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Greyhound Mine Site
Custer County, Idaho
Preliminary Assessment
TDD: 99-02-0008

Contract: 68-W6-0008
October 1999

Region 10

START

Superfund Technical Assessment and Response Team

Submitted To: Monica Tonel, Task Monitor
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PRELIMINARY ASSESSMENT
GREYHOUND MINE SITE
CUSTER COUNTY, IDAHO

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LIST OF ACRONYMS

Acronym	Definition
amsl	above mean sea level
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	cubic feet per second
EPA	United States Environmental Protection Agency
GMMC	Greyhound Mining and Milling Company
mg/L	milligram per liter
mm	millimeter
PA	Preliminary Assessment
PVC	polyvinyl chloride
TCLP	Toxicity Characteristic and Leaching Procedure
TDL	Target Distance Limit
USFS	United States Forest Service

PRELIMINARY ASSESSMENT
GREYHOUND MINE SITE
CUSTER COUNTY, IDAHO

1. INTRODUCTION

Ecology and Environment, Inc., was tasked by the United States Environmental Protection Agency (EPA) to provide technical support for completion of a Preliminary Assessment (PA) at the Greyhound Mine site in Custer County, Idaho. E & E completed PA activities under Technical Direction Document No. 99-02-0008, issued under EPA, Region 10, Superfund Technical Assessment and Response Team Contract No. 68-W6-0008. The specific goals for the Greyhound Mine Site PA identified by the EPA are:

- Determine the potential threat to public health and/or the environment posed by the site;
- Determine the potential for a release of hazardous constituents into the environment; and
- Determine the potential for placement of the site on the National Priorities List.

Completion of the PA included reviewing existing site information, collecting receptor information within the range of site influence, determining regional characteristics, and conducting a site visit. This document includes a discussion of background site information (Section 2), a discussion of migration/exposure pathways and potential receptors (targets; Section 3), and a list of pertinent references (Section 4).

2. SITE BACKGROUND

2.1 SITE LOCATION

Site Name:	Greyhound Mine Site
CERCLIS ID No.:	IDSFN1002113
Location:	Custer County, Idaho
Latitude:	44°34'37" North
Longitude:	115°07'40" West
Legal Description:	Sections 4 and 5, Township 14 North, Range 11 East, Boise Meridian
Site Owner:	Greyhound Mining and Milling, Inc. 4414 South Gekeler Lane Boise, Idaho 83705 (208) 342-8901
Site Operator:	Greyhound Mining and Milling, Inc. 4414 South Gekeler Lane Boise, Idaho 83705 (208) 342-8901
Site Contact:	Greyhound Mining and Milling, Inc. 4414 South Gekeler Lane Boise, Idaho 83705 (208) 342-8901

The Greyhound Mine site is an inactive mine located in the Seafoam Mining district in northwest Custer County, Idaho, approximately 45 miles north of Stanley, Idaho (Figure 2-1). The property is near the headwaters of Sulfur Creek, which is a tributary to Rapid River. Elevation at the mine ranges from approximately 7,000 feet above mean sea level (amsl) at the lower end to 8,500 feet amsl on the upper ridge. The area surrounding and adjacent to the Seafoam Mining district is designated as *Frank Church River of No Return Wilderness* (USGS 1990).

Access to the site is by an unimproved gravel road open only between late June and October.

2.2 SITE DESCRIPTION

The mining area is privately owned but is located entirely within the Salmon River Division of the Challis National Forest. The Greyhound Mine property covers a long, narrow area that runs northwest-southeast for approximately 2.5 miles. The total area of the property is approximately 430 acres, of which 180 are patented private land and 250 are unpatented national forest land (Yanke 1999).

The major features of the site are presented in Figure 2-2. The three main camp buildings constructed in the 1900s are located at approximately 7,000 feet amsl. A pilot mill built in 1979 is located approximately 200 feet below the main camp. Remnants of a historical mill, including a collapsed ore bin and a tailings pile of approximately 1,000 cubic yards, are located approximately 200 feet below the pilot mill. The tailings pile is located on the slope of Sulfur Creek. A tailings pond of approximately 31,400 square feet in area is located directly across Sulfur Creek from the pilot mill and at similar elevation as the pilot mill. A tunnel constructed in the 1990s is located approximately 1,000 feet above the pilot mill. In the tunnel, there are an open adit and rails in good condition. Seeping water observed in the adit flowed into an unnamed tributary of Sulfur Creek, approximately 5 feet west of the adit. The pilot mill facility includes one jaw crasher, one ball mill, one rod mill, two flotation tanks each divided into six cells, one holding tank approximately 10 feet in diameter and 15 feet high, one chemical storage trailer, one electrical control trailer, two aboveground fuel tanks (3,500 and 5,000 gallons), eight barrels of Chevron lubricant, one drum of waste oil, and 12 used batteries (E & E 1999).

