,850 JK **(2,566.67 AC)**	**9940**	232 JK **(154.67 AC)**	226 JK **(150.67 AC)**	217 JK **(144.67 AC)**

Table 6-1—Source Surface Soil Sample Analytical Results Summary
Gold Creek Shoshone Silver Mill PA/SI

Description	Background		Sources						
Source Location			Carbon Drums	South Open Area Drums	Access Road Drums	Burn Pile		Scrap Metal Pile	Former Lakeview Landfill
CLP Number	MJ0C50	MJ0C51	MJ0C35	MJ0C36	MJ0C44	MJ0C41	MJ0C42	MJ0C55	MJ0C43
EPA Sample Number	1314048	1314049	1314033	1314034	1314042	1314038	1314039	1314040	1314041
WESTON Sample ID	GCSM-SS-BK001-0000	GCSM-SS-BK002-0000	GCSM-SS-DR001-0000	GCSM-SS-DR002-0000	GCSM-SS-DR003-0000	GCSM-SS-SS001-0000	GCSM-SS-SS001-1000	GCSM-SS-SS002-0000	GCSM-SS-SS003-0000
Sample Location	BK001	BK002	DR001	DR002	DR003	SS001	SS001	SS002	SS003
Depth (feet)	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
Inorganics (mg/kg)									
Aluminum (EC)	11,000	*31,000*	13,300	6,550	10,100	5,510	5,470	14,800	9,340
Antimony	1.4 BJK SQL = 12.8	1.2 BJK SQL = *15.72*	10.3 BJL	**63.8 JL**	3.6 BJK	**155 JL**	**148 JL**	15.1 BJL	**17.4 JL**
Arsenic	*44.5*	36	116 JH **(66.67 AC)**	1,420 JH **(816.09 AC)**	**50.2**	1,250 JH **(718.39 AC)**	**1,310**	**254**	**114**
Barium	93.3	*349*	97	42.4 B	69.2	40.6 B	40 B	107	59.5
Beryllium	0.47 B SQL = 1.06	0.65 B SQL = *1.31*	0.51 B	0.28 B	0.41 B	0.19 B	0.18 B	0.29 B	0.41 B
Cadmium	0.04 U	*0.05 U*	0.22 U	**1.2**	0.33 B	0.04 U	0.04 U	0.05 U	**1.4**
Calcium (EC)	734 BJK	*2,290 JK*	1,190 JK	388 BJK	1,270 JK	156 BJK	167 BJK	712 BJK	695 BJK
Chromium	*9.8*	8	**10**	**16**	7.3	6.7	6.8	7.7	6.9
Cobalt	7.3 B SQL = 10.65	6.2 B SQL = *13.11*	4.7 B	0.65 B	5.6 B	0.23 U	0.23 UJK	4.5 B	4.4 B
Copper	14 JK (17.08 AC)	18.6 JK *(22.69 AC)*	**34.8**	**65.6**	21.4 JK (17.54 AC)	**33.6**	34.6 JK **(28.36 AC)**	41.2 JK **(33.77 AC)**	96.2 JK **(78.85 AC)**
Cyanide	0.06 UJK (0.093 AC)	0.08 UJK *(0.124 AC)*	0.23 B	0.07 U	0.06 UJK	0.06 U	0.06 UJK	0.08 UJK	0.07 UJK
Iron (EC)	17,900	*20,300*	19,500	54,200	15,700	37,400	39,000	23,000	17,000
Lead	*29.1*	16.7	**305**	**659**	**48.8**	**920**	**915**	**161**	**1,080**
Magnesium (EC)	*4,740*	1,990	4,190 JK	6,110 JK	4,240	5,850 JK	5,800	2,880	4,220
Manganese	454	*1,230*	569	297	582	78.7	79.9	529	659
Mercury	0.05 U	*0.07 U*	0.06 U	**0.13**	0.05 U	**0.11**	**0.13**	0.07 U	0.09 B
Nickel	11.1	*12*	11.5	10.8	9.8	3.9 B	4.1 B	7.4 B	9.2
Potassium (EC)	675 B	*855 B*	943 B	527 B	862 B	576 B	550 B	498 B	584 B
Selenium	0.72 U	*0.89 U*	0.81 U	0.74 U	0.73 U	0.71 U	0.72 UJK	1 B	0.74 U
Silver	1.1 BJK SQL = 2.13	1.3 BJK SQL = *2.62*	**8.7**	**89.4**	2.2 JK (1.26 AC)	**71.9**	**71.6**	**12.5**	**16.3**
Sodium (EC)	120 U	*205 U*	139 U	145 U	112 U	173 U	144 U	286 U	112 U
Thallium	1.1 U	*1.3 U*	1.2 U	**2.6**	1.1 U	1.1 U	1.1 U	1.3 U	1.1 U
Vanadium	13.1	*26.2*	15.8	17.3	12.4	8.7 B	8.9 B	11.8 B	9.1 B
Zinc	95.7	*104*	134 JK (89.33 AC)	611 JK **(407.33 AC)**	**184**	90.9 JK (60.6 AC)	94.6	82.9	**749**

Notes:

Bold: The reported concentration is above background.

Bold and Underlined: The reported concentration is significantly elevated and was attributed to source (see Section 5 for detailed explanation).

Italics: Background value used for comparison to release sample concentrations

AC: Adjusted Concentration

B: The reported concentration is greater than the instrument detection limit, but less than the sample quantitation limit.

EC: Earth Crust Metal

H: High bias

J: The analyte was positively identified. The reported concentration is an estimate.

K: Unknown bias

L: Low bias

mg/kg: milligrams per kilogram

SQL: Sample Quantitation Limit

U: The analyte was not detected at or above the instrument detection limit given.

SECTION 7

GROUNDWATER PATHWAY

7.1 HYDROGEOLOGIC DESCRIPTION

Groundwater occurrence and flow in the Gold Creek drainage has not been studied. However, aquifers are likely to be found in the faulted, fractured, and weakly weathered Cambrian age metasedimentary bedrock (Maxim 2000). Groundwater occurrence and flow likely are controlled by the orientation and interconnection of fracture systems (Maxim 2000). Due to the steep, narrow, bedrock valleys, alluvial aquifers are likely to be thin, discontinuous, and confined to the valley bottoms (Maxim 2000). The steep mountain topography was carved out by Pleistocene glaciers leaving a sheet of glacial outwash, till, and glacial lake deposits overlying the bedrock. The youngest deposits consist of stream alluvium, landslide deposits, and talus (Bennett and Mitchell 1998).

7.2 LIKELIHOOD OF RELEASE

7.2.1 Source Containment

Source areas at the site were evaluated for containment features. No liners, secondary containment features, maintained engineered cover, ancillary equipment for the ASTs, impervious areas underneath drums or storage areas, functioning and maintained run-on and runoff control and management systems, or any other type of containment system was observed for any of the site sources. Evidence of surface runoff from the ore piles at the north site boundary was observed crossing the site access road towards the north ditch of the main road and into Gold Creek.

7.2.2 Depth to Aquifer

7.2.2.1 Depth to Groundwater

Depth to groundwater near the site occurs between 20 to 30 feet bgs based on the results of soil borings advanced north of the Mill site. However, driller's well reports obtained from the Idaho Department of Water Resources (IDWR) indicated that groundwater in the area can be found anywhere from the surface (artesian wells) to more than 100 feet bgs (IDWR 2001b).

7.2.2.2 Depth to Contamination

The depth of contamination is the distance between the maximum depth of any hazardous substance detected at the site and the top of the aquifer in question. There are no reports of hazardous substance contamination at any of the drinking groundwater wells identified within the 4-mile target distance limit (TDL; EPA, 2001). Depth to contamination in the site vicinity, if present, is unknown.

7.2.3 Net Precipitation

Net precipitation is the difference between the sum of monthly evapotranspiration values and the sum of monthly precipitation values for an area. The mean monthly precipitation in the area ranges from 1.02 inches to 3.22 inches (WRCC 2001). Monthly evapotranspiration values for the area are unknown.

7.2.4 Travel Time

Travel time is based on the geologic materials in the interval between the lowest known point of hazardous substances at the site and the top of the aquifer being evaluated, and the thickness of the aquifer layer with the lowest hydraulic conductivity. The hydraulic conductivity of these materials is unknown.

7.2.5 Groundwater Sampling And Analytical Results

No groundwater samples were collected at the site or within the TDL during this PA/SI investigation.

7.3 GROUNDWATER PATHWAY TARGETS

The 4-mile TDL for the groundwater pathway is presented in Figure 7-1. Two domestic wells and four public drinking water supply wells were identified within 4-miles of the site (EPA 2001). The following sections present additional information on the groundwater pathway targets obtained during this PA/SI.

7.3.1 Nearest Well

The nearest well to the site sources is located at the Gold Creek Lodge, approximately 1 mile from the site.

7.3.2 Groundwater Population

The total population using groundwater within 4-miles of the site is approximately 1,005, based on the average number of people per household in Bonner County (2.58; USCB, 2001) and the actual population served by the drinking water supply wells (EPA 2001). A list of drinking water wells and the populations served is presented in Table 7-1.

