FINAL
Site Investigation Report

Bear Gulch Mine Complex

Summit Mining District
Idaho Panhandle National Forests
Shoshone County, Idaho
April 2003

USDA Forest Service
Region 1 and IPNF

MAXIM TECHNOLOGIES INC®
A TETRA TECH COMPANY

SITE INVESTIGATION REPORT

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Coeur d'Alene River Ranger District
Idaho Panhandle National Forests
Shoshone County, Idaho

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Shoshone County, Idaho

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April 2003

EXECUTIVE SUMMARY

Maxim Technologies, Inc.® (Maxim) prepared this site investigation and characterization report for the U.S. Department of Agriculture, Forest Service. The Forest Service identified the Bear Gulch Mine Complex as a priority site for reclamation activities. Abandoned, historic lead/silver/zinc mines are situated in the Bear Gulch drainage that present a potential risk to human health and the environment from uncontrolled mine waste deposits, mine discharges, and mine openings.

Mining activities occurred intermittently in the Bear Gulch watershed, which is located primarily on National Forest land within the Idaho Panhandle National Forests, Coeur d'Alene River Ranger District, from the late 1890s up until as recently as the late 1970s. This document describes the results of a site investigation that was performed at five historic mine sites located in Bear Gulch. The sites included in the investigation are the Bear Top/Orofino Mill site, Silver Scott Mine, Bear Top Mine, Ione Mine, and Orofino Mine. The mines are located both in the floodplain of Bear Gulch Creek and on the heavily forested, steep hillsides above the creek.

The purpose of the Bear Gulch Mine Complex project was to characterize impacts associated with historic hard rock mining and to estimate the volume of mine waste materials present at the five mine sites. The objectives were to determine lateral and vertical extent of metals concentrations in mine wastes, calculate waste volume, and document water quality conditions in Bear Gulch Creek and in discharging adits.

Maxim conducted the investigation according to standard operating methods and procedures described in a project specific Sampling and Analysis Plan. Site characterization activities were completed during October and November 2001 and July 2002. A total of 54 mine waste samples, two sediment samples, and seven surface water samples were collected and analyzed. Site maps were completed for each site, and topographic surveys were completed at several of the sites. Samples were analyzed for metals and acid/base characteristics, among other parameters.

Analytical data from individual mine waste areas were assessed to determine which metals exceeded background concentrations and reference cleanup guidelines and standards. The following describes Maxim's key findings.

BEAR GULCH CREEK SURFACE WATER AND SEDIMENT QUALITY

Analytical results from upstream and downstream samples collected from Bear Gulch Creek indicate the Bear Gulch Mine Complex impacts water quality. Water quality impacts result principally from mine waste present at the Bear Top/Orofino Mill site located in the floodplain of Bear Gulch Creek. These wastes, including tailings, reworked tailings, mixed tailings and alluvium, and concentrate, are in direct contact with the creek along the streambanks, in the streambed, and on adjacent areas along a stream length of at least 1,000 feet.

Total cadmium, iron, lead, and zinc were detected in the upstream and downstream samples, with concentrations of these metals exceeding acute and chronic aquatic life standards. Concentrations of these metals were all higher in the downstream sample, indicating mine wastes are impacting water quality.

Mean total metals in the streambed sediment samples were relatively low compared to background concentrations, but total copper, lead, and zinc concentrations were considerably higher in the downstream sample than the upstream sample. These data also indicate that mine wastes at the millsite and possibly the other mines in the Bear Gulch Mine Complex negatively impact sediment quality in Bear Gulch Creek.

ADIT DISCHARGE CHARACTERISTICS

The five adit discharges present at the mines during the field investigations had very limited flows, with the highest flow measured from the lower adit at the Orofino Mine (4 gallons per minute). Flows from the other adits were all less than one gallon per minute. Adit discharge water quality was generally near-neutral in pH and contained relatively low concentrations of common ions.

The primary metals of concern in the adit discharges are cadmium, copper, lead, and zinc. Zinc concentrations were generally the highest of the metals detected in the discharges, with the highest dissolved zinc concentration of 5.68 milligrams per liter being measured at the Orofino Mine (lower adit). This concentration was generally 10 times higher than zinc concentrations measured at the other adit discharges. Generally, cadmium, lead, and zinc exceeded State of Idaho acute and chronic water quality criteria, although loading of these metals to Bear Gulch is minor if at all based on the flow regime sampled during the site investigation.

MINE WASTE CHARACTERISTICS

Safety hazards were identified at each of the five mine sites and included open adits, open stopes at the Bear Top Mine, collapsed or dilapidated buildings, exposed mine waste, and abundant debris. Perhaps the most significant safety hazards are the open adits and stopes.

At the five sites, 18 discrete or unique areas of mine waste were identified. Four waste areas were mapped and described at the Bear Top/Orofino Mill site including waste and debris associated with the mill, exposed tailings, mill concentrate, and mixed tailings and alluvium. Mine waste at the four mine sites were primarily waste rock dumps downslope of adits. A total of 12 waste rock dump/areas were described and mapped including two at the Silver Scott Mine, three at the Bear Top Mine, four at the Ione Mine, and three at the Orofino Mine.

The greatest volume of mine waste present at the five sites was found at the Bear Top/Orofino Mill site, the Bear Top Mine, and the Ione Mine (between about 11,000 and 13,000 cubic yards at each site). The Silver Scott Mine had the lowest volume (about 1,500 cubic yards). The total volume of mine waste at the five sites is about 44,000 cubic yards.

Contaminants of concern are defined as those contaminants (metals) that exhibit concentrations greater than three times background levels and/or exceed cleanup guidelines for human health risk. The one common contaminant of concern that was present at all the mine dumps characterized except for the Lower Workings at the Ione Mine, is total lead. Concentrations of total lead in nearly all mine waste samples exceeded 1,100 milligrams per kilogram (mg/kg), well above background levels. For many samples, lead concentrations exceeded 10,000 mg/kg. Total lead concentrations ranged from 116,000 mg/kg in tailings to 59 mg/kg in mine waste rock. In mine waste samples other metals including cadmium, copper, mercury (at all but the Silver Scott Mine), and zinc were found at concentrations greater than three times background.

Even though the majority of the samples submitted for analysis exhibited near-neutral pHs, leachate tests conducted on mine wastes indicated that the metals present in the waste are leachable. The most common leachable metals are lead and zinc, although cadmium, copper, and mercury (in one sample) were detected in synthetic leachate. Most leachable metals (4 or more) were measured above State of Idaho chronic aquatic life standards in samples collected from the Bear Top/Orofino Mill site and the upper workings of the Orofino Mine.

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1.0 INTRODUCTION

Maxim Technologies, Inc.® (Maxim) prepared this site characterization report for the U.S. Department of Agriculture, Forest Service (USDA-FS), Region 1, under the terms and conditions of Contract No. 53-0343-0-0014, Delivery Order No. 43-0343-1-0421. The Forest Service identified the Bear Gulch Mine Complex, which is located in Shoshone County, Idaho, within the Coeur d'Alene River Ranger District, Idaho Panhandle National Forests (IPNF), as a priority site for reclamation activities. Abandoned, historic lead/silver/zinc mines are situated in the Bear Gulch drainage that present a potential risk to human health and the environment from uncontrolled mine waste deposits, mine discharges, and mine openings.

This document describes the results of a site investigation that was performed at five historic mine sites located in Bear Gulch. Site investigation and characterization work was completed according to Maxim's Work Plan, which was submitted to the USDA-FS on September 16, 2001, and by following the National Contingency Plan's non-time-critical removal action process and associated Environmental Protection Agency (EPA) guidance documents (EPA, 1993).