2.3 SITE OPERATIONS AND WASTE CHARACTERISTICS

The mine produced mainly silver and lead ores, with minor amounts of gold, copper, and zinc. The vein is in a shear zone in the Idaho batholith. The ore zone is crushed granite impregnated with quartz and silver-bearing sulfides or sulfantimonides, which make up 20% to 30% of the total vein (Mitchell 1995).

The first mineral discoveries in the Greyhound Ridge area were made in 1880. The first known large-scale operation was by the Greyhound Mining & Milling Company (GMMC) which was incorporated in 1902 and controlled the mine until 1940. From 1905 to 1907, the GMMC developed a 40-ton-per-day pyritic smelter and a stamp mill with ten 1,050-pound stamps. A surfactant flotation process was used to concentrate ores (Parsley 1999). The mill and smelter were operated a few months during 1909 and 1910 and then were stopped due to a heavy snowstorm that kept necessary supplies from reaching the mine (Mitchell 1995).

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Various lessees worked on the property in 1928 and 1929. However, the property was idle from 1930 to 1937. In 1937, the property was leased to Gold Producers, Inc, but the lease was abandoned because of the high antimony content of the ore and uncertainty in the price of silver. Small amounts of ore were produced by various lessees in 1939 and 1940. The GMMC forfeited its charter in 1940 (Mitchell 1995).

The Smith family owned the property from 1940 to 1974 and sold the mine to Mr. Harry Milton and Mr. Dan Yanke in 1974 (Yanke 1999). Mr. Yanke's share of ownership increased gradually, and by the late 1980s he owned 100% of the mine. No mining work was conducted from 1940 to 1980 (Yanke 1999). A new GMMC was incorporated in 1979, with Mr. Yanke as president. The mine now is legally owned by the new GMMC. A pilot mill was built on the property in 1979, and lead-silver ore was produced from the mine in 1980. The total recorded production from the Greyhound Mine from 1916 to 1981 was 5,689 tons of ore. This yielded 42.43 ounces of gold, 13,148 ounces of silver, 682 pounds of copper, 26,994 pounds of lead, and 4,551 pounds of zinc (Mitchell 1995). The mining waste from the historical operation includes a tailings pile adjacent to Sulfur Creek, and tailings have eroded into the creek.

The new GMMC did exploration work at Greyhound Mine in 1986 and later extended the existing tunnel from 560 feet to 1,411 feet and built a three-compartment raise on a newly discovered ore shoot at the end of the tunnel. The new GMMC continued development work on the mine from 1988 to 1990. In 1988, the company conducted test runs through the pilot mill on approximately 800 tons of ore (Mitchell 1995).

The pilot mill used existing buildings, including general storage building, bunkhouse, and fuel storage building. Ore was mined and shipped to the pilot mill after being coarsely crushed in the upper tunnel. Then the ore was grinded in the ball mill or rod mill to finer sizes before it was transferred to flotation tanks. In the flotation tanks, chemical reagents such as pine oil, Frother 68 (a heteropolar surface-active organic substance), and Aerofloat (dithiophosphates) were added to concentrate minerals. The concentrates then were stored and shipped to a smelter while the process water and tailing slurries were carried across Sulfur Creek to a tailings pond via a gravity-fed, double-wall pipe system comprising of an outer 6-inch polyvinyl chloride (PVC) pipe and an inner 2-inch rubber pipe. The tailings pond is a topographically confined impoundment located on United States Forest Service (USFS) land where process water was allowed to evaporate (Yanke 1990).

In 1999, United Silver Mines, Inc., entered into an exploration agreement with the new GMMC to map and delineate the Greyhound ore body (Peter 1999).