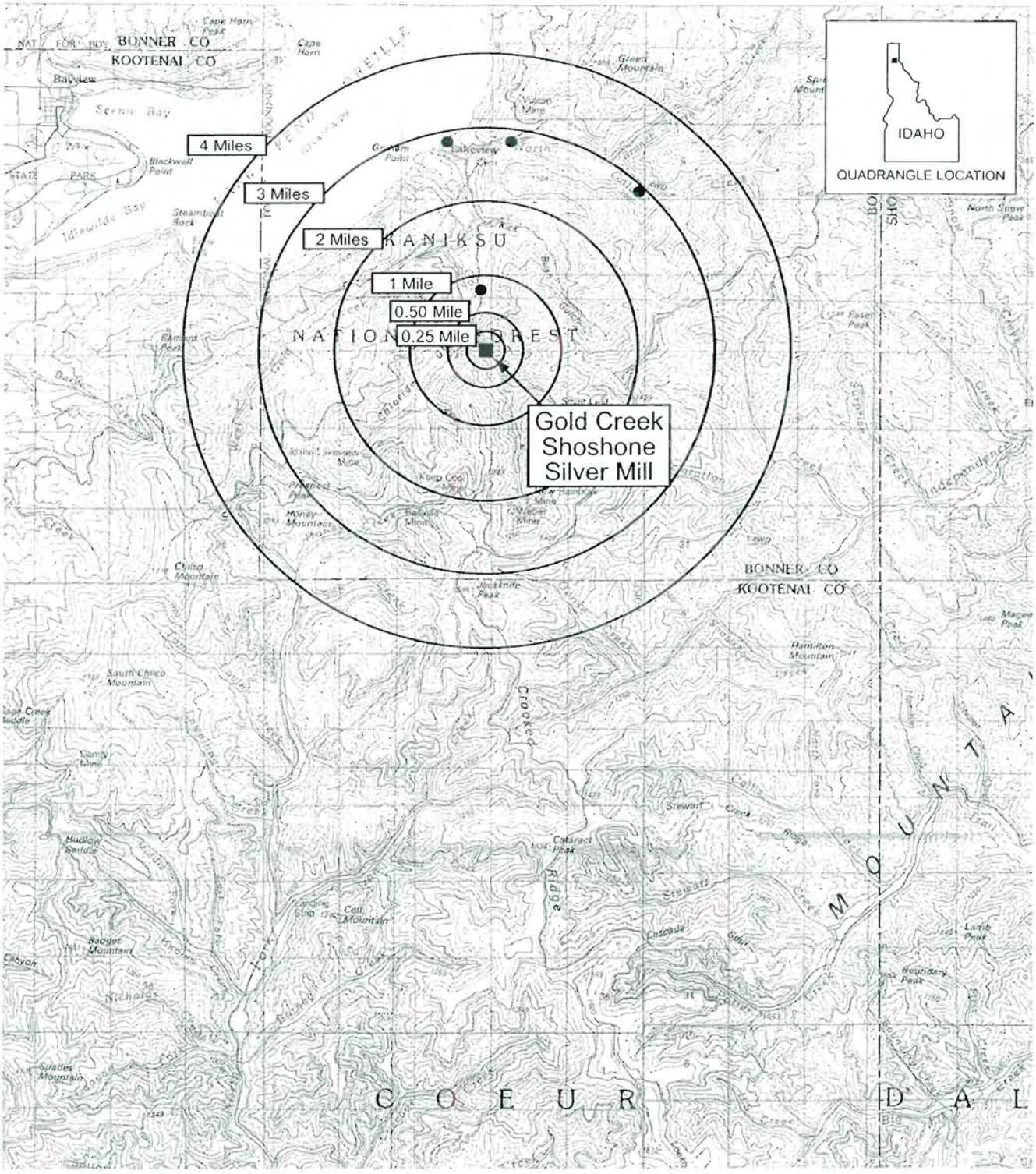
The population served by the nearest well (Gold Creek Lodge) was listed in the 1990 census as 30.16 (Table 7-1). However, according to local residents, the lodge has been closed for several years and no one is currently residing in it.

7.3.3 Well Head Protection Areas

There are no documented wellhead protection areas within the TDL.

7.3.4 Groundwater Resources

Groundwater is currently used as a drinking water source within the TDL.



Source: USGS 30'X60' Series Topo Map of Couer D'Alene, Idaho-Montana

4-Mile Target Distance Limit (TDL) Map
Gold Creek Shoshone Silver Mill PA/SI
Bonner County, Idaho

0 1 2
Scale in Miles

● Approximate Location of Drinking Groundwater Wells

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Figure
7-1

02-0168 Fig7-1.ai

Table 7-1—Groundwater Drinking Water Population Within a 4-Mile Radius
Gold Creek Shoshone Silver Mill PA/SI

Distance (Miles)	Wells	Population
0-0.25	0	0
0.25-0.5	0	0
0.5-1	2 domestic 1 public	5.16[1] 25
1-2	0	0
2-3	3 public	975
3-4	0	0
Total	**6**	**1,005.16**

Notes:

[1] Domestic well population was estimated based on the average number of persons per household for Bonner County, 2.58 people (USCB 2001). Source: EPA 2000; USCB 2001.

SECTION 8

SURFACE WATER PATHWAY

The following section presents the findings, locations, analyses conducted, and analytical results of samples collected from the overland flow path and in-water segment of the surface water pathway obtained during this PA/SI. Sampling locations are presented in Figures 3-1 and 3-2, and 3-3. Tables 8-1 through 8-5 present the analytical results of the samples collected and a comparison to background concentrations. Data validation memoranda and Form I analytical results are included in Appendix B.

Hydrologic and sensitive environments information was obtained from *Gold Creek Ecosystem Assessment At The Watershed Scale* produced by the USFS Sandpoint Ranger District, Idaho Panhandle National Forest (USFS 2001).

8.1 HYDROLOGIC SETTING

According to the USFS, the Gold Creek watershed is approximately 13,900 acres in size. The Mill site is estimated to be less than 0.5 % of the watershed area. The Gold Creek watershed is characterized by glaciated and residual landscapes featuring moderate and high relief forested and rocky slopes with moderately and densely spaced draws. Over half of the watershed consists of slopes greater than 40%. Elevations range from 5,395 feet (Chilco Mountain) to 2,040 feet (Lakeview town site). Most of the drainage is underlain by bedrock with low to moderate surface and mass erosion potentials. The surface bedrock is usually weakly weathered.

Soil surveys conducted by the USFS indicated that soils at the Mill site are mapped as Typic Udivitrands (Unit # 467) and consist of silt loam surface layers 14 inches to 31 inches thick derived of volcanic ash-influenced loess, of which the lower layers contain 10% to 60% rock fragments (USFS unpublished). Well-drained sandy loam, fine sandy loam, and silt loam textures are typically observed below the surface layer and overlying quartzite, siltite, and argillite. This unit typically occurs at low to mid elevations consisting of sideslopes, toeslopes, and adjacent stream bottoms of incised drainages within the mountain slopes (USFS unpublished).

WESTON estimated the drainage area for the site from topographic maps to be approximately 2.5 acres in size. The drainage area delineates the surface area that contributes surface water runoff for the site. During the August 2001 field effort several reaches of Gold Creek were dry downstream of the Conjecture Mine to sample location CS007.

8.1.1 Overland Flow Segment

The surface water hazardous substance migration path includes both the overland segment and the in-water segment. Two primary overland flow paths were identified leading from site sources to the probable points of entry (PPE) into Gold Creek. The north path originates in the area north of the borrow pit, by the north ore piles, runs along the east side of the site access road toward the north, intersecting the main road to Lakeview (USFS Road No. 278), and emptying into the north side road ditch. This road ditch flows downgradient and directly east emptying

into Gold Creek. Herein, this will be referred to as the north overland flow path and North PPE. The distance of the north overland flow path to the North PPE is estimated as 0.2 miles.

The second flow path originates in the areas near the main Mill building and machine shop, running directly east toward the caretaker's residence and access road. The path follows the access road toward the south and to a dip in the access road, and toward a small trail leading into Gold Creek. Herein, this will be referred to as the south overland flow path and South PPE. The distance of the south overland flow path to the South PPE is estimated as 0.11 miles.

8.1.2 Probable Point of Entry

As presented in the preceding section and Figure 8-1, two PPEs (the North and South PPEs) were identified at the site during the PA/SI field effort.

8.1.3 Surface Water Flow Path

The primary surface water pathway is illustrated in Figure 8-1. The flow path of surface water from the PPEs to the 15-mile TDL is summarized as follows: The North and South PPEs into Gold Creek (Figure 8-1) begin in the vicinity of the Mill and extend approximately 2.5 miles downstream to the delta in Lake Pend Oreille. From the delta, the TDL is applied as an arc extending 12.5 miles into Lake Pend Oreille north-northeast of the delta and approximately 6 miles southeast of the delta towards Scenic and Idlewilde Bays (Figure 8-1).

8.2 LIKELIHOOD OF RELEASE

8.2.1 Distance to Surface Water

The shortest distance from any of the site sources to Gold Creek is approximately 0.2 miles (from the ore piles located on the north boundary of the site).

8.2.2 Flood Frequency

The Federal Emergency Management Agency, under the National Flood Insurance Program produces the Flood Insurance Route Maps for the United States. The agency has not produced any maps covering the Mill and its vicinity (IDWR 2001a). A conservative estimate of a 500-year floodplain was assumed for all PA/SI efforts.