The sites included in this investigation are the following:

- Bear Top/Orofino Millsite and tailings
- Silver Scott Mine (also known as the Lost Cabin Mine)
- Bear Top Mine
- Ione Mine (Pirate Chief Claims)
- Orofino Mine (also known as the Silver Crystal Mine)

1.1 PURPOSE AND OBJECTIVES

The purpose of the Bear Gulch Mine Complex project was to characterize impacts associated with historic hard rock mining and to estimate the volume of mine waste materials present at the five mine sites. Data presented in this report will be used to support mine waste reclamation decisions in the Bear Gulch drainage based on human health and environmental risk evaluations. The following objectives were established for the investigation and characterization work:

- Document metals concentrations in mine wastes to characterize the extent and degree of contamination due to mining and processing operations, and verify the potential risks to human health and the environment.

- Document the number and size of mine openings.

- Develop information relative to waste volume and area affected by mining disturbances.

- Prepare base maps for each site showing pertinent natural and cultural features, sampling stations, and the approximate extent of mine waste material.

1.2 SITE LOCATION AND DESCRIPTION

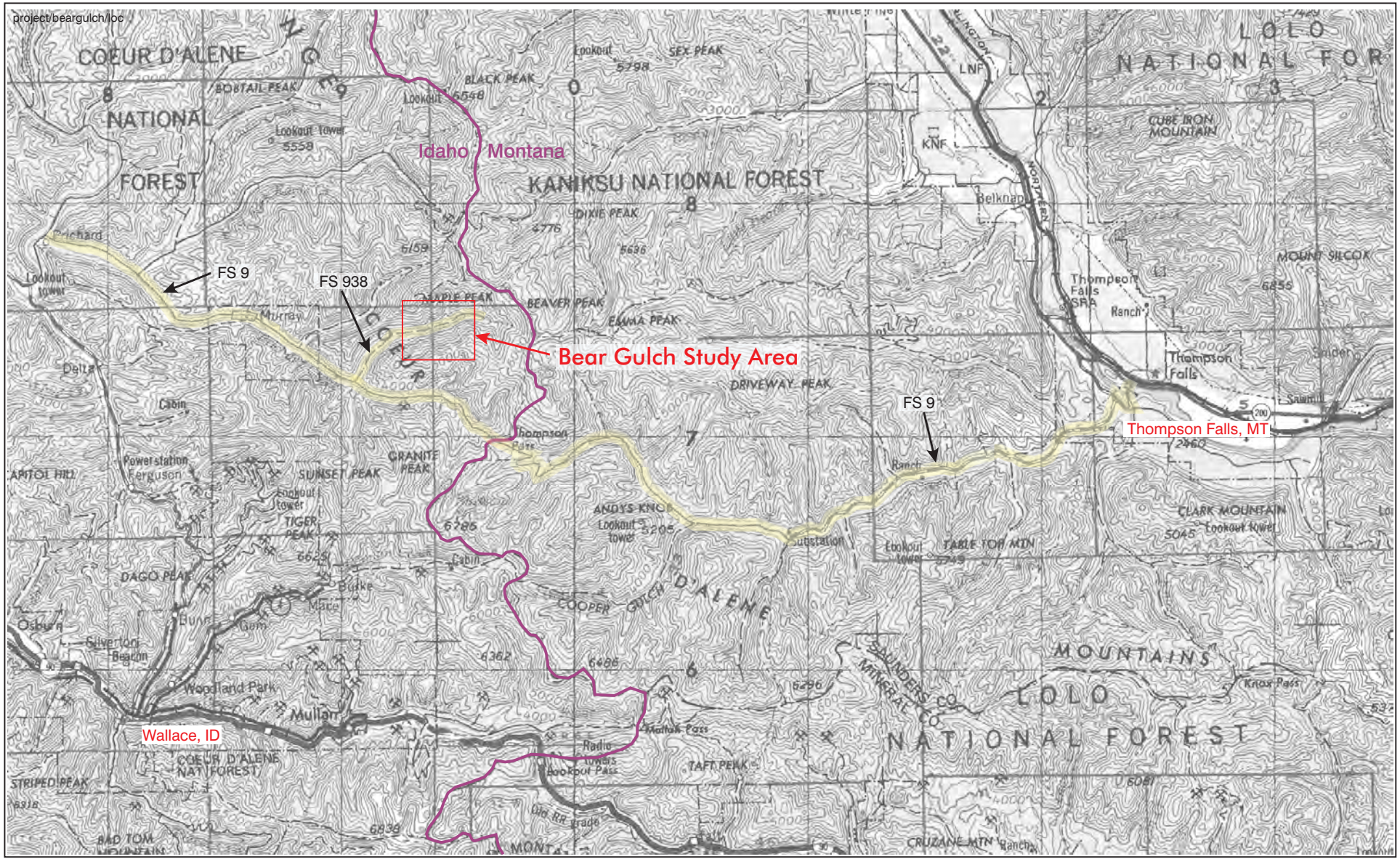
The Bear Gulch Mine Complex is situated in the Summit Mining District (District) in the central portion of Shoshone County, and is located approximately seven miles east of Murray, Idaho (Figure 1). The District is one of eleven districts that are collectively known as the Coeur d'Alene Mining District. Mining activities have occurred intermittently in the District since the late 1890s up until as recently as the late 1970s. This investigation was focused on five sites located in the Coeur d'Alene River Ranger District of the IPNF (also known as the Coeur d'Alene National Forest), and are situated within the Bear Gulch Drainage (Figure 2a). Access to the area is by Forest Service (FS) Road 9, which follows the North Fork of the Coeur d'Alene River from the Kingston exit off Interstate 90 to Thompson Pass. Thompson Pass can also be accessed from Thompson Falls, Montana, by traveling west on FS Road 9. Access to the five mine sites is by gravel road FS Road 938, which intersects USFS Road 9 about seven miles west of Thompson Pass (Figure 1).

Figure 2a shows the study area on an aerial photograph of the drainage. The Bear Top/Orofino Millsite is located in the bottom of the Bear Gulch drainage, a tributary to Prichard Creek. The Bear Top, Orofino, and Ione Mines are located on the south slope above Bear Gulch, while the Silver Scott Mine is located on the north side of the drainage. Site elevations range from approximately 3,600 feet at the millsite up to approximately 5,500 feet above mean sea level at the Ione Mine. The area is heavily forested with dense brush and conifers, and the topography is generally very steep. Approximate private property boundaries are shown on Figure 2b and Table 1 presents a summary table listing the location, ownership, cultural features, waste materials, and proximity to Bear Gulch for each site.

1.3 MINING HISTORY

The Summit Mining District (Prichard and Eagle Creek drainages) is one of eleven districts that are collectively known as the Coeur d'Alene Mining District. Most of the mines in the Summit District are base metal (lead and zinc) shear zone-hosted deposits within metasedimentary rocks of the Precambrian aged Belt Supergroup. The most important for the mines in the district is the Prichard formation, which is classified into upper and lower parts (IGS 1997). Most of the lode mines in the area are hosted in Hosterman's (1956) lower Prichard unit, which consists of banded medium-gray argillite with abundant pyrite crystals.

In the Coeur d'Alene District, waste materials from old mills commonly contain high levels of arsenic as well as other metals. Jig tailings from a mill using gravity flotation generally contain several orders of magnitude less arsenic than tailings from mills using more recent floatation separation techniques. Lower arsenic levels can be attributed to the different separation techniques. Jig separation is a gravity based method where the heavier minerals remain together. Selective flotation separates minerals such as sphalerite and galena from arsenic-bearing minerals.