The on-site wastes include a historical tailings pile located adjacent to Sulfur Creek, an adit with potentially contaminated water flowing into a tributary of Sulfur Creek, one waste oil drum, and 12 used batteries located at the pilot mill. A tailings pond is located on USFS land across Sulfur Creek. The tailings pond is not lined at the bottom. Process water and tailings slurry reportedly do not overflow the impoundment to Sulfur Creek (Parsley 1999). The waste oil drum and used batteries are stored on a concrete pad. No staining was observed on the pad (E & E 1999). The tailings pile which has no vegetative cover is eroding into Sulfur Creek. The sulfide sulfur in the tailings may react continually with air and water to form sulfuric acid, which then may potentially leach metals into Sulfur Creek.

2.4 SITE INVESTIGATIONS

In 1994, the Idaho Geological Survey, in cooperation with the University of Idaho, conducted an extensive review of 300 inactive or abandoned mines in the south side of Salmon River of Idaho. Greyhound Mine was one of the reviewed sites. The review was sponsored by the USFS. The study started in 1994 and finished in 1995. The scope of work included reviewing historical mine operations, geological surveys, and Site Inspections (SIs). According to the SI Report, discharge from the adit was observed during the site visit; however, the water was not acidic (Moye 1994). The 6-inch PVC pipe carrying mine tailings slurry was observed suspending across Sulfur Creek. The report states that mine tailings slurry potentially could discharge into Sulfur Creek because of cracking or clogging of the pipe (Moye 1994). No samples were collected.

In November 1995, a tailings sample was collected from the surface of the tailings pond by personnel representing the Sawtooth National Forest Service. The sample was analyzed for toxicity characteristic leaching procedure (TCLP) using EPA Methods 6010A and 7470 (mercury). The results indicated metals concentrations of silver (0.01 milligram per liter [mg/L]), arsenic (1.68 mg/L), barium (0.07 mg/L), cadmium (0.279 mg/L), lead (0.89 mg/L), chromium (less than 0.005 mg/L), mercury (less than 0.0002 mg/L), and selenium (less than 0.04 mg/L; Gabardi 1999). On July 9, 1999, two surface soil samples were collected by the Environmental Division of Nelson Construction Company, a consultant hired by the GMMC. One sample was collected from the historical tailings pile, and the other from soil near the mouth of the adit. The samples were analyzed by Analytical Laboratories, Inc., located in Boise, Idaho, for TCLP using EPA Method 6010 or 7470. Arsenic was detected at 2.02 mg/L in the

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On July 9, 1999, eight surface water samples (Stations 1 through 8) were collected at Greyhound Mine by Nelson Construction Company. The samples were collected at six locations along Sulfur Creek, one location at a spring near the main camp, and one location at the adit. The samples were analyzed by Analytical Laboratories, Inc., for metals using the EPA Method 200 series. The results indicated that only arsenic was detected from 0.02 to 0.52 mg/L. The higher arsenic concentration of 0.52 mg/L was detected in water from the adit (Station 8). The background arsenic level is established by sample Stations 1, 2, and 7, whose concentrations ranged from 0.02 mg/L to 0.021 mg/L. The high concentrations of arsenic in the background locations may be associated with the intense arsenopyrite mineralization in the Seafoam Mining district (Parsley 1999). The sample results are provided in Table 2-1. The sample locations are shown in Figure 2-2.

TABLE 2-1

JULY 1998 SURFACE WATER SAMPLE RESULTS
GREYHOUND MINE SITE
CUSTER COUNTY, IDAHO
(mg/L)