8.2.3 Two-Year 24-Hour Rainfall

According to the Atmospheric Sciences Center of the Desert Research Institute Western Regional Climate Center, the average annual precipitation for the site vicinity is 24.33 inches (WRCC 2001). Daily precipitation average and extreme data compiled since 1948 indicate the two-year 24-hour rainfall in the area is 2 inches.

8.2.4 Flood Containment

Source areas at the site were evaluated for containment features. No liners, secondary containment features, maintained engineered cover, ancillary equipment for the ASTs,

impervious areas underneath drums or storage areas, functioning and maintained run-on and runoff control and management systems, or any other type of containment system was observed for any of the site sources. Evidence of surface runoff from the ore piles at the site north boundary was observed crossing the site access road towards the north ditch of the main road and into Gold Creek.

8.3 SURFACE WATER PATHWAY SAMPLING LOCATIONS

8.3.1 Surface Soil—Overland Flow Path

A surface soil sample was collected along each of the overland flow paths to the North PPE and South PPE into Gold Creek (Figure 3-2). Overland flow path surface soils samples were collected on 4 August 2001. Surface soil sample OF001 was collected along the most likely overland flow path of contaminants to Gold Creek from the ore piles, tailings pond, and borrow pit located on the northern boundary of the site. Surface soil sample OF002 was collected at the most likely overland flow path of contaminants to Gold Creek from the Mill buildings, ASTs, drums, and the south open area. These two samples, in conjunction with source characterization samples, contribute to establishing attribution of contaminants found in the release samples to the site.

These soil samples consisted of reddish brown fine-grained sand with silt and pea-sized gravel.

8.3.2 Gold Creek Sediments

In addition to sediment sample CS014 (discussed in Section 5.3.1), eight sediment samples (0 to 10 cm bgs; CS001 to CS003, CS007, CS008, CS010, CS011, and CS013) were collected along Gold Creek from 31 July to 4 August 2001 (Figure 3-1). Gold Creek was dry from upstream of sample CS014 to downstream of sample CS007 during the field effort.

Sediments collected along Gold Creek ranged from tan to dark brown, fine to coarse-grained sand with silt, to gravel with coarse sand and some silt.

8.3.3 Gold Creek Delta Sediments

Twelve sediment samples (0 to 10 cm bgs; DS001 to DS012) were collected from the Gold Creek delta in Lake Pend Oreille on 30 July 2001 (Figure 3-3). Sample locations were determined in the field based on sediment availability, sample recoveries, grain size, and access. Sediment sampling was biased to finer-grained sediments.

Sediments collected in the delta ranged from tan to dark brown, fine to coarse-grained sand with silt and gravel, to gravel and coarse sand.

8.4 SURFACE WATER PATHWAY ANALYTICAL RESULTS

8.4.1 Surface Soil—Overland Flow Path

Fourteen inorganic constituents were detected in overland flow-path surface soil samples OF001 and OF002 (Table 8-1). The constituents detected were aluminum, antimony, arsenic, barium, chromium, copper, iron, lead, magnesium, manganese, nickel, silver, vanadium, and zinc. Of these, cadmium (3.4 mg/kg), lead (318 mg/kg), silver (4.4 mg/kg), and zinc (780 mg/kg) were detected at concentrations significantly above background in sample OF001. Arsenic (668 mg/kg), lead (308 mg/kg), and silver (23.2 mg/kg) were detected at concentrations significantly above background in sample OF002.

Field pH screening indicated the presence of slightly acidic soils with a pH of 5 for both samples.

8.4.2 Gold Creek Sediments

Fifteen inorganic constituents were detected in the eight sediment samples collected in Gold Creek (Tables 8-2, 8-3, and 8-4). Constituents detected were aluminum, antimony, arsenic, barium, cadmium, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, silver, and zinc. Samples with detected concentrations of inorganic constituents significantly above background were restricted to those collected along the Mill site and downstream as far as sample CS010 (Figure 3-1). Arsenic (289 mg/kg), cadmium (5.3 mg/kg), copper (198.36 mg/kg), lead (3,240 mg/kg), silver (31.2 mg/kg), and zinc (1,880 mg/kg) were detected at concentrations significantly above background in sample CS011 (Table 8-2). In addition, lead was detected significantly above background in sample CS010 at a concentration of 410 mg/kg (Table 8-2).

8.4.3 Gold Creek Delta Sediments

Fifteen inorganic constituents were detected in the 12 sediment samples collected in Gold Creek's delta into Lake Pend Oreille (Table 8-5). Constituents detected were aluminum, arsenic, barium, cadmium, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, potassium, silver, and zinc. None of the inorganic constituents were detected at concentrations significantly above background.

8.5 SURFACE WATER PATHWAY TARGETS

8.5.1 Drinking Water Intakes

Three surface water intakes were identified within the 15-mile surface water pathway TDL [(EPA 2001; IDEQ 2001) Figure 8-1, Table 8-6]. These intakes are located approximately 2.5 miles from the Gold Creek delta along the western shore of Lake Pend Oreille and serve approximately 217 individuals (EPA 2001; IDEQ 2001). No surface water intakes occur along Gold Creek.

8.5.2 Wetlands and Other Sensitive Environments

According to the USFS, areas within the 15-mile surface water pathway TDL (both river and lake) currently are used by the federally-listed endangered bull trout (*Salvelinus confluentus*).

The Gold Creek watershed is a priority watershed for bull trout recovery at the Idaho Panhandle National Forests and is currently the second-most important bull trout spawning stream within the Lake Pend Oreille watershed (USFS 2001a). Bull trout redd counts conducted along Gold Creek since 1983 indicate that the populations within the watershed are stable (USFS 2001a). Other fish species that are known to occur in Gold Creek include the westslope cutthroat trout (*Oncorhynchus clarki lewisi*), rainbow trout (*Oncorhynchus mykiss*), the juvenile rainbow trout (*Oncorhynchus mykiss*), the Kootenay Lake strain of the kokanee trout (*Oncorhynchus nerka*), the lake trout (*Salvelinus namaycush*), the chinook salmon (*Oncorhynchus tshawytscha*), and other rainbow cutthroat trout hybrids. According to the USFS, areas of Gold Creek within the TDL are used by these particular fish species as spawning and migratory areas.

Bald eagle (*Haliaeetus leucicophalus*), federally listed as threatened, commonly winter and nest along the shores of Lake Pend Oreille; however, the Gold Creek watershed is isolated from these known nesting areas (USFS 2001a). Aside from the bald eagle and the bull trout, no other threatened or endangered species have been identified within the TDL. However, state "focal" species such as the harlequin duck (*Histrionicus histrionicus*), flammulated owls (*Otus flammeolus*), and the Rocky Mountain elk use areas of the Gold Creek watershed within the TDL (USFS 2001a). Focal species are those whose presence is an indicator of ecological integrity of the ecosystem, species for which population viability is a concern, or species with high social, cultural, or economic values. In addition, a large area of the Gold Creek watershed within the TDL is also a designated wildlife management area by the Idaho Fish and Game for the Rocky Mountain elk. The closest bald eagle habitat inside the TDL is approximately 2.5 miles north of the Mill site, while the closest harlequin duck habitat is approximately 1.75 miles north of the site (USFS 2001a). No sighting information was available for either the flammulated owl or the Rocky Mountain elk. According to the National Wetlands Inventory maps, no wetland areas are located within the TDL (USFWS 2001).