From USGS 250,000 Wallace Quad

N

0 Mile 4

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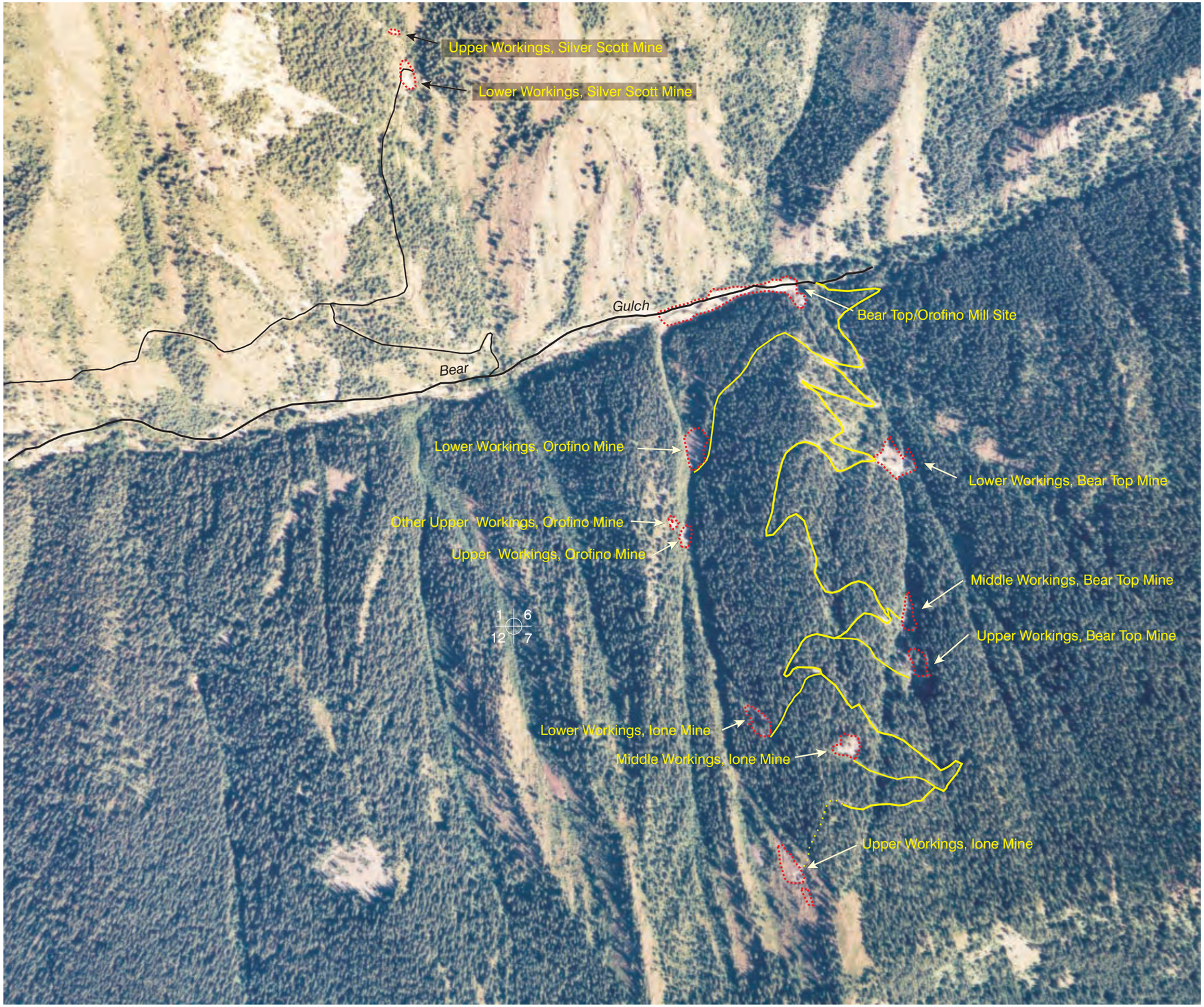
1570158

Location Map, Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests
Shoshone County, Idaho
FIGURE 1



project/beargulch/sitephoto

1 6
12 7 Section Corner - approximate (not ortho corrected)

Roads - black and/or yellow for clarity

Mine Workings

N

0 Approx. Feet 600

Air Photo-10 July 1996, USDA-FS
Located on USGS 7.5' Burke and Murray Quads

Date: Sep 2002
Project # 1570158
File: project/beargulch/sitephoto

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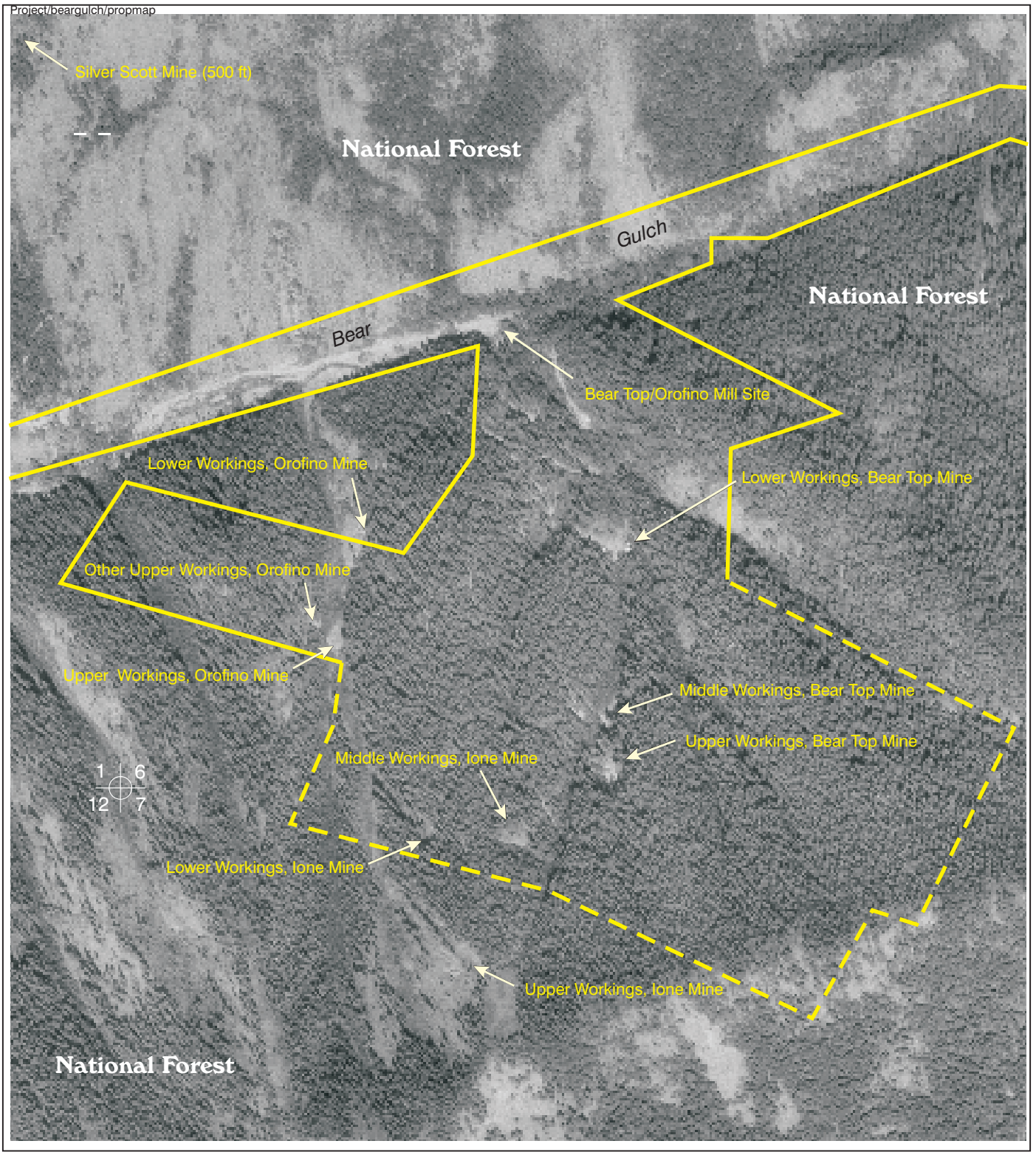
Project Title: Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

Sheet Title: Vicinity Map

FIGURE 2a



DOQ airphoto provided by IPNF

Private Land

Boundary is approximate and based on Partial Dependent resurvey of MS 1885 by J.R.S. Surveying, Inc. of Bonners Ferry, ID recorded 11/23/01.

Boundary is approximate and based on MS 1885 and MS 3245.