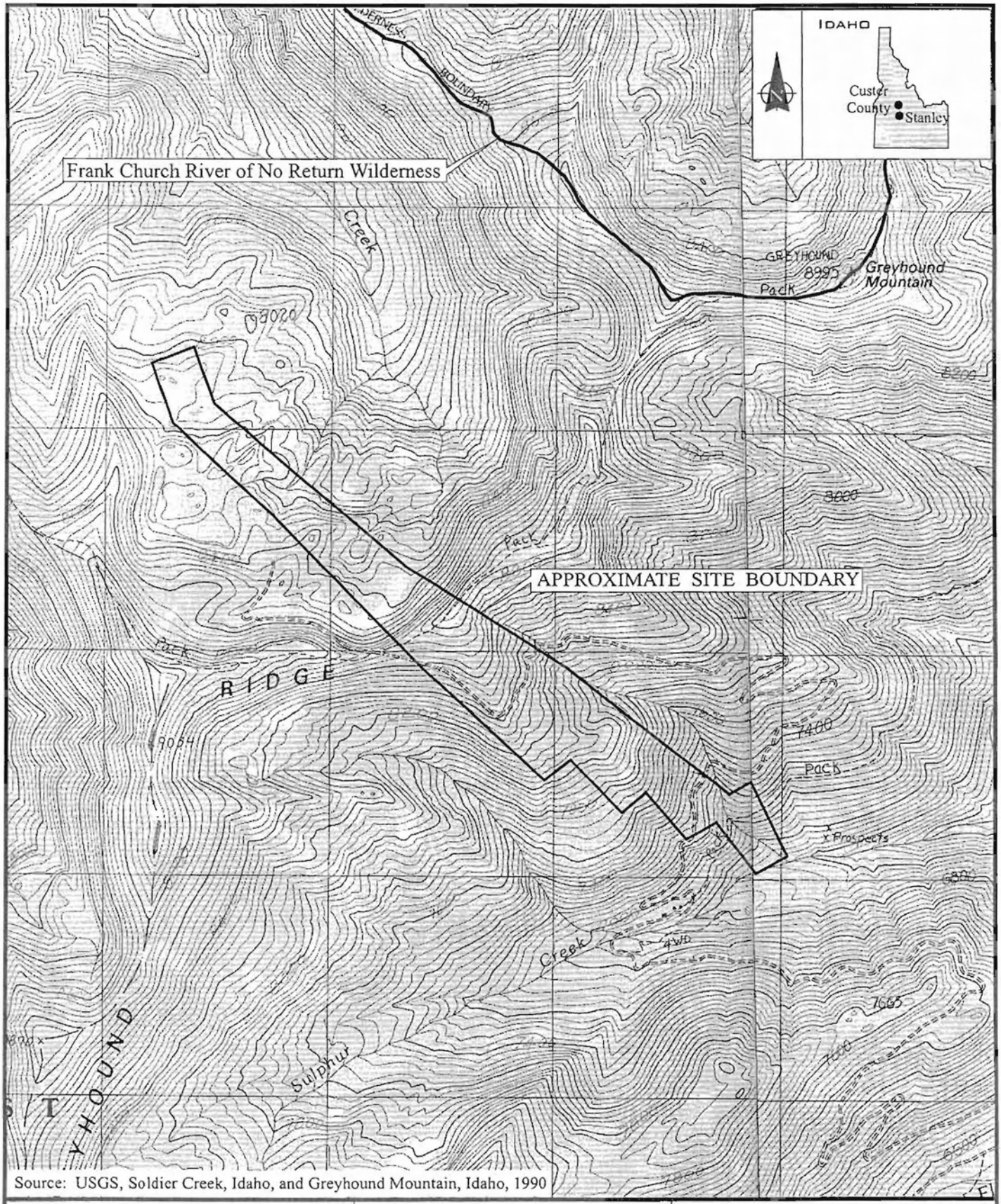
Location:	**Station 1** 50 feet up unnamed tributary of Sulfur Creek west of Greyhound main camp	**Station 2** 50 feet above confluence of Sulfur Creek and unnamed tributary west of Greyhound main camp	**Station 3** 50 feet below confluence of Sulfur Creek and unnamed tributary west of Greyhound main camp	**Station 4** 50 feet above confluence of Sulfur Creek and unnamed tributary east of Greyhound camp	**Station 5** 50 feet up unnamed tributary of Sulfur Creek east of Greyhound main camp	**Station 6** 50 feet below confluence of Sulfur Creek and unnamed tributary east of Greyhound main camp	**Station 7** Spring located 500 feet north of Greyhound main camp	**Station 8** Adit located approximately 1,050 feet up unnamed tributary east of Greyhound main camp
Antimony	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	**0.006**
Arsenic	**0.02**	**0.021**	**0.026**	**0.023**	**0.129**	**0.068**	**0.021**	**0.52**
Barium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	**0.0029**
Chromium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Copper	<0.01	<0.01	<0.01	<0.01	**0.01**	<0.01	<0.01	<0.01
Lead	<0.005	<0.005	<0.005	<0.005	**0.006**	<0.005	<0.005	**0.007**
Manganese	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Selenium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	<0.005	<0.005	<0.005	<0.005	**0.035**	**0.007**	<0.005	**0.193**
Total cyanide	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Source: Parsley 1999. **Bold** indicates the analyte was detected above the sample quantitation limit.

Key:

mg/L = Milligrams per liter.