8.5.3 Fisheries

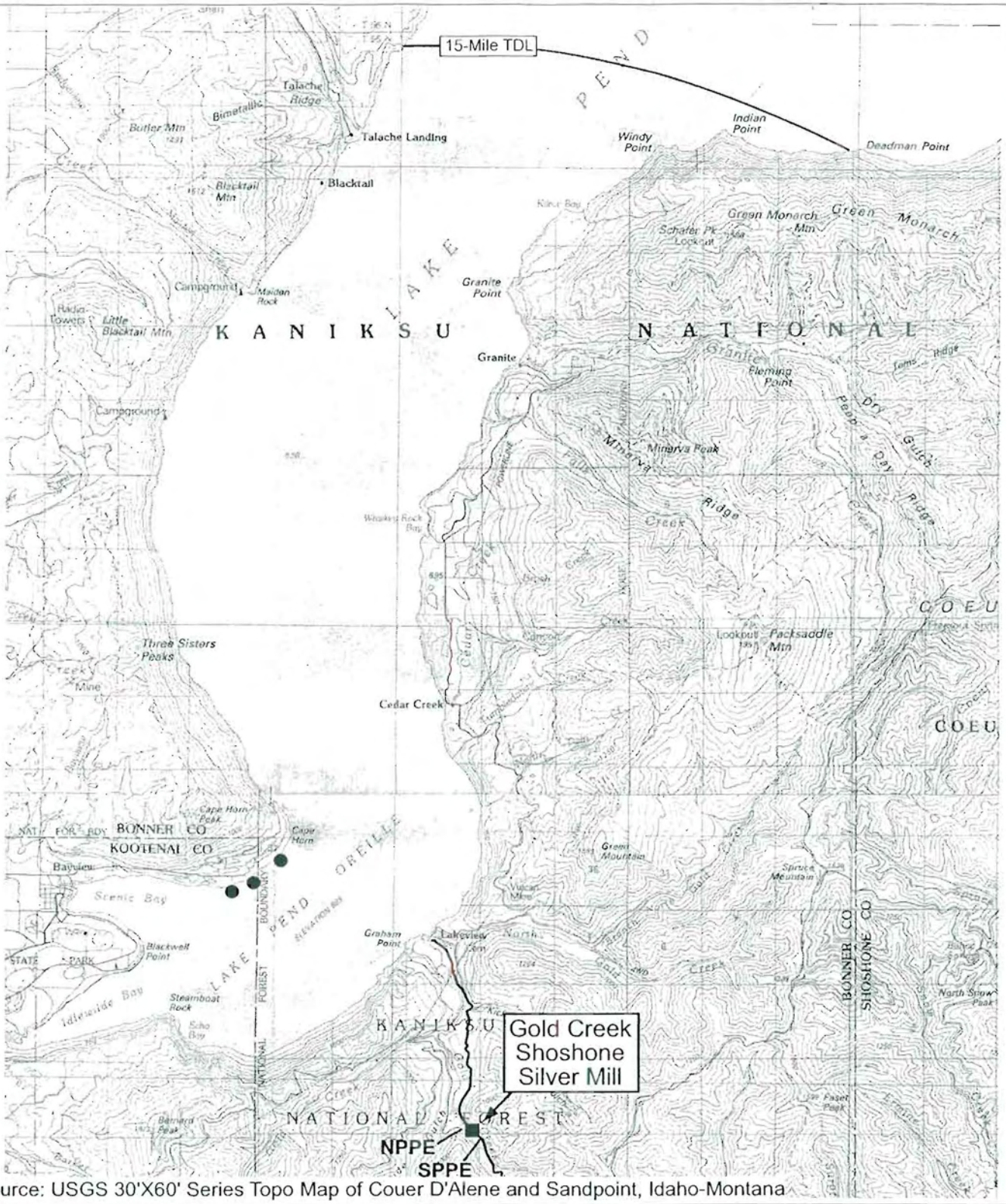
The Idaho Department of Fish and Game (IDFG) consider both Gold Creek and Lake Pend Oreille as recreational fisheries; however, the entire Gold Creek watershed has been closed for fishing since 1994 due to the threatened status of the bull trout (IDFG 2001). In addition to the restrictions on the bull trout, recreational fishing at the lake has been reduced during the last couple of years due to the presence of sensitive species such as the kokanee trout (*Oncorhynchus nerka*).

Fish catch data provided by the IDFG collected during a 12-month creel survey indicated that approximately 8,827 rainbow trout, 4,707 lake trout, and 1,032 cutthroat trout were caught in the lake in 2000 (Table 8-7). The TDL constitutes approximately 30% of the entire Lake Pend Oreille fishery; therefore, approximately 4,370 fish (2,648 rainbow trout, 1,412 lake trout, and 309 cutthroat trout) are caught annually within the TDL by recreational fisherman. According to the IDFG, these numbers represent only a fraction of the typical lake fishery due to the restrictions on the kokanee trout and bull trout harvest since their harvest is closed (IDFG 2001). Since fish actual weights were not available, a conservative estimate of one pound per fish was used. Based on these numbers, approximately 4,370 pounds of fish were caught within the TDL in 2000 (Table 8-7). Commercial fishing has not been documented within the TDL (IDFG unpublished). According to the IDFG, 2,200 bull trout were caught and released in the entire

Lake Pend Oreille fishery, translating to 660 bull trout being caught and released within the TDL.

8.5.4 Resources

Surface water along Gold Creek is not currently used to irrigate commercial food crops, water commercial livestock, for commercial food preparation, to supply a major designated water recreation area, or for drinking water. However, as presented in Section 8.3.1, water from the portion of Lake Pend Oreille within the TDL is used as a drinking water resource.



Source: USGS 30'X60' Series Topo Map of Couer D'Alene and Sandpoint, Idaho-Montana

15-Mile Target Distance Limit (TDL) Map
Gold Creek Shoshone Silver Mill PA/SI
Bonner County, Idaho

0 1 2

Scale in Miles

NPPE	North Probable Point of Entry
SPPE	South Probable Point of Entry
●	Surface Water Intakes

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Figure **8-1**

02-0168 Fig8-1.ai

Table 8-1—Overland Flow Path Surface Soil Samples Analytical Results Summary
Gold Creek Shoshone Silver Mill PA/SI

Description	Background		Release	
			North PPE	South PPE
CLP Number	MJ0C50	MJ0C51	MJ0C46	MJ0C45
EPA Sample Number	1314048	1314049	1314044	1314043
WESTON Sample ID	GCSM-SS-BK001-0000	GCSM-SS-BK002-0000	GCSM-SS-OF001-0000	GCSM-SS-OF002-0000
Sample Location	BK001	BK002	OF001	OF002
Depth (feet)	0 - 1	0 - 1	0 - 1	0 - 1
Inorganics (mg/kg)				
Aluminum (EC)	11,000	*31,000*	25,300	13,900
Antimony	1.4 BJK SQL = 12.8	1.2 BJK SQL = *15.72*	6.3 BJK	17.9 JL (9.04 AC)
Arsenic	*44.5*	36	**62.6**	**668**
Barium	93.3	*349*	172	77.6
Beryllium	0.47 B	*0.65 B*	0.52 B	0.7 B
Cadmium	0.04 U	*0.05 U*	**3.4**	0.41 B
Calcium (EC)	734 BJK	*2,290 JK*	858 BJK	647 BJK
Chromium	*9.8*	8	7.1	16
Cobalt	*7.3 B*	6.2 B	4.7 B	5.7 B
Copper	14 JK (17.08 AC)	18.6 JK *(22.69 AC)*	50.3 JK **(41.23 AC)**	52.1 JK **(42.7 AC)**
Cyanide	0.06 UJK	*0.08UJK*	0.07 UJK	0.07 UJK
Iron (EC)	17,900	*20,300*	16,000	34,300
Lead	*29.1*	16.7	**318**	**308**
Magnesium (EC)	*4,740*	1,990	2,530	7,950
Manganese	454	*1,230*	578	**1,360**
Mercury	0.05 U	*0.07 U*	0.06 U	0.07 B
Nickel	11.1	*12*	10.3	**16.4**
Potassium (EC)	675 B	*855 B*	626 B	604 B
Selenium	0.72 U	*0.89 U*	0.78 U	0.75 U
Silver	1.1 BJK SQL = 2.13	1.3 BJK *SQL = 2.62*	**4.4**	**23.2**
Sodium (EC)	120 U	*205 U*	180 U	115 U
Thallium	1.1 U	*1.3 U*	1.2 U	1.1 U
Vanadium	13.1	*26.2*	22.1	15.8
Zinc	95.7	*104*	**780**	**259**

Notes:

Bold: The reported concentration is above background.

Bold and Underlined: The reported concentration is significantly elevated and was attributed to source (see Section 5 for detailed explanation).

Italics: Background value used for comparison to release sample concentrations

AC: Adjusted Concentration

B: The reported concentration is greater than the instrument detection limit, but less than the sample quantitation limit.

EC: Earth Crust Metal

H: High bias

J: The analyte was positively identified. The reported concentration is an estimate.

K: Unknown bias

L: Low bias

mg/kg: milligrams per kilogram

SQL: Sample Quantitation Limit

U: The analyte was not detected at or above the instrument detection limit given.

Table 8-2—Gold Creek Sediment Samples CS010, CS011, and CS013 Analytical Results Summary
Gold Creek Shoshone Silver Mill PA/SI

Description	Background			Release		
CLP Number	MJ0C53	MJ0C54	MJ0C49	MJ0C48	MJ0C47	MJ0C42
EPA Sample Number	1314301	1314302	1314047	1214046	1314045	1314300
WESTON Sample ID	GCSM-SD-BK003-0000	GCSM-SD-BK004-0000	GCSM-SD-CS014-0000	GCSM-SD-CS010-0000	GCSM-SD-CS011-0000	GCSM-SD-CS013-0000
Sample Location	BK003	BK004	CS014	CS010	CS011	CS013
Depth (feet)	0	0	0	0	0	0
Inorganics (mg/kg)						
Aluminum (EC)	15600 JK	15600 JK	6,470	9,510	11,900	8,660
Antimony	7.6 BJK SQL= *103.44*	3.1 BJK SQL = 52.40	1.7 B SQL = 12.56	15.5 JL	59.8 JL	7.5 BJL
Arsenic	38.8 JK (67.51 AC)	18.7 JK (35:54 AC)	50.8 JK *(88.39 AC)*	**170**	**289**	**228**
Barium	133 BJK SQL= *344.82*	102 BJK SQL = 174.67	37.8 B SQL = 41.88	49.7	92.8	57.4
Beryllium	0.48 UJK	0.41 BJK	0.4 B	0.46 B	0.44 B	0.45 B
Cadmium	0.78 UJK *(1.1 AC)*	0.46 UJK (0.65 AC)	0.32 U	**1.3**	**5.3**	**1.2**
Calcium (EC)	17900 JK	7440 JK	15,600 JK	2630 JK	2830 JK	8140 JK
Chromium	19.8 JK *(25.54 AC)*	15.8 JK (20.38 AC)	8	7.7	8	10.7
Cobalt	5.3 BJK	4.4 BJK	4.6 B	6.9 B	5.2 B	6.6 B
Copper	26 BJK SQL = *43.1*	26.3 JK (32.09 AC)	12.9 JK (15.74 AC)	52.1 JK (42.70 AC)	242 JK **(198.36 AC)**	28.6 JK (23.44 AC)
Cyanide	0.52 UJK	0.26 UJK	0.07 UJL	0.06 UJK	0.09 UJK	0.07 UJK
Iron (EC)	16500 JK	14700 JK	15,500	18,700	18,100	20,300
Lead	49.6 JK *(71.42 AC)*	18.4 JK (26.5 AC)	30.6 JK (44.06 AC)	**410**	**3,240**	**210**
Magnesium (EC)	4530 BJK	2830 BJK	10700 JK	9,060	4,740	10,700
Manganese	1050 JK *(1302 AC)*	476 JK (590.24 AC)	343 JK (425.32 AC)	1,040	989	**1,930**
Mercury	R	R	0.06 U	0.05 U	0.13 B	0.06 U
Nickel	18 BJK SQL = *68.96*	14.3 BJK SQL = 34.93	9.9	15.5	10.5 B	14.6
Potassium (EC)	1130 BJK	900 BJK	1120 B	636 B	1020 B	596 B
Selenium	5.9 UJK	3 UJK	0.83 U	0.73 U	1 U	0.74 UJK