1 6
12 7
Section Corner

N

0 Approx. Feet 700

MAXIM 1570158

Property Map
Bear Gulch Mine Complex
Idaho Panhandle National Forests
FIGURE 2b

TABLE 1
SUMMARY OF SITE INFORMATION
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

SITE	LOCATION	OWNERSHIP	GEOLOGIC FEATURES	CULTURAL FEATURES	MINE OPENINGS	WASTE MATERIAL AREAS/ DESIGNATION	SURFACE WATER
Bear Top Mine	SE1/2, Sec 6, T49N, R6E	Patented claims surrounded by National Forest land	Prichard Fm	Empty Fuel Drums Collapsed Building 3 standing buildings Ore Chute, partially collapsed Rail tracks Drill steel and air hose Rock core Drain Pipe (dry) in Adit 2	Level 1 Adit 1, open Level 2 2 flowing adits Level 3 Adit 3, gated but open Large stope, Adit 3 Adit 4, open Adit 5 open	Level 1 (lower) waste rock dump Level 2 (middle) waste rock dump Level 2 sulfide ore stockpile Level 3 (upper) waste rock dump	Tributary to Bear Gulch 1 gpm flowing from the 2 adits at the Level 2 Adit 5, occasional seepage
Orofino Mine	SW1/4, Sec 6, T49N, R6E	Patented claims surrounded by National Forest land, excluding the Lower Workings which is on National Forest	Prichard Fm	Ore Bin, collapsed Concrete foundation, building ruins Scattered 8-inch pipe Concrete cistern	Adit 1, open Adit 2, open	Lower waste rock dump Upper waste rock dump	Tributary to Bear Gulch 5 gpm flowing from Adit 1 1 gpm flowing from Adit 2
Bear Top/Orofino Millsite	SW1/4, Sec 6, T49N, R5E	Patented claims surrounded by National Forest land	Prichard Fm	Mill Building, collapsed Loading Ramp Ruins Wooden Debris		Tailings, Mill debris Sediment, Reworked Tailings/Alluvium Concentrate Loading area	Bear Gulch Creek
Ione Mine	SW1/4, Sec 6, T49N, R6E	Patented claims surrounded by National Forest land, excluding the Upper Workings which is on National Forest	Prichard Fm	Small building	Adit 1, open (seeps) Adit Adit 2, open Adit 3, open	Lower waste rock dump Middle waste rock dump Upper waste rock dump Related upper waste rock dump	Tributary to Bear Gulch
Silver Scott Mine	NE1/4, Sec 1, T49N, R5E	National Forest land	Prichard Fm Sulfide Ore	Metal sided building Rail tracks Ore bin, collapsed Portal timber structure	Adit 1, gated but open Adit 2, open	Lower "recent" waste rock dump Upper waste rock dump Posssible hotspots in upper waste rock dump	Tributary to Bear Gulch

Notes:
Information sources: IGS, 1997, USFS RFP to Maxim, Site visit with USFS and Maxim on 9/05/01

1.3.1 BEAR TOP/OROFINO MILLSITE

The Bear Top/Orofino Millsite was built in 1904 on the active waterway of Bear Gulch Creek, producing gravity or jig tailings. The water powered mill structure consisted of a flume, compressor, crusher, rollers and jigs, concentrator, and a 3,000 foot aerial tramway connecting to the No. 3 level of the Bear Top Mine. Original mill capacity was 60 tons per day, which was later upgraded several times with the advent of electric power to a peak capacity of 150 to 200 tons per day. The millsite was operated intermittently until the mid-1930s producing "first-class" smelting-grade ore (IGS 1997).

The road up Bear Gulch (FS Road 938) bridges Bear Gulch Creek and turns into the access road for the Orofino, Bear Top, and Ione mines. Just past this bridge on the south bank of Bear Gulch are the stone footings and other remains of the old jig mill. The flooding of a tributary has destroyed this section of the road and washed out a substantial amount of jig tails. The rest of the tails are located just to the west of the mill and impinge directly on Bear Gulch Creek. The old mill is totally collapsed. The remaining tailings form a dump about 200 feet long (east - west), 40 feet wide (north - south), and approximately five feet thick. There is an old concentrate loading ramp about 240 feet west of the mill on the north side of the FS Road 938.

1.3.2 BEAR TOP MINE

The Bear Top Mine was operated intermittently from the early 1900s until as recently as 1977. Total recorded production for the Bear Top Mine between 1904 and 1973 was 22,070 tons of ore yielding 19 ounces of gold, 23,794 ounces of silver, 7,242 pounds of copper, 6,500,000 pounds of lead, and 237,000 pounds of zinc (IGS 1997).

There were three working levels of the Bear Top Mine (labeled lower, middle, and upper) that were utilized to expose the vein of lead sulfide ore, which strikes N 45° to 65° W and dips from 60° S to vertical along a high angle brecciated fault shear zone. The ore minerals of this vein are galena with sphalerite and chalcopyrite in a gangue of quartz, pyrite, and carbonate minerals. Site openings include five open adits distributed over the three working levels, and two open stopes on the main adit of upper workings (one large stope and one small stope or shaft). Other features include standing buildings, fuel drums, and collapsed ore chutes, rail tracks, and scattered drill steel, air hose and rock core samples.

1.3.3 OROFINO MINE

The inactive Orofino Mine was consolidated with the Bear Top Mine in 1911 and the most recent recorded operations occurred in 1954. Lessees reclaimed the dump in 1955. The Orofino Mine is located directly down slope from the Ione Mine and its two levels exposed a vein the strikes from N 60° W to 80° E and dips from 50° to 60° S. Production figures for the Orofino are not available, but considering the size of the waste rock dumps, this mine was possibly one of the largest producers in Bear Gulch.

The Orofino Mine site includes two fairly large waste rock dumps, two small waste rock dumps, and two open adits. The uppermost adit and dump are located about 200 feet up the tributary from the lower dump and are not accessible by a usable road. The two smaller waste rock dumps are located approximately 75 feet and 175 feet west of the upper adit and large waste rock dump. Other features include building ruins, a collapsed ore bin, a concrete cistern, and scattered pipe ruins. Both open adits were observed to have running water discharging from their respective openings during the IGS visit in July 1996 and Maxim's July 2002 visit.

1.3.4 IONE MINE

The Ione Mine is located above the Orofino Mine site on the north slope of the basin near the head of Bear Gulch. The Ione was discovered in 1908 (IGS 1997). Nothing more is reported about the Ione Mine until 1922/1923 when the Ione Mining Company developed the workings. The most recent operations occurred at the mine in the 1970s. No mention of the mine is made after 1980. No production records are available for the Ione Mine; however, from available information, it appears output from this mine was small.

At the Ione mine, four levels (lower, middle, upper, and (upper) upper) expose a mineralized shear zone striking N 70° E and dipping 65° S. The ore minerals are galena and minor sphalerite in a gangue of quartz and carbonate. The mine includes four waste rock dumps and fours open adits. Other features include a small building, rail tracks, and scattered drill steel. The access road to the upper adits has been washed out and is not accessible by vehicular traffic. The upper adits are dry and on a very steep slope, positioned above and to the west of the lower adit/tunnel.

1.3.5 SILVER SCOTT MINE

The Silver Scott Mine lies on the north side of Bear Gulch Creek and has been operated as recently as 1983. An access road connects the lower mine workings with the main Bear Gulch road. The mine site includes two waste rock dumps and two open adits. The lower adit is dry and well timbered. Heavy gauge rail tracks lead from the adit to a collapsed loading platform on a dump face located approximately 50 feet south of the portal. The waste dump area covers approximately one acre, and fills the steep ephemeral drainage. Recent flood events have washed away a significant portion of the waste dump (IGS 1997). The upper adit is located approximately 100 feet up-slope from the lower adit and dump area. The upper adit is dry and its associated waste rock dump is iron stained with a heavy sulfur smell (IGS 1997). This adit was probably driven on the vein and probably has sulfides in the waste dump.

1.4 GEOLOGY

The Idaho Geological Survey (IGS 1997) presents a summary of the geologic framework of the Summit Mining District. The principal references to the geology and ore deposits of the Summit Mining Districts are Hosterman (1956) and Shenon (1938).