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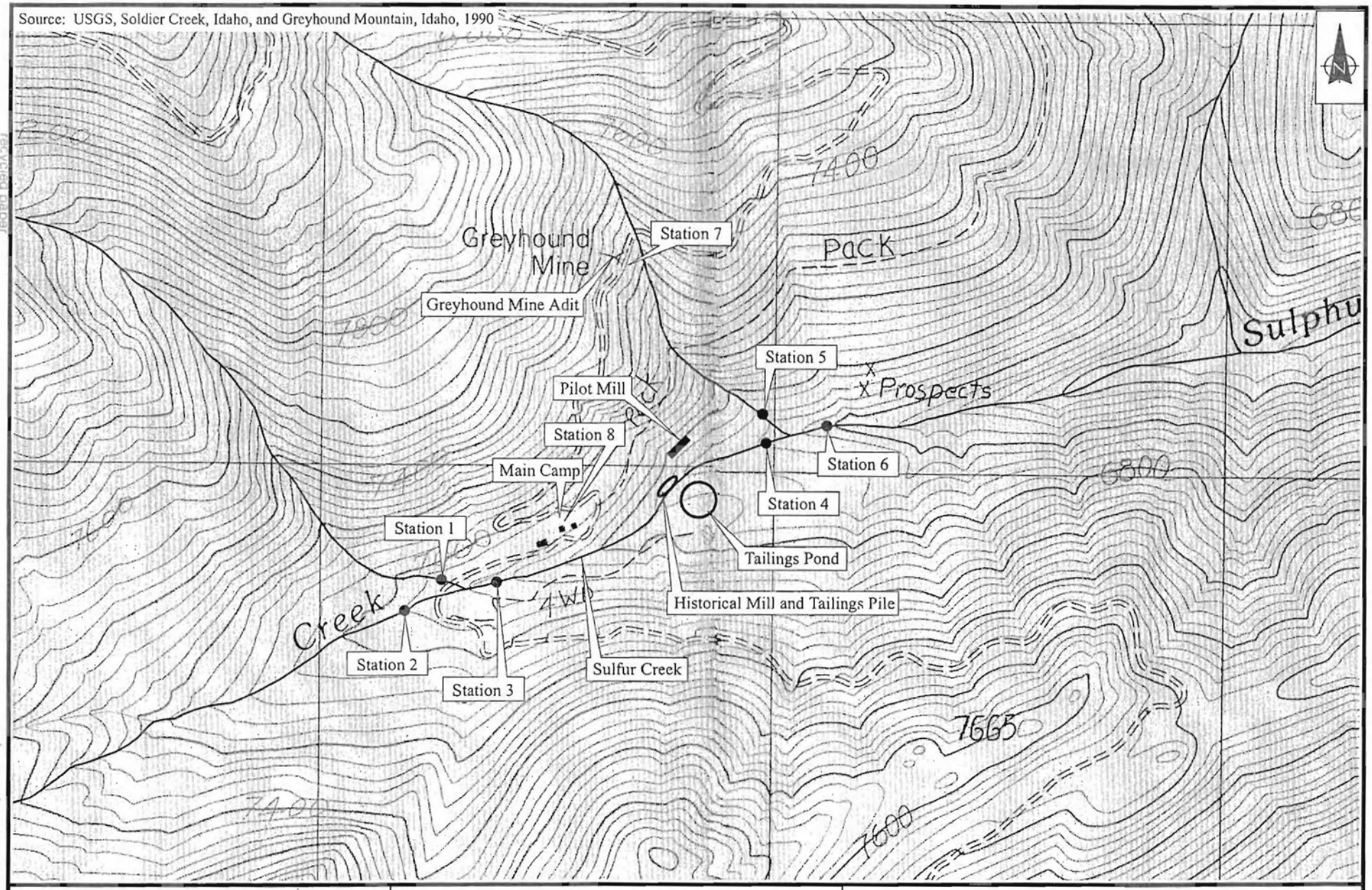
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Seattle, Washington

GREYHOUND MINE
Custer County, Idaho

Figure 2-1
SITE VICINITY MAP

0 .25 .5
Approximate Scale in Miles

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ecology and environment, inc. International Specialists in the Environment Seattle, Washington	GREYHOUND MINE Custer County, Idaho	Figure 2-2 SITE MAP			
	0 .25 .5 Approximate Scale in Miles	Drawn: AES	Date 8/23/99	Job No. DB0801SAT0	Dwg.No. DB0801 2-2

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3. MIGRATION/EXPOSURE PATHWAYS AND TARGETS

The following sections describe migration/exposure pathways and potential targets within the site's range of influence (Figure 3-1).