Table 8-2—Gold Creek Sediment Samples CS010, CS011, and CS013 Analytical Results Summary
Gold Creek Shoshone Silver Mill PA/SI

Description	Background			Release		
CLP Number	MJ0C53	MJ0C54	MJ0C49	MJ0C48	MJ0C47	MJ0C42
EPA Sample Number	1314301	1314302	1314047	1214046	1314045	1314300
WESTON Sample ID	GCSM-SD-BK003-0000	GCSM-SD-BK004-0000	GCSM-SD-CS014-0000	GCSM-SD-CS010-0000	GCSM-SD-CS011-0000	GCSM-SD-CS013-0000
Sample Location	BK003	BK004	CS014	CS010	CS011	CS013
Depth (feet)	0	0	0	0	0	0
Silver	2.7 BJK SQL = *17.24*	1.2 BJK SQL = 8.73	0.89 B SQL = 2.09	16.5	**31.2**	8.6
Sodium (EC)	868 UJK	538 UJK	161 B	124 U	170 U	99.7 U
Thallium	8.8 UJK	4.5 UJK	1.2 U	1.1 U	1.5 U	1.1 U
Vanadium	13.1 BJK	12.4 BJK	8 B	9 B	12.8 B	9.7 B
Zinc	173 JK *(259.5 AC)*	114 JK (171 AC)	183 JH	**595**	**1,880**	**474**

Notes:

Bold: The reported concentration is above background.

Bold and Underlined: The reported concentration is significantly elevated and was attributed to source (see Section 5 for detailed explanation).

Italics: Background value used for comparison to release sample concentrations

AC: Adjusted Concentration

B: The reported concentration is greater than the instrument detection limit, but less than the sample quantitation limit.

EC: Earth Crust Metal

H: High bias

J: The analyte was positively identified. The reported concentration is an estimate.

K: Unknown bias

L: Low bias

mg/kg: milligrams per kilogram

R: Quality Control indicates that data are unusable (compound may or may not be present).

SQL: Sample Quantitation Limit

U: The analyte was not detected at or above the instrument detection limit given.

Table 8-3—Gold Creek Sediment Samples CS007 and CS008 Analytical Results Summary
Gold Creek Shoshone Silver Mill PA/SI

Description	Background					Release		
CLP Number	MJ0C27	MJ0C53	MJ0C54	MJ0C49	MJ0C25	MJ0C23	MJ0C24	MJ0C26
EPA Sample Number	1314025	1314301	1314302	1314047	1214023	1314021	1314022	1214024
WESTON Sample ID	GCSM-SD-BK001-0000	GCSM-SD-BK003-0000	GCSM-SD-BK004-0000	GCSM-SD-CS014-0000	GCSM-SD-CS009-0000	GCSM-SD-CS007-0000	GCSM-SD-CS008-0000	GCSM-SD-CS008-1000
Sample Location	BK001	BK003	BK004	CS014	CS009	CS007	CS008	CS008[a]
Depth (feet)	0	0	0	0	0	0	0	0
Inorganics (mg/kg)								
Aluminum (EC)	8,780	15,600 JK	15,600 JK	6,470	5,750	6,100	8,350	9,300
Antimony	2.6 BJL SQL = 12.7	7.6 BJK SQL= *103.44*	3.1 BJK SQL = 52.40	1.7 B SQL = 12.56	8.9 BJL SQL = 12.61	4.6 BJL	6.4 BJL	7.7 BJL
Arsenic	114 JH	38.8 JK (67.51 AC)	18.7 JK (35.54 AC)	50.8 JK *(88 39 AC)*	*601 JH*	166 JH (95.4 AC)	246 JK (141.38 AC)	199 JH (114.37 AC)
Barium	43.8 B SQL = 45.65	133 BJK SQL= *344.82*	102 BJK SQL = 174.67	37.8 B SQL = 41.88	54.1	40.5 B	44.4	49.2
Beryllium	0.43 B	0.48 UJK	0.41 BJK	0.4 B	0.56 B	0.44 B	0.52 B	0.54 B
Cadmium	0.18 U	0.78 UJK (1.1 AC)	0.46 UJK (0.65 AC)	0.32 U	*2.1*	1.1	1.3	1.3
Calcium (EC)	390 BJK	17,900 JK	7,440 JK	15,600 JK	999 BJK	2,540 JK	2,230 JK	2,570 JK
Chromium	6	19.8 JK *(25.54 AC)*	15.8 JK (20.38 AC)	8	7.7	7.6	9.7	9.9
Cobalt	10.8 B	5.3 BJK	4.4 BJK	4.6 B	6.6 B	4.7 B	6 B	6.5 B
Copper	18.9	26 BJK SQL = *43.1*	26.3 JK (32.09 AC)	12.9 JK (15.74 AC)	36.8	21.7	32	29.8
Cyanide	0.07 U	0.52 UJK	0.26 UJK	0.07 UJL	0.21 B	0.08 B	0.06 U	0.06 U
Iron (EC)	10,000	16,500 JK	14,700 JK	15,500	16,700	14,900	17,600	19,300
Lead	15.1	49.6 JK (71.42 AC)	18.4 JK (26.5 AC)	30.6 JK (44.06 AC)	*172*	97.3	142	123
Magnesium (EC)	1,150 JK	4,530 BJK	2,830 BJK	10,700 JK	3,120 JK	6,230 JK	8,670 JK	9,530 JK
Manganese	231	1,050 JK *(1,302 AC)*	476 JK (590.24 AC)	343 JK (425.32 AC)	1,290	910	1,090	1,070
Mercury	0.06 U	R	R	0.06 U	0.05 U	0.05 U	0.05 U	0.05 U
Nickel	21.5	18 BJK SQL = *68.96*	14.3 BJK SQL = 34.93	9.9	11.1	11.7	13.3	16.4
Potassium (EC)	1,940	1,130 BJK	900 BJK	1,120 B	1,040 B	697 B	706 B	792 B
Selenium	0.78 U	5.9 UJK	3 UJK	0.83 U	0.71 U	0.71 U	0.71 U	0.71 U
Silver	2.2 B SQL = 2.28	2.7 BJK SQL = *17.24*	1.2 BJK SQL = 8.73	0.89 B SQL = 2.09	4.7	2.6	6.5	12.5
Sodium (EC)	156 U	868 UJK	538 UJK	161 B	78.6 U	97.5 U	95.1 U	71.5 U
Thallium	1.2 U	8.8 UJK	4.5 UJK	1.2 U	1.1 U	1.1 U	1.1 U	1.1 U
Vanadium	10.1 B	13.1 BJK	12.4 BJK	8 B	8 B	6.9 B	8.8 B	9.4 B
Zinc	165 JK (247.5 AC)	173 JK (259.5 AC)	114 JK (171 AC)	183 JH	795 JK *(1,192.5 AC)*	470 JK (313.33 AC)	522 JK (348 AC)	523 JK (348.67 AC)

Notes:

Bold: The reported concentration is above background.

Bold and Underlined: The reported concentration is significantly elevated and was attributed to source (see Section 5 for detailed explanation).

Italics: Background value used for comparison to release sample concentrations

AC: Adjusted Concentration

B: The reported concentration is greater than the instrument detection limit, but less than the sample quantitation limit.

EC: Earth Crust Metal

H: High bias

J: The analyte was positively identified. The reported concentration is an estimate.

K: Unknown bias

L: Low bias

mg/kg: milligrams per kilogram

R: Quality Control indicates that data are unusable (compound may or may not be present).

SQL: Sample Quantitation Limit

U: The analyte was not detected at or above the instrument detection limit given.