The host rocks for most of the ore bodies mined in the District are the metasedimentary rocks of the Precambrian age Belt Supergroup. Most important mining in the district is the Prichard Formation, which is classified into upper and lower parts (IGS 1997). Many of the lode mines in the area are hosted in Hosterman's lower Prichard unit, which consists of banded medium-gray argillite with abundant pyrite crystals.

The primary mineralization in the Summit Mining District occurs along faults and shear zones that cross bedding at steep angles. Mineralization noted in these structures includes pyrite, magnetite, chlorite, carbonate, quartz, pyrrhotite, sphalerite, galena, and latite quartz (IGS 1977). Mineralization in the Bear Gulch Mine Complex is a base metal (primarily lead and zinc), shear zone-hosted deposit.

1.5 HYDROLOGIC SETTING

The study area is located within Bear Gulch drainage, a tributary of Prichard Creek which discharges into the Coeur d'Alene River at Prichard, Idaho (Figure 1). The Bear Top/Orofino Millsite is situated within the Bear Gulch floodplain. Several unnamed tributaries of Bear Gulch are proximal to the four mine sites (Figure 2a). Waste rock dumps are located adjacent to tributary streams at the Silver Scott Mine and the Orofino Mine (Figure 2a). Tributaries to Bear Gulch are ephemeral and typically exhibit peak runoff during spring months.

Groundwater occurrence and flow in the Bear Gulch drainage has not been studied. Due to the steep, narrow bedrock valleys, alluvial aquifers are likely thin, discontinuous and confined to the valley bottoms. The metasedimentary rocks in the study area are faulted and fractured (IGS 1997) and groundwater occurrence and flow are likely controlled by the orientation and interconnectedness of fracture systems. Bedrock aquifers apparently sustain baseflow in Bear Gulch Creek and are an important contributor to other surface water flows in the study area.

1.6 PREVIOUS SITE INVESTIGATIONS

The IGS completed a site inspection of the Bear Gulch mines in 1996 and reported their results in the document titled "Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Forest Service Lands (Region 1), Idaho Panhandle National Forest, Volume I: Prichard Creek and Eagle Creek Drainages". Samples collected during the IGS investigation included two water samples at the Orofino Mine, and background water quality samples from several tributaries of Prichard Creek, including Bear Gulch Creek.

With the exception of one sample collected from the main stem of Prichard Creek, all background surface water samples from major tributaries to Prichard Creek exhibited metals concentrations below the U.S. Environmental Protection Agency (EPA's) primary and secondary Maximum Contaminant Levels (MCLs) and the acute and chronic aquatic life standards (IGS 1997). The US Geological Survey (USGS) is in the process of conducting a more detailed study of water quality in Prichard and Eagle Creeks and their tributaries. Samples collected from water flowing from two adits at the Orofino Mine did not exceed any primary or secondary

drinking water MCLs for metals. However, the samples did exceed the chronic aquatic life standard for lead and the acute and chronic Aquatic life standards for zinc (IGS 1997).

Samples collected during the 1996 IGS investigation included one tailings sample from the Bear Top/Orofino millsite and one waste rock sample from the Silver Scott Mine. Arsenic, cadmium, and lead concentrations far exceeded background levels in the Bear Top/Orofino tailings and in waste rock present at the Silver Scott Mine. These results indicated that human health and environmental risks might be present at the sites in the Bear Gulch Mine Complex. According to data collected for these investigations, tailings and waste rock contain elevated concentrations of trace metals including arsenic, cadmium, chromium, copper, manganese, lead, and zinc.

1.7 REPORT ORGANIZATION

Section 2.0 of this report presents investigative methods, a list of deviations from the Sampling and Analysis Plan (SAP), reference cleanup guidelines for solid material, and applicable chronic aquatic life standards. Section 3.0 presents results, organized by site, related to mine waste distribution and thickness, chemical and physical characteristics of materials sampled, and estimates of mine waste volume. An assessment of data quality assurance/quality control with respect to the QAPP is included in Section 4.0. A list of references cited in this report is presented in Section 5.0.

Supporting data for this report is contained in Appendices A through N. Tables of chemical and physical data are included in Appendix A and the complete project database is contained in Appendix B. Appendix C contains stream survey field forms, and copies of field notebooks and site sketches. Appendix D contains selected photographs taken at each site. Appendix E contains support documentation for volumetric estimates for mine waste dumps. Appendices F through M contain data validation documentation. Copies of analytical laboratory reports arranged in chronological order are contained in Appendix N.

2.0 METHODS

To guide field investigation activities, Maxim developed a Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP) for the project (Maxim, 2001). The following sections describe the methods used for the investigation, and changes made to the SAP while completing the field investigation. Maxim conducted the field investigation during three separate mobilizations in October and November 2001 and July 2002.

2.1 CHANGES TO SAP

In some instances, field methods described in the SAP were either revised or altered to accommodate site characterization activities. These changes were noted in the project field book and include the following:

- Several of the mines sites consist of multiple adits and associated waste material piles. In order to evaluate the potentially different chemical characteristics of each waste pile, a letter designation was added to the waste sample identification to identify the location of the sample at the mine site. For example, the Silver Scott mine included samples from both the upper (designated with the letter U) and lower (designated with the letter L) waste rock piles: FS-SC-(U)-01 and FS-SC-(L)-01.

- Locations of all subsample sites were not photographed due to the relatively large number of locations, and not all of the composite sample locations were photographed with visual depictions of the sample designation (marked on dry-erase board or lath).

- Sediment samples obtained from Bear Gulch were containerized in glass jars supplied by the analytical laboratory. The project SAP directed the samples be placed in polyethylene sample containers.

- "Hot spot" samples were not obtained from waste rock dumps due to the visual homogeneity of waste rock at individual dumps.

- It was not possible to excavate and collect any depth integrated samples from the hand sample locations because the steep slopes (angle of repose) at the waste rock dump sites and the coarse nature (gravels and cobbles) of waste rock caused immediate sloughing of sample excavations. Hand auger coring was also not possible because of the larger rock sizes present in the waste dumps. For this reason, depths of mine waste in dumps and native soil samples from beneath the waste rock dumps could not be collected.

- Surface water sample location FS-(U)-BT-101 (SW) was labeled as an upper workings sample; however, it was collected from a wet adit located at the top of the middle workings waste rock dump (top of ore chute).

- Surface water samples were not collected from upstream and downstream of the waste rock dumps because water was not flowing in the ephemeral drainages during the November 2001 site investigation.

2.2 MINE WASTE SAMPLING

Two methods were used to collect samples to investigate the nature and extent of mine waste, a backhoe and hand sampling tools. A backhoe was used in accessible areas located at the Bear Top/Orofino Mill and in one area at the lower workings of the Bear Top Mine. Hand tools were used to sample locations that were not accessible to the backhoe or that were on slopes too steep for safe backhoe operation.

2.2.1 BACKHOE TEST PITS

A total of 13 backhoe test pits were excavated at the Bear Top/Orofino Millsite and one test pit at the lower workings of the Bear Top Mine in November 2001. Notes describing the characteristics of the native material, waste rock, and tailings were entered into the project field book. Other observations noted included apparent thickness of each unit, color, texture, and debris. Where encountered, depth to groundwater was also noted. Samples of each material type encountered in the test pits were collected using a depth-integrated channel sampling technique as described in the project SAP (Maxim, 2001). Decontamination procedures were followed for sampling tools used in the backhoe test pits according to procedures specified in the project SAP.

2.2.2 HAND TOOL EXCAVATED SAMPLE COLLECTION

A total of 13 hand tool excavated composite samples were collected from the upper and lower workings of the Silver Scott Mine and the lower workings of the Ione Mine site during October and November 2001. An additional 22 hand tool excavated composite sample locations were collected from the Bear Top, Orofino, and Ione Mine sites during the July 2002 sampling event. Each sample consisted of a composite of three or more subsample locations that were collected along lateral traverses generally parallel to the slope. Only surface samples from at a depth of 0 to 2 inches below grade were collected due to the limitations of the sampling method. Subsamples were composited in a stainless steel bowl, the samples mixed thoroughly, and a sample was containerized in a heavy-duty polyethylene bag in accordance with the methods and procedures described in the project SAP (Maxim, 2001). Notes describing characteristics of waste rock were entered into the project field book. Other observations noted included apparent thickness of mine waste, color, texture, and debris characteristics.