3.1 GROUNDWATER MIGRATION PATHWAY

The Greyhound Mine site lies inside the eastern border of the Idaho batholith and is underlain mainly by quartz monzonite and granodiorite belonging to that mass. Dikes of aplite, lamprophyre, and rare pegmatite belonging to the same period of igneous activity are locally abundant (Ross 1956). The rock consisting of granodiorite is moderately dark gray and faintly gneissic because of the sub-parallel orientation of biotite and hornblende. Texturally, the average rock is a medium-grained phanerite. The average grain size is about 8 millimeters (mm) and ranges from 2 to 15 mm. The average mineral composition of the granodiorite includes 35% andesine, 28% quartz, 25% orthoclase-microcline, and 10% biotite. The rock consisting of quartz monzonite is light gray, weathering pale yellow-gray or pale brown. This rock tends to be finer-grained than the granodiorite. The average rock of quartz monzonite is a medium-grained phanerite, which has an average grain size of about 3 mm. The average mineral composition of quartz monzonite includes 41% quartz, 27% orthoclase, 26% oligoclase, and 3% biotite (Treves 1953).

A hydrogeological survey has not been done in the area. Because of the geologic formation, groundwater occurs only in joints and fractures. There are no groundwater wells or residents identified within a 4-mile radius of the mine site (IDWR 1999a; EPA 1999). Approximately two seasonal workers from the GMMC lived at the Greyhound Mine main camp during pilot mill operation. Occasionally, the GMMC owner stays at the main camp during summer. During their stay at the site, the residents draw drinking water from a spring near the main camp.

3.2 SURFACE WATER MIGRATION PATHWAY

The main camp and pilot mill are not located on a flood plain. However, the historical tailings pile is eroding into Sulfur Creek. Stormwater runoff from the historical tailings pile flows into Sulfur Creek. In addition, the adit seep with arsenic detected at 0.52 mg/L (Section 2.4) discharges into a tributary of Sulfur Creek, approximately 1,000 feet upstream of the creek. Sulfur Creek flows approximately 3 miles east into Rapid River. The course of Rapid River at the confluence with Sulfur Creek is northbound, and then the river turns west to flow approximately 8 miles to its confluence with the Middle Fork of Salmon

River. The flow rate of Sulfur Creek is approximately 0.04 cubic foot per second (cfs; Moye 1994), measured near the main camp. The flow rate of Rapid River is approximately 121 cfs, measured 100 feet upstream of its confluence with the Middle Fork of Salmon River (Ondrechen 1999), and the flow rate for the Middle Fork of Salmon River is approximately 768 cfs, measured approximately 3.5 miles downstream of its confluence with Rapid River (Ondrechen 1999).

The average annual precipitation and the two-year, 24-hour rainfall event recorded in the nearest station (Stanley) are approximately 14.63 and 2 inches, respectively (WRCC 1998). The upgradient drainage area of the site is approximately 100 acres (Moye 1994).

Sulfur Creek was used as a source for mining process water by the Greyhound Mine (Yanke 1999). No drinking water is drawn from Sulfur Creek, Rapid River, or the Middle Fork of Salmon River within the 15-mile target distance limit (TDL; IDWR 1999b). Within the 15-mile TDL, surface water is not used for commercial irrigation or livestock watering.

The Middle Fork of Salmon River and the river's tributaries support sport fishing, but mainly for catch and release. No fish are caught for consumption (Jodlowski 1999). The Idaho Department of Fish and Game (IDFG 1998) stipulates that all fish species in Rapid River and its tributaries, if caught, must be released.

Within the 15-mile TDL, Rapid River and its tributaries are critical habitats for the federal-listed threatened Snake River spring/summer/fall Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*O. mykiss*) and for the federal-listed endangered or threatened fish species such as bull trout (*Salvelinus confluentus*). In addition, Rapid River and its tributaries are spawning areas critical for maintenance of resident fish species such as bull trout (*Salvelinus confluentus*), cutthroat trout (*O. clarki henshawi*), and Westslope trout (*O. clarki lewisi*; Jodlowski 1999). The Middle Fork of Salmon River is federally designated as a wild and scenic river (USGS 1990). Whether wetlands are along streams within the 15-mile TDL is unknown because a National Wetlands Inventory (NWI) map has not been produced for the area (Block 1999).