Table 8-4—Gold Creek Sediment Samples CS001, CS002, and CS003 Analytical Results Summary
Gold Creek Shoshone Silver Mill PA/SI

Description	Background								Release		
CLP Number	MJ0C27	MJ0C53	MJ0C54	MJ0C49	MJ0C18	MJ0C21	MJ0C22	MJ0C25	MJ0C15	MJ0C16	MJ0C17
EPA Sample Number	1314025	1314301	1314302	1314047	1314017	1314019	1314020	1214023	1314014	1314015	1314016
Weston Sample ID	GCSM-SD-BK001-0000	GCSM-SD-BK003-0000	GCSM-SD-BK004-0000	GCSM-SD-CS014-0000	GCSM-SD-CS004-0000	GCSM-SD-CS005-0000	GCSM-SD-CS006-0000	GCSM-SD-CS009-0000	GCSM-SD-CS001-0000	GCSM-SD-CS002-0000	GCSM-SD-CS003-0000
Sample Location	BK001	BK003	BK004	CS014	CS004	CS005	CS006	CS009	CS001	CS002	CS003
Depth (feet)	0	0	0	0	0	0	0	0	0	0	0
Inorganics (mg/kg)											
Aluminum (EC)	8,780	15,600 JK	15,600 JK	6,470	11,000	7,550	3,640	5,750	7,170	6,490	6,920
Antimony	2.6 BJL	7.6 BJK	3.1 BJK	1.7 B	1.1 UJL	1.6 B	0.98 B	8.9 BJL	2.7 B	4.3 B	10 2 B
Arsenic	114 JH	38.8 JK (67.51 AC)	18.7 JK (32.54 AC)	50.8 JK (88.39 AC)	23 JH	27.9 JK (48 55 AC)	15 3 JK (26.62 AC)	*601 JH*	125 JK (71.84 AC)	142 JK (81.61 AC)	46.4 JK (26.67 AC)
Barium	43.8 B	133 BJK	102 BJK	37.8 B	64.8 B	55.3 B	27.9 B	54.1	68.2	44.7 B	42.8 B
Beryllium	0.43 B	0.48 UJK	0.41 BJK	0.4 B	0.51 B	0.71 B	0.28 B	0.56 B	0.43 B	0.42 B	0.41 B
Cadmium	0.18 U	0.78 UJK	0.46 UJK	0.32 U	0.08 U	0.06 U	0.28 U	*2.1*	0.35 U	0.6 B	1.2 B
Calcium (EC)	390 BJK	17,900 JK	7,440 JK	15,600 JK	7,100 JK	1,530 JK	736 BJK	999 BJK	21,400 JK	6,390 JK	7,280 JK
Chromium	6	19.8 JK *(25.54 AC)*	15.8 JK (20.38 AC)	8	13.3	8.9	3.6	7.7	10	7 9	8.1
Cobalt	10.8 B	5 3 BJK	4.4 BJK	4.6 B	5.7 B	6.2 B	2.2 B	6.6 B	10.6 B	5.1 B	4.7 B
Copper	18 9	26 BJK SQL = *43.1*	26.3 JK (32.09 AC)	12.9 JK (15.74 AC)	16	14.6 JK (17.81 AC)	14.2 JK (17.32 AC)	36.8	18.7 JK (15.33 AC)	19.4 JK (15.90 AC)	20 1 JK (16.47 AC)
Cyanide	0.07 U	0 52 UJK	0.26 UJK	0.07 UJL	0.12 U	0.09 UJL	0.08 UJL	0.21 B	0.09 UJL	0.09 UJL	0.09 UJL
Iron (EC)	10,000	16,500 JK	14,700 JK	15,500	17,400	22,200	10,400	16,700	17,000	15,200	15,100
Lead	15.1	49.6 JK (71.42 AC)	18.4 JK (26.5 AC)	30.6 JK (44.06 AC)	14.4	11.2 JK (16.13 AC)	5.6 JK (8.06 AC)	*172*	46 1 JK (32.01 AC)	60.8 JK (42.22 AC)	48.4 JK (33.61 AC)
Magnesium (EC)	1,150 JK	4,530 BJK	2,830 BJK	10,700 JK	7,960 JK	3,300 JK	2,130 JK	3,120 JK	12,000 JK	6,740 JK	6,170 JK
Manganese	231	1050 JK *(1,302 AC)*	476 JK (590.24 AC)	343 JK (425.32 AC)	309	332 JK (411 68 AC)	157 JK (194.68 AC)	1,290	669 JK (539.52 AC)	598 JK (482.26 AC)	560 JK (451.61 AC)
Mercury	0.06 U	R	R	0.06 U	0.1 U	0.07 U	0 06 U	0.05 U	0.07 U	0.07 U	0.07 U
Nickel	21.5	18 BJK SQL = *68.96*	14.3 BJK SQL = 34.93	9.9 (13.36 AC)	12.9 B SQL = 15 78	13 2	5.5 B SQL = 10.13	11.1	13	11.6 B	10.4 B
Potassium (EC)	1,940	1,130 BJK	900 BJK	1,120 B	1,000 B	1,050 B	709 B	1,040 B	1,250 B	1,020 B	1,160 B
Selenium	0.78 U	5.9 UJK	3 UJK	0.83 U	1 3 U	0.96 U	0.85 U	0.71 U	1 U	0.99 U	1 U
Silver	2.2 B SQL = 2.28	2.7 BJK SQL = *17.24*	1.2 BJK SQL = 8.73	0.89 B SQL = 2.09	0.82 B SQL = 3 94	0.98 B SQL = 2.85	0 47 B SQL = 2.53	4.7	1.7 B	2.3 B	5.3
Sodium (EC)	156 U	868 UJK	538 UJK	161 B	226 U	184 B	155 B	78.6 U	227 B	187 B	161 B
Thallium	1.2 U	8.8 UJK	4.5 UJK	1.2 U	2 U	1.4 U	1.3 U	1.1 U	1.5 U	1.5 U	1.5 U
Vanadium	10.1 B	13.1 BJK	12.4 BJK	8 B	12 B	10.7 B	4.5 B	8 B	9.6 B	8.3 B	7.7 B
Zinc	165 JK (247.5 AC)	173 JK (259.5 AC)	114 JK (171 AC)	183 JH	40.5 JK	40.5 JH	33 JH	795 JK *(1,192.5 AC)*	218 JH (145.33 AC)	261 JH (174 AC)	426 JH (284 AC)

Notes:

Bold: The reported concentration is above background.

Bold and Underlined: The reported concentration is significantly elevated and was attributed to source (see Section 5 for detailed explanation)

Italics: Background value used for comparison to release sample concentrations

AC: Adjusted Concentration

B: The reported concentration is greater than the instrument detection limit, but less than the sample quantitation limit.

EC: Earth Crust Metal

H: High bias

J: The analyte was positively identified. The reported concentration is an estimate.

K: Unknown bias

L: Low bias

mg/kg: milligrams per kilogram

R: Quality Control indicates that data are unusable (compound may or may not be present).

SQL: Sample Quantitation Limit

U: The analyte was not detected at or above the instrument detection limit given.

Table 8-5—Gold Creek Delta Sediment Samples Analytical Results Summary
Gold Creek Shoshone Silver Mill PA/SI