2.2.3 LABORATORY ANALYSIS

Mine waste samples were submitted for laboratory analyses at Northern Analytical Laboratories, Inc. in Billings, Montana for the following parameters:

- Total and leachable metals (arsenic, cadmium, chromium, copper, lead, zinc)
- Total mercury
- Acid/base accounting (sulfur fractionation, neutralization potential, and SMP lime requirement)
- pH and electrical conductivity (EC)

Analytical methods followed EPA and USDA procedures outlined in the project SAP (Maxim 2001).

2.3 SURFACE WATER AND STREAM SEDIMENT SAMPLING

Two surface water samples, FS-MS-101 (SW) and FS-MS–102 (SW), were obtained from Bear Gulch upstream and downstream of the Orofino/Bear Top Mill site in November 2001. The samples were collected as grab samples from the approximate stream channel center according to the methods and procedures described in the project SAP (Maxim, 2001).

Five surface water samples, FS-(L)IM-101 (SW), FS-(L)OM-102 (SW), FS-(U)OM-101 (SW), FS-(M)BT-102 (SW), and FS-(U)BT-101 (SW), were obtained from adit discharges at the Ione Mine, Orofino Mine, and Bear Top Mine, respectively, during the July 2002 field investigation. The samples were collected as grab samples according to the procedures described in the project SAP (Maxim, 2001).

Field parameters measured during surface water sample collection consisted of pH, specific conductance, and temperature. Stream flow measurements were obtained using a pygmy meter in Bear Gulch Creek. Stream flow from the adit discharges was visually estimated because only very low flows were present.

Two stream sediment samples, FS-MS-101 (SE) and FS-MS–102 (SE), were collocated with the Bear Gulch Creek surface water sample locations from a depth of 0 to 2 inches. Sediment samples consisted of the finer grain size fraction as cobbles and boulders were excluded from the sampled material.

2.3.1 LABORATORY ANALYSIS

Northern Analytical Laboratories analyzed surface water samples for the following parameters:

- Total and dissolved metals (aluminum, antimony, arsenic, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, silver, sodium, and zinc)
- Common ions (bicarbonate, calcium, carbonate, chloride, fluoride, potassium, and sulfate)
- Total alkalinity (as $CaCO_3$), acidity, total dissolved solids (TDS), and hardness

Sediment samples were analyzed for the same suite of parameters as mine waste samples. Analytical methods followed EPA procedures outlined in the project SAP (Maxim 2001).

2.4 SURVEYING AND MAPPING

A professional licensed surveyor completed topographic surveys at the Bear Top/Orofino Millsite, the lower Silver Scott Mine, and the upper workings of the Bear Top Mine. The survey included locating sampling locations, mine features (adits, structures, etc.), stream channels, edge of waste as identified by Maxim field personnel, and access roads.

At the remaining mine sites, sketch maps were produced in the field that showed locations of mine features, mine dumps, and sample locations. A cloth tape was used to measure horizontal distances and vertical elevations were estimated using a hand level and rod. An altimeter was used to determine approximate elevation of the sites.

2.5 WASTE ROCK AND TAILINGS VOLUME ESTIMATES

Thickness of tailings, mixed tailings, and concentrate present at the Bear Top/Orofino Millsite was measured in test pits, and the extent of these mine waste materials was identified in the field and surveyed. An average thickness was calculated based on test pit measurements and the volume calculated using the average thickness multiplied by area.

Waste rock thickness at the other dump sites was based on field estimates from visual observations of the variation from an approximated natural slope. Waste rock volume estimates were established primarily on field observation of the dump surface topography, surrounding native surface topography, and estimates of dump thickness. These volume estimates are approximations and should be considered qualitative. Where possible, a surface model of the dump and surrounding topography were contoured with Surfer^{TM} to generate a waste thickness model and calculate volume.

2.6 DATA COMPARISON

Total metals data for waste rock, tailings, sediment, and native soils collected during this investigation were compared to available background metals data and several cleanup guidelines developed for abandoned mine sites (Table 2). Background metals data in rock samples and soil samples for the Prichard Formation of the Belt Supergroup are reported in the 1997 IGS report. Table 2 presents risk-based reference cleanup guidelines for recreational use of abandoned mine sites from two sources. One set of referenced guidelines was developed for the Montana Department of Environmental Quality (MDEQ) by Tetra Tech, Inc. (1996) and are based on the following:

- Recreational exposure,
- Soil-related exposure assumed to be half of the total potential exposure for each metal, and
- A carcinogenic risk of five in 10,000 ($5x10^{-4}$).

The other set of referenced guidelines are recorded in the US Environmental Protection Agency's September 2002 Record of Decision for the Bunker Hill Mining and Metallurgical

Complex (EPA 2002). Cleanup levels in the ROD are based on the Idaho Department of Health and Welfare's (IDHW) 2001 document titled "*Final Baseline Human Health Risk Assessment for the Coeur d'Alene Basin Extending from Harrison to Mullan on the Coeur d'Alene River and Tributaries, Remedial Investigation/Feasibility Study*".

Reference recreational cleanup guidelines listed in Table 2 should not be interpreted as cleanup action levels. Cleanup action levels can only be determined through a site-specific risk assessment, which was outside the scope of this project.

TABLE 2
BACKGROUND, CLEANUP GUIDELINES AND AQUATIC STANDARDS FOR METALS
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

Element	Background Metals Data[1] (mg/kg)		Reference Cleanup Guidelines (mg/kg)		Chronic Aquatic Life Standard[5] (mg/L)
	Rock	Soil	MDEQ[2]	EPA	
Aluminum	--	--	--	--	--
Antimony	1.1	1.0	293	--	--
Arsenic	--	10	700	420[3]	0.19
Cadmium	0.5	1.3	19,500	--	0.00037*
Chromium	40	43	735,000	--	0.057*
Copper	22	21	27,100	--	0.0035*
Iron	30,000	31,000	--	--	--
Lead	34	54	1,100	1,000[4]	0.00054*
Manganese	224	1,285	665	--	--
Mercury	0.03	0.13	220	--	0.000012
Nickel	10	29	14,650	--	0.049*
Selenium	--	--	--	--	0.005
Silver	0.4	0.5	--	--	--
Zinc	60	140	220,000	--	0.032*

Notes: 1. Data for the Prichard Formation of the Belt Supergroup reported in IGS (1997)
2. From Tetra Tech (1996)
3. From Table 7.1-20 EPA (2002). Public recreational soil/sediment ingestion and dermal contact (child/adult) and a carcinogenic risk of one in 10,000 ($1x10^{-4}$)
4. From EPA (2002)
5. From IDAPA 16.01.02.250 (2000)
mg/kg – milligrams per kilogram; mg/L – milligrams per liter
* Based on 25 mg/L hardness as calcium carbonate
-- not available

Average and range of concentrations for leachable metals for the various sites were compared to chronic aquatic life standards for metals listed in the Idaho Administrative Procedures Act (IDAPA 16.01.02.250, 2000). Leachable metals were determined by EPA Method 1312, the synthetic precipitation leaching procedure (SPLP). This comparison was used to estimate the

potential for groundwater or surface water quality impacts resulting from mine waste leachate, although it is a very conservative comparison since concentrations in leachate from mine waste would likely be considerably diluted before reaching Bear Gulch Creek. Applicable Idaho aquatic standards relative to a 25 mg/l hardness as calcium carbonate are listed in Table 2.

3.0 RESULTS

Results of the investigation and characterization work are presented in this section. Discussions related to mine waste distribution and thickness, chemical and physical characteristics of materials sampled at each site, and estimates of mine waste volumes are presented in separate subsections for each site. In each subsection, a sample inventory table summarizes pertinent information about each sample collected for this investigation. A site map is also presented for each mine waste area at each site.