3.3 SOIL EXPOSURE PATHWAY

The Greyhound Mine site is located in a remote mountainous area with little public access. No residents are located within a 4-mile radius of the site. Approximately two seasonal workers from the GMMC lived at the Greyhound Mine main camp during pilot mill operation. Occasionally, the GMMC owner stays at the main camp during summer.

No federal- or state-designated threatened or endangered terrestrial species were identified at the site (Stephens 1999).

No commercial agriculture or livestock grazing take place on site.

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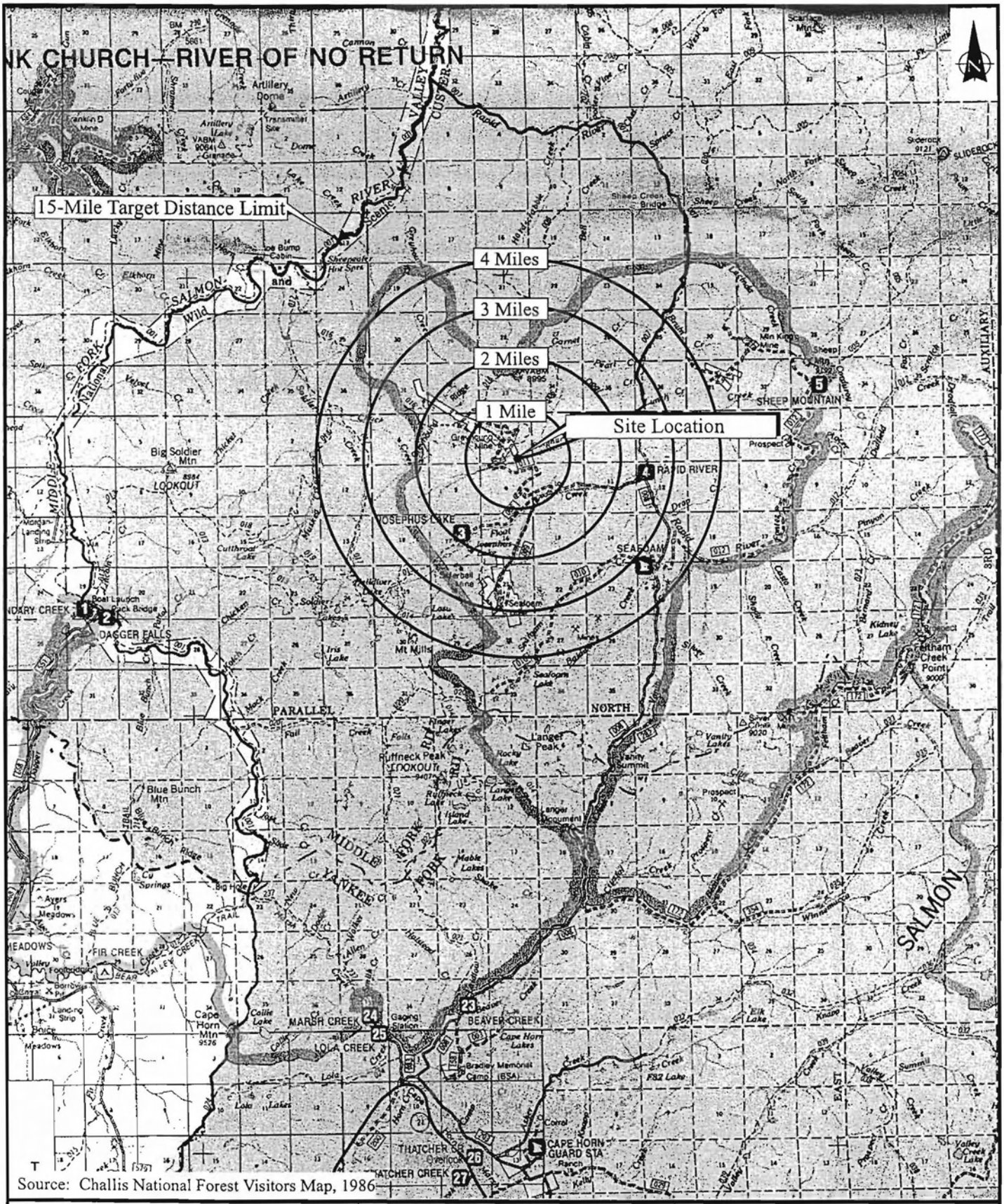
3.4 AIR MIGRATION PATHWAY

No vegetation was observed on the tailings. No residents are located within a 4-mile radius of the site. Approximately two seasonal workers from the GMMC lived at the Greyhound Mine main camp during pilot mill operation. Occasionally, the GMMC owner stays at the main camp during summer.