Description	Background								Release		
CLP Number	MJ0C27	MJ0C53	MJ0C54	MJ0C49	MJ0C18	MJ0C21	MJ0C22	MJ0C25	MJ0C02	MJ0C03	MJ0C04
EPA Sample Number	1314025	1314301	1314302	1314047	1314017	1314019	1314020	1214023	1314001	1314002	1314003
Weston Sample ID	GCSM-SD-BK001-0000	GCSM-SD-BK003-0000	GCSM-SD-BK004-0000	GCSM-SD-CS014-0000	GCSM-SD-CS004-0000	GCSM-SD-CS005-0000	GCSM-SD-CS006-0000	GCSM-SD-CS009-0000	GCSM-SD-DS001-0000	GCSM-SD-DS002-0000	GCSM-SD-DS003-0000
Sample Location	BK001	BK003	BK004	CS014	CS004	CS005	CS006	CS009	DS001	DS002	DS003
Depth (feet)	0	0	0	0	0	0	0	0	0	0	0
Inorganics (mg/kg)											
Aluminum (EC)	8,780	15,600 JK	15,600 JK	6,470	11,000	7,550	3,640	5,750	6,470	6,120	4,240
Antimony	2.6 BJL	7.6 BJK	3.1 BJK	1.7 B	1.1 UJL	1.6 B	0.98 B	8.9 BJL	1.7 B	6.3 B	2.3 B
Arsenic	114 JH	38.8 JK (67.51 AC)	18.7 JK (32.54 AC)	50.8 JK (88.39 AC)	23 JH	27.9 JK (48.55 AC)	15.3 JK (26.62 AC)	*601 JH*	50 8 JK (29.19 AC)	530 JK (304.6 AC)	78.6 JK (45.17 AC)
Barium	43.8 B SQL = 45.65	133 BJK SQL = *344.82*	102 BJK SQL = 174.67	37.8 B SQL = 41.88	64.8 B SQL = 78 89	55.3 B SQL = 56.98	27.9 B SQL = 50.63	54.1	37.8 B	46.8 B	41.2 B
Beryllium	0.43 B SQL = 1.14	0.48 UJK (0.61 AC)	0.41 BJK SQL = *4.36*	0.4 B SQL = 1.05	0.51 B SQL = 1.97	0.71 B SQL = 1.42	0.28 B SQL = 1.27	0.56 B SQL = 1.05	0.4 B	0.37 B	0.28 B
Cadmium	0.18 U	0.78 UJK (1.1 AC)	0.46 UJK (0.65 AC)	0.32 U	0.08 U	0.06 U	0.28 U	*2.1*	0.32 U	1.8	0.34 U
Calcium (EC)	390 BJK	17,900 JK	7,440 JK	15,600 JK	7,100 JK	1,530 JK	736 BJK	999 BJK	15,600 JK	35,200 JK	7,380 JK
Chromium	6	19.8 JK *(25.54 AC)*	15.8 JK (20.38 AC)	8	13.3	8.9	3.6	7.7	8	8.6	5
Cobalt	10.8 B	5.3 BJK	4.4 BJK	4.6 B	5.7 B	6.2 B	2.2 B	6.6 B	4.6 B	4.4 B	3.5 B
Copper	18.9	26 BJK SQL = *43.1*	26.3 JK (32.09 AC)	12.9 JK (15.74 AC)	16	14.6 JK (17.81 AC)	14.2 JK (17.32 AC)	36.8	12.9 JK (10.57 AC)	15.2 JK (12.46 AC)	14.2 JK (11.64 AC)
Cyanide	0.07 U	0.52 UJK	0.26 UJK	0.07 UJL	0.12 U	0.09 UJL	0.08 UJL	0.21 B	0.07 UJL	0.08 UJL	0.07 UJL
Iron (EC)	10,000	16,500 JK	14,700 JK	15,500	17,400	22,200	10,400	16,700	15,500	14,600	10,500
Lead	15.1	49.6 JK (71.42 AC)	18.4 JK (26.5 AC)	30.6 JK (44.06 AC)	14.4	11.2 JK (16.13 AC)	5.6 JK (8.06 AC)	*172*	30 6 JK (21.25 AC)	79.9 JK (55.49 AC)	32.5 JK (22.57 AC)
Magnesium (EC)	1,150 JK	4,530 BJK	2,830 BJK	10,700 JK	7,960 JK	3,300 JK	2,130 JK	3,120 JK	10,700 JK	18,600 JK	5,690 JK
Manganese	231	1,050 JK *(1,302 AC)*	476 JK (590.24 AC)	343 JK (425.32 AC)	309	332 JK (411.68 AC)	157 JK (194.68 AC)	1,290	343 JK (276.61 AC)	347 JK (279.84 AC)	528 JK (425.81 AC)
Mercury	0.06 U	R	R	0.06 U	0.1 U	0.07 U	0.06 U	0.05 U	0.06 U	0.07 U	0.06 U
Nickel	21.5	18 BJK SQL = *68.96*	14.3 BJK SQL = 34.93	9.9 (13.36 AC)	12.9 B SQL = 15.78	13.2	5.5 B SQL = 10.13	11.1	9 9	9.8 B	6.6 B
Potassium (EC)	1,940	1,130 BJK	900 BJK	1,120 B	1,000 B	1,050 B	709 B	1,040 B	1,120 B	1,070 B	927 B
Selenium	0.78 U	5.9 UJK	3 UJK	0.83 U	1.3 U	0.96 U	0.85 U	0.71 U	0.83 U	0.92 U	0.83 U
Silver	2.2 B SQL = 2.28	2.7 BJK SQL = *17.24*	1.2 BJK SQL = 8.73	0.89 B SQL = 2.09	0.82 B SQL = 3.94	0.98 B SQL = 2.85	0.47 B SQL = 2.53	4.7	0.89 B	4.2	1.4 B
Sodium (EC)	156 U	868 UJK	538 UJK	161 B	226 U	184 B	155 B	78.6 U	161 B	191 B	149 B
Thallium	1.2 U	8.8 UJK	4.5 UJK	1.2 U	2 U	1.4 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Vanadium	10.1 B	13.1 BJK	12.4 BJK	8 B	12 B	10.7 B	4.5 B	8 B	8 B	8.1 B	5.1 B
Zinc	165 JK (247.5 AC)	173 JK (259.5 AC)	114 JK (171 AC)	183 JH	40.5 JK	40.5 JH	33 JH	795 JK *(1,192.5 AC)*	183 JH (122 AC)	594 JH (396 AC)	147 JH (98 AC)

Table 8-5—Gold Creek Delta Sediment Samples Analytical Results Summary
Gold Creek Shoshone Silver Mill PA/SI

Description	Release									
CLP Number	MJ0C05	MJ0C06	MJ0C07	MJ0C08	MJ0C09	MJ0C10	MJ0C11	MJ0C12	MJ0C13	MJ0C14
EPA Sample Number	1314004	1314005	1314006	1314007	1314008	1314009	1314010	1314011	1314012	1314013
Weston Sample ID	GCSM-SD-DS004-0000	GCSM-SD-DS005-0000	GCSM-SD-DS005-1000	GCSM-SD-DS006-0000	GCSM-SD-DS007-0000	GCSM-SD-DS008-0000	GCSM-SD-DS009-0000	GCSM-SD-DS010-0000	GCSM-SD-DS011-0000	GCSM-SD-DS012-0000
Sample Location	DS004	DS005	DS005	DS006	DS007	DS008	DS009	DS010	DS011	DS012
Depth (feet)	0	0	0	0	0	0	0	0	0	0
Inorganics (mg/kg)										
Aluminum (EC)	6,430	5,990	6,490	4,540	5,690	5,820	9,520	5,150	10,900	7,430
Antimony	2.5 B	4.5 B	4.8 B	2.8 B	1.3 B	5 B	5.6 B	4.5 B	2.8 B	3.2 B
Arsenic	81.4 JK	148 JK (85.06 AC)	120 JK (68.96 AC)	68.5 JK (39.37 AC)	29.6 JK (17.01 AC)	143 JK (82.18 AC)	204 JK (117.24 AC)	39.4 JK (22.64 AC)	79.2 JK (45.52 AC)	106 JK (60.92 AC)
Barium	42.7 B	54.6 B	55 B	43 B	40.8 B	47.4 B	98.2	70.6	67.2	42.8 B
Beryllium	0.41 B	0.42 B	0.41 B	0.32 B	0.34 B	0.41 B	0.56 B	0.4 B	0.44 B	0.46 B
Cadmium	0.3 U	0.67 B	0.57 B	0.24 U	0.25 U	0.35 U	0.93 B	0.53 B	0.27 U	0.22 U
Calcium (EC)	14,800 JK	17,300 JK	16,300 JK	7,690 JK	19,700 JK	16,100 JK	17,700 JK	8,980 JK	14,500 JK	17,900 JK
Chromium	9.7	7.9	8.1	8.9	6.8	8	11.6	5.7	10.8	8.6
Cobalt	4.1 B	4.6 B	4.7 B	3.6 B	4.1 B	4.6 B	6.8 B	3.8 B	4.7 B	6.4 B
Copper	14.4 JK (11.80 AC)	22 JK (18.03 AC)	19.8 JK (16.23 AC)	17.1 JK (14.02 AC)	10.5 JK (8.61 AC)	17.8 JK (14.6 AC)	28 JK (22.95 AC)	14.3 JK (11.72 AC)	12.9 JK (10.57 AC)	12 JK (9.84 AC)
Cyanide	0.07 UJL	0.09 UJL	0.09 UJL	0.1 UJL	0.07 UJL	0.08 UJL	0.1 UJL	0.07 UJL	0.08 UJL	0.08 UJL
Iron (EC)	14,100	14,700	13,700	11,100	12,100	14,400	17,800	16,400	21,100	16,400
Lead	39.8 JK (27.64 AC)	60.4 JK (41.94 AC)	70 JK (48.61 AC)	24.9 JK (17.29 AC)	22 JK (15.28 AC)	65.1 JK (45.21 AC)	112 JK (77.78 AC)	70.1 JK (48.68 AC)	37 JK (25.69 AC)	30.8 JK (21.39 AC)
Magnesium (EC)	7,940 JK	10,100 JK	10,800 JK	6,760 JK	14,700 JK	9,640 JK	10,400 JK	6,060 JK	16,900 JK	14,900 JK
Manganese	460 JK (370.97 AC)	611 JK (492.74 AC)	556 JK (448.38 AC)	282 JK (227.42 AC)	252 JK (203.22 AC)	396 JK (319.35 AC)	567 JK (457.26 AC)	591 JK (476.61 AC)	411 JK (331.45 AC)	258 JK (208.06 AC)
Mercury	0.06 U	0.07 U	0.07 U	0.08 U	0.06 U	0.07 U	0.08 U	0.07 B	0.07 U	0.06 U
Nickel	10.1	10.9 B	10.8 B	11.5 B	8.9 B	10.2 B	15.1	7.9	13.7	11.5
Potassium (EC)	1,080 B	1,020 B	1,090 B	906 B	1,050 B	1,040 B	1,330 B	1,290	1,100 B	1,280 B
Selenium	0.83 U	0.96 U	0.97 U	1.1 U	0.81 U	0.93 U	1.2 U	0.79 U	0.9 U	0.89 U
Silver	1.2 B	2.8 B	3.9	0.87 B	0.85 B	2.1 B	4.8	0.98 B	1.6 B	1.7 B
Sodium (EC)	168 B	190 B	143 B	243 B	189 B	174 B	281 B	179 B	173 B	191 B
Thallium	1.5 U	1.4 U	1.5 U	1.7 U	1.2 U	1.4 U	1.8 U	1.2 U	1.4 U	1.3 U
Vanadium	7.9 B	8.2 B	8.3 B	6.2 B	6.7 B	8 B	12 B	6.3 B	10.3 B	8.4 B
Zinc	185 JH (123.33 AC)	271 JH (180.67 AC)	262 JH (174.67 AC)	164 JH (109.33 AC)	173 JH (117.33 AC)	255 JH (170 AC)	383 JH (255.33 AC)	153 JH (102 AC)	309 JH (206 AC)	196 JH (130.67 AC)

Notes:

Bold: The reported concentration is above background.