Tables of chemical data are included in Appendix A. Tables A1, A2, and A3 provide mean total metals, mean leachable metals, and mean acid base accounting, respectively, for each mine site. Other tables in Appendix A present summary statistics by site for total metals, leachable metals, and acid base accounting. Average results presented in the summary statistics tables contained in Appendix A were calculated using one-half the detection limit for values reported as less than detection.

Appendix B contains the project database with analytical testing results for each sample analyzed. Table B4 provides a cross reference of laboratory numbers and sample designations. Table B5 provides a summary of the stream gauging data for Bear Gulch Creek. Table B6 summarizes surface water quality data for the Bear Gulch Creek samples locations.

Supporting data for this report are included in Appendices C through N. Appendix C contains stream gauging field forms, field calculation of discharge from the various "wet" adits in the Bear Gulch Mine Complex, and copies of field notes. Appendix D contains selected photographs taken at each site. Appendix E contains supporting documentation for volume estimation of the waste rock dumps at each site. Data validation information is presented in Appendices F through M. Laboratory reports are arranged in chronological order in Appendix N.

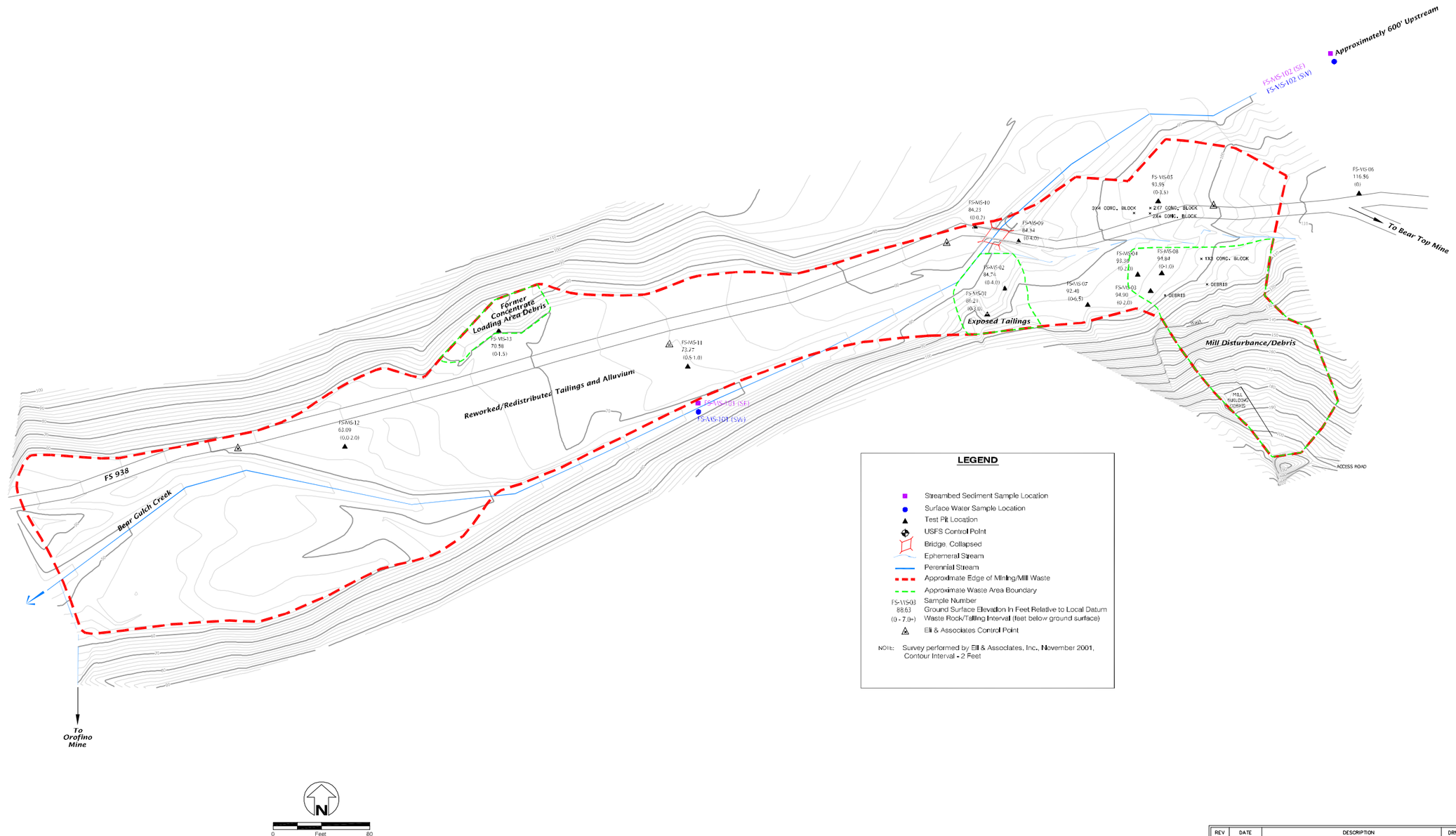
3.1 BEAR TOP/OROFINO MILLSITE

Investigative work at the Bear Top/Orofino Millsite included excavating 13 test pits with a backhoe and collecting four composite samples with hand sampling tools (Table 3). Figure 3 presents the surveyed topographic map of the site showing approximate limits of mapped waste areas, sampling locations, and other site features.

3.1.1 WASTE DISTRIBUTION, CHARACTER, AND THICKNESS

Maxim identified three concentrated waste areas at the site:

- Mill Disturbance/Debris, which is located south of Bear Gulch Creek at on the eastern most limit of the site and is topographically the highest point.



LEGEND

- Streambed Sediment Sample Location
- Surface Water Sample Location
- Test Pit Location
- USFS Control Point
- Bridge, Collapsed
- Ephemeral Stream
- Perennial Stream
- Approximate Edge of Mining/Mill Waste
- Approximate Waste Area Boundary
- FS-MS-03 — Sample Number
- 88.63 — Ground Surface Elevation In Feet Relative to Local Datum
- (0 - 7.0+) — Waste Rock/Tailing Interval (feet below ground surface)
- Ell & Associates Control Point

NOTE: Survey performed by Ell & Associates, Inc., November 2001, Contour Interval - 2 Feet

REV	DATE	DESCRIPTION	DRN BY	APP BY

Date: July 2002
Project #: 1570158
File: projects\beargulch\graphics\orofino
Sheet: 1 of 1