No federal- or state-designated endangered or threatened species were identified within 4 miles of the site (Stephens 1999). The Greyhound Mine site is located approximately 1.5 miles from the boundary of the federally designated Frank Church River of No Return Wilderness area (USGS 1990).

No NWI maps have been produced for the area; therefore, whether wetlands are present within a 4-mile radius of the site is unknown (Block 1999).

No commercial agriculture or livestock grazing take place within the 4-mile TDL.



Source: Challis National Forest Visitors Map, 1986

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GREYHOUND MINE
Custer County, Idaho

Figure 3-1
4-MILE RADIUS AND 15-MILE DOWNSTREAM MAP

0 2.5 5
Approximate Scale in Miles

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AES	8/30/99	DB0801SAT0	DB0801 3-1

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ATTACHMENT A
PHOTOGRAPHIC DOCUMENTATION

PHOTOGRAPH IDENTIFICATION SHEET

Camera Serial #: N/A **TDD #: 99-02-0008**
Lens Type: Disposal KODAK Camera **Site Name: Greyhound Mine, Custer County, Idaho**

Photo No.	Dir.	Date	By	Time	Description
1	N	07/15/99	LL	1431	Remains of a historical mill near Sulfur Creek. Background shows the mill structure. Picture was taken from a tailings pond across Sulfur Creek.
2	N	07/15/99	LF	1440	Shot of a suspended tailings pipe from a recent pilot mill across Sulfur Creek to the tailings pond. Picture was taken from the tailings pond.
3	S	07/15/99	LF	1445	Shot of the tailings pond.
4	E	07/15/99	LF	1445	Shot of the tailings pond.
5	W	07/15/99	LF	1500	Shot of historical tailings pile.
6	NE	07/15/99	LF	1512	Shot of collapsed historical mill structure near tailings pile.
7	S	07/15/99	LF	1516	Shot of surface water runoff route from tailings to Sulfur Creek.
8	SW	07/15/99	LF	1517	Shot of surface water runoff route from tailings to Sulfur Creek.
9	NW	07/15/99	LF	1530	Shot of the pilot mill. Ore hopper at left, rod mill and ball mill at center, and flotation units at right.
10	NE	07/15/99	LF	1535	Shot of chemical storage trailer and drums.
11	D	07/15/99	LF	1537	Shot of motor batteries left on site.
12	NW	07/15/99	LF	1539	Shot of empty petroleum product drums.
13	NW	07/15/99	LF	1545	Shot of a 3,500-gallon fuel tank located above the chemical trailer.
14	E	07/15/99	LF	1547	Shot of a 5,000-gallon fuel tank located above the mill.
15	NW	07/15/99	LF	1555	Shot of remnants of a lumber sawmill.
16	S	07/15/99	LF	1557	Shot of wood chip pile near the sawmill.
17	SW	07/15/99	LF	1558	Shot of former lumber sawmill, a boiler, and historical tailings pile.
18	NE	07/15/99	LF	1600	Shot of the pilot mill and 5,000-gallon fuel tank. Picture was taken from the lumber sawmill.
19	SE	07/15/99	LF	1600	Shot of suspended tailings pipe picture was taken from the historical tailings pile.
20	D	07/15/99	LF	1610	Shot of discharge from an adit above the pilot mill (newer adit).
21	NE	07/15/99	LF	1610	Shot of Probable point of entry of adit discharge to an unnamed creek.
22	N	07/15/99	LF	1617	Shot of the recent mine tunnel.
23	NW	07/15/99	LF	1618	Shot of a fuel tank for the compressor and the generator near the tunnel.
24	N	07/15/99	LF	1621	Shot of the compressor and generator near the tunnel.

Key:

D = Down.
Dir. = Direction.
E = East.
LF = Linda Foster
LL = Lilin Li
N = North.
N/A = Not applicable.
NE = Northeast.
NW = Northwest.
TDD = Technical Direction Document.
S = South.
W = West