Bold and Underlined: The reported concentration is significantly elevated and was attributed to source (see Section 5 for detailed explanation).

Italics: Background value used for comparison to release sample concentrations

AC: Adjusted Concentration

B: The reported concentration is greater than the instrument detection limit, but less than the sample quantitation limit.

EC: Earth Crust Metal

H: High bias

J: The analyte was positively identified. The reported concentration is an estimate.

K: Unknown bias

L: Low bias

mg/kg: milligrams per kilogram

R: Quality Control indicates that data are unusable (compound may or may not be present).

SQL: Sample Quantitation Limit

U: The analyte was not detected at or above the instrument detection limit given.

Table 8-6—Drinking Water Intakes and Population
Gold Creek Silver Mill PA/SI

Name of Drinking Water Intake	Population Served
Capehorn Estates	42
Cape Horn Water Users Association	100
Pend Oreille Pines	75
Total	**217**

Source: EPA Geographic Information Query System, 2001.

Table 8-7—Annual Fish Harvest Within 15 Miles of the Site
Gold Creek Shoshone Silver Mill PA/SI

Fish Species	Number Harvested[1]	Average Pound Per Fish[2]	Pounds Harvested
Sports Fish Harvest			
Rainbow trout	2,648	1	2,648
Lake trout	1,412	1	1,412
Cutthroat trout	309	1	309
Total	**4,369**		**4,369**[1]

Notes:

[1] Estimated by WESTON to be 30% of the total harvest within Lake Pend Oreille fishery—Bonner County, ID.

[2] Estimated to be 1 pound per fish.

SECTION 9

SOIL EXPOSURE PATHWAY

9.1 SURFICIAL CONDITIONS

9.1.1 Soil Type

Surface soil in the vicinity of the Mill site has been described by the USFS as silt loam surface layers, 14 inches to 31 inches thick, from which the lower layers contain 10% to 60% rock fragments and are underlain by well-drained sandy loam, fine sandy loam, and silt loam textures (USFS unpublished).

9.1.2 Areas of Contamination

Based on observations made during the field effort, the majority of the Mill site appears to be unpaved. Ore piles were observed in two areas of the Mill: north of the borrow pit, and in the south open area. Stained soils were observed near the Mill Building ASTs and the burn and scrap metal piles located in the south open area. Other areas of soil contamination include the tailings pond and areas surrounding the ore piles and the three drum accumulation areas. The former Lakeview landfill also was considered a suspect area for potential impacts from the site due to its proximity to the site and the possibility of it being used as a disposal area.

9.2 LIKELIHOOD OF EXPOSURE

9.2.1 Site Accessibility/Attractiveness

Although located in a remote and difficult area to access in the Kaniksu National Forest, the site is unfenced and freely accessible. A caretaker is present on-site to discourage hunting or other recreational activities.

9.3 SOIL SAMPLING LOCATIONS

In accordance with the SQAP (WESTON 2001), soil sampling was performed only to characterize site sources. The sample locations are presented in Section 6.1.

9.4 SOIL SAMPLING ANALYTICAL RESULTS

Surface soil samples were collected only to characterize the site sources; analytical results were presented in Section 6.2 and Table 6-1.

9.5 SOIL EXPOSURE TARGETS

9.5.1 Resident Population

Currently no workers are present at the Mill, and during periods of activity in the past, the maximum number of workers has been less than 10 (Coon, 2001). No schools nor day care facilities were identified within 200-feet of the site.

9.5.2 Nearby Population Within One-Mile

The area within the TDL is very sparsely populated and residents consist of the caretaker and spouse and seasonal residents within the town of Lakeview. The caretaker's residence is located immediately adjacent to the site, beyond 200 feet from any of the site sources. The 1990 census reports only three people within 2-3 miles of the site; therefore, the caretaker and spouse are the only residents within 1-mile of the site.

9.5.3 Terrestrial Sensitive Environments

No sensitive terrestrial environments were identified at the Mill site during the field effort.

9.5.4 Resources

No commercial agriculture, silviculture, or commercial livestock production or grazing were identified at the Mill site during the field effort.

SECTION 10

AIR PATHWAY

10.1 POTENTIAL TO RELEASE

Since there are currently no air emissions at the site (the facility is inactive), the potential to release at the site stems mainly from the potential to release by particulate migration. Site sources to be evaluated for potential to release by particulate migration include the north and south ore piles, the tailings pond, and the burn and scrap metal piles located at the south open area.

10.1.1 Air Quality Sampling and Analytical Results

No air samples were collected during this PA/SI.

10.2 AIR PATHWAY TARGETS

The area within the TDL is very sparsely populated with the exception of the caretaker and spouse and seasonal residents within the town of Lakeview. Additional information regarding the targets is presented below.

10.2.1 Population Within Four Miles

According to the 1990 census only three people are reported within 4 miles of the site. In addition to these, the caretaker and spouse live immediately adjacent to the site. No workers currently are present at the Mill and during periods of activity in the past, the maximum number of workers has been fewer than ten.

10.2.2 Sensitive Environments

As presented in Section 8.5.2, some areas within the TDL (both river and lake) currently are used by the federally listed endangered bull trout (*Salvelinus confluentus*) as habitat and spawning areas. In addition, the Gold Creek watershed also has been identified as a priority watershed for bull trout recovery in the Idaho Panhandle National Forest (USFS 2001a). The federally listed threatened bald eagle (*Haliaeetus leucicophalus*) has been observed to winter and nest along the shores of Lake Pend Oreille. The closest bald eagle habitat inside the TDL is approximately 2.5 miles north of the Mill site. The westslope cutthroat trout (*Oncorhynchus clarki lewisi*), the juvenile rainbow trout (*Oncorhynchus mykiss*), and the kokanee trout (*Oncorhynchus nerka*) are known to use areas of Gold Creek within the TDL as spawning and migratory areas. A large area of the Gold Creek watershed within the TDL is also a designated wildlife management area by the Idaho Fish and Game for the Rocky Mountain elk.

10.2.3 Resources

There is no commercial agriculture or major or designated recreation areas within the TDL. Some areas of the TDL currently may be used for commercial silviculture.

SECTION 11

CONCLUSIONS

The Gold Creek Shoshone Silver Mill is an ore milling operation located within the Kaniksu National Forest in Bonner County, Idaho. The facility was in operation intermittently from 1980 to 1992 and is currently inactive. Gold Creek flows along the length of the Mill site approximately 300 feet to the east. The facility received ore from several mines located in the upper reaches of the Gold Creek watershed.

Analytical results from source samples collected during this PA/SI indicate the presence of several inorganic constituents (TAL metals and cyanide) at concentrations significantly above background within the site sources. These constituents include arsenic, beryllium, cadmium, chromium, cobalt, copper, cyanide, lead, manganese, mercury, nickel, vanadium, selenium, silver, and zinc.

Based on a review of background information, several areas of the Mill site that were identified as sources prior to field activities were field verified by WESTON during the PA/SI field effort conducted in July-August 2001. These areas include the Mill Building ASTs, the tailings pond, the north and south ore accumulation areas, the three drum accumulation areas, the burn and scrap metal piles in the south open area, and the former Lakeview landfill.

The area is very remote and sparsely populated. With the exception of the site caretaker and spouse, population within four miles of the site is mainly seasonal/recreational and is concentrated around the town of Lakeview, located along the south shore of Lake Pend Oreille approximately 2.5 miles north of the site. Endangered and threatened species such as the bull trout and the bald eagle use areas of the Gold Creek watershed and the lake within the TDL for habitat, migratory pathways, and winter nesting. In addition, other salmonid species and hybrids such as the westslope cutthroat trout, rainbow trout, kokanee trout, chinook salmon, and lake trout also use portions of the lake and watershed within the TDL as habitat and migratory pathways. Both Gold Creek and Lake Pend Oreille are major recreational fisheries in the area. However, the Gold Creek fishery is closed due to the endangered status of the bull trout. No wetlands were identified along the in-water segment of the surface water pathway.

Analytical results from surface soil samples collected along the North and South Overland Flow Paths, and the sediment samples collected at the North and South PPEs, indicate the presence of metals at concentrations significantly above background. Metal concentrations significantly above background also were observed in sediment samples collected in Gold Creek along and downstream of the Mill site and downstream to the confluence with Chloride Gulch, approximately 0.4 miles north of the site. Metals detected in the sediment sample collected in Gold Creek upstream from the Mill site may indicate that some of the metal impacts observed downstream of the Mill site may be partly attributable to the Conjecture, Webber, and New Rainbow mines located upstream of the Mill site.

Although several inorganic constituents were detected along the in-water segment of Gold Creek downstream of Chloride Gulch and in the sediment samples collected within the Gold Creek

delta in Lake Pend Oreille, no metal concentrations significantly above background were observed.

Based on the number of human health and ecological targets identified during this PA/SI, it was determined that the groundwater and air migration pathways and the soil exposure pathway would not significantly contribute to the site HRS score.

SECTION 12

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