MAXIM TECHNOLOGIES INC

Project Title:
Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

Sheet Title:
Site Plan
Bear Top/Orofino Mill Site
FIGURE 3

TABLE 3
BEAR TOP/OROFINO MILLSITE SAMPLING SUMMARY
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

DESCRIPTION						LITHOLOGY	ANALYTICAL TESTING					COMMENTS
Method	Sample Site	Location	Total Depth[1]	Sample Name	Sample Interval[1]		Total Metals[2]	Total Mercury	Leachable Metals[2]	pH and EC	Acid/Base Accounting[3]	
BH	FS-MS-01	Appromately 65 feet south of Bear Gulch bridge	4	FS-MS-01-0-3(T)	0-3	Gray, angular gravel with grey fine to coarse grained sand	√	√	√	√	√	
				FS-MS-01-3-3.5(N)	3-3.5	Dark brown silty sand with occassional gravel and woody (organic) debris	√	√		√	√	
				FS-MS-01-3.5-4(N)	3.5-4							
BH	FS-MS-02	40' south of Bear Gulch bridge	4	FS-MS-02-0-4(T)	0-4	Gray, angular gravel with grey fine to coarse grained sand						Boulders and groundwater at 4 feet
BH	FS-MS-03	140' east of Bear Gulch bridge at toe of slope	3.5	FS-MS-03-0-2(T)	0-2	Gray, angular gravel with grey fine to coarse grained sand with wood debris and coarse rock fragments	√	√	√	√	√	
				FS-MS-03-2-2.5(N)	2-2.5	Light brown silty sand						
				FS-MS-03-2.5-3(N)	2.5-3							
BH	FS-MS-04	120' east of Bear Gulch bridge, 20' northwest of FS-MS-03	2.5	FS-MS-04-0-2(T)	0-2	Gray, angular gravel with grey fine to coarse grained sand						
				FS-MS-04-2-2.5(N)	2-2.5	Dark brown silty sand with gravel						
BH	FS-MS-05	135' east of Bear Gulch bridge, approximately 10' north of road	4.5	FS-MS-05-0-3.5(W)	0-3.5	Brown silty to sandy gravel	√	√	√	√	√	
				FS-MS-05-3.5-4(N)	3.5-4	Dark brown silty to sandy, rounded gravel	√	√		√	√	
				FS-MS-05-4-4.5(N)	4-4.5							
BH	FS-MS-06	300' east of Bear Gulch bridge, north edge of road	4	FS-MS-06-0-4(N)	0-4	Dark brown, silty to sandy gravel with cobbles	√	√		√	√	
BH	FS-MS-07	100' southeast of Bear Gulch bridge, 50' west of FS-MS-03	7	FS-MS-06-0-4(T)	0-4	Gray sandy gravel						
				FS-MS-06-6.5-7.0(N)	6.5-7	Dark brown silt to sandy silt						
BH	FS-MS-08	20' northeast of FS-MS-03	4	NS	0-1	Wood planking and gravel						Possible tailing with waste rock
				FS-MS-08-1-2(N)	1-2	Brown, tan to yellow-tan, fine grained sand and silt						
				NS	2-4	Blocky cobbles, boulders and rounded gravel with brown sand						
BH	FS-MS-09	Approximately 15' east of Bear Gulch bridge	5	FS-MS-09-0-4(W)	0-4	Brown sandy gravel with cobbles	√	√		√	√	Groundwater at 4 feet, large boulders at 5 feet
BH	FS-MS-10	10' west of Bear Gulch bridge	4	FS-MS-10-0-0.2(T)	0-0.2	Grey sandy gravel						
				FS-MS-10-0.2-0.7(N)	0.2-0.7	Boulders, cobbles and gravel with brown silty sand						
				FS-MS-10-0.7-1.2(N)	0.7-1.2							
				NS	1.2-4	Brown silty sand						

TABLE 3 (Continued)
BEAR TOP/OROFINO MILLSITE SAMPLING SUMMARY
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

DESCRIPTION						LITHOLOGY	ANALYTICAL TESTING					COMMENTS
Method	Sample Site	Location	Total Depth[1]	Sample Name	Sample Interval[1]		Total Metals[2]	Total Mercury	Leachable Metals[2]	pH and EC	Acid/Base Accounting[3]	
BH	FS-MS-11	Approximately 270 feet downstream (west) of Bear Gulch bridge, 35 feet south of road	4	FS-MS-11-0-1(T)	0-1	Gravel with dark grey coarse sand						Tailings mixed with alluvium
				FS-MS-1-1.5(N)	1-1.5	Gravelly black silty sand						
				FS-MS-11-0-1.5-2(N)	1.5-2	Gravel with medium to coarse sand						
				NS	2-4	Gravel with medium grained sand						
BH	FS-MS-12	290 feet west of FS-MS-11, 20' south of road	3	FS-MS-12-0-2(T)	0-2	Grey, gravel with coarse sand	√	√	√	√	√	Tailings mixed with alluvium
				FS-MS-12-2-2.5(N)	2-2.5	Gravel with medium to coarse sand						
				FS-MS-12-2.5-3(N)	2.5-3		√	√		√	√	
BH	FS-MS-13	Approximately 30 feet north of road and 410 feet downstream of Bear Gulch bridge	4	FS-MS-13-0-1.5(W)	0-1.5	Light brown to orange silty sand with angular gravel	√	√	√	√	√	Color contrast 1.5 feet below grade
				FS-MS-13-1.5-2(N)	1.5-2	Dark brown silty sand with gravel						
				NS	2-4							
HS	FS-MS-101	38 feet south of FS-MS-11 on Bear Gulch	0.165	FS-MS-101(SE)	0-0.165	Coarse sand, gravel and cobbles with minor amounts of silt and organic matter	√	√	√	√	√	Cobble and boulder size material not sampled
HS	FS-MS-102	Approximately 600 feet upstream of millsite on Bear Gulch	0.165	FS-MS-102(SE)	0-0.165	Coarse sand, gravel, cobbles, boulders with some silt	√	√	√	√	√	Cobble and boulder size material not sampled
HS	FS-MS-101	38 feet south of FS-MS-11 in Bear Gulch	NA	FS-MS-101(SW)	NA	NA	√	√	√	√	√	
HS	FS-MS-102	Approximately 600 feet upstream of millsite in Bear Gulch	NA	FS-MS-102(SW)	NA	NA	√	√	√	√	√	

Notes:

1 = Depth in feet below ground surface.

2 = Arsenic, cadmium, chromium, copper, lead, zinc

3 = Sulfur fractionation, neutralization potential, SMP lime requirement

BH = backhoe

HS = hand sample

NA = Not applicable

Duplicate identified in comments column

NS = Not sampled

N = Native

T = Tailings

W = Waste Rock

SW = Surface Water

SE = Sediment

- Exposed Tailings, located on the southern bank of Bear Gulch Creek due south of the FS Road 938 bridge.

- Former Concentrate Loading Area Debris, located in the north-central portion of the site, positioned topographically higher than the Bear Gulch floodplain and north of FS Road 938.

The Mill Disturbance/Debris area extends from the Bear Gulch floodplain up the south slope of the Bear Gulch valley at a very high angle of repose to a point some 120 feet off the valley floor. The lower margin of the waste pile impinges on an ephemeral drainage that bisects the floodplain and parallels FS Road 938. Millsite debris consists of tailings, waste rock, and wood debris up to two feet thick sloughed over native material. Waste rock consists of large angular to subangular cobbles and boulders. Jig tailings are were identified as gray very angular gravel and gray fine to course sand with minor silt. Native material consists of dark brown silty sand and rounded gravel with organics. The contact with native material beneath waste was distinguished in test pits FS-MS-03, FS-MS-04, and FS-MS-08 (Appendix D) by a change in the material texture, characteristic color, and the degree of rounding. The maximum observed debris pile thickness in the former millsite area ranged from 2 to 2.5 feet, although Maxim field geologists were not able to investigate the upper slope area of the debris pile due to the material instability and the steep slope that the debris lays on.

The Exposed Tailings deposit associated with the former Bear Top/Orofino Millsite is located on the south bank of Bear Gulch Creek due west of the millsite debris pile. The IGS report states that a major portion of the tailings from the millsite was eroded during the 1996 spring floods and transported downstream (IGS 1997). The remaining jig tailings exist as a pile roughly 65 feet wide in the east-west direction by 30 feet in the north-south direction, and are up to 6.5 feet thick. The tailings pile impinges directly on Bear Gulch Creek and show signs of recent erosion. The jig tailings material consists of gray very angular gravel and gray fine to coarse sand with minor silt. The contact with native alluvium underlying tailings was distinguished in test pits FS-MS-01 , FS-MS-02, and FS-MS-07 (Appendix D).

The Former Concentrate Loading Area is located on the north side of Bear Gulch valley approximately 240 feet west of the millsite. The loading ramp is positioned north of FS Road 938 and is above the floodplain. The toe of the concentrate loading ramp was excavated in backhoe test pit FS-MS-13. Surface material at the base of the loading ramp (presumed to be ore concentrate) consists of light brown to red oxidized silty sand with angular gravel up to 1½ feet thick. Native alluvium consisting of dark brown silty sand with subangular and subrounded gravel was observed beneath the oxidized material.

Maxim also identified an area of Reworked/Redistributed Tailings and Alluvium that is comprised of mixed jig tailings, mine waste, and alluvium (Figure 3). This area extends from the eastern millsite area to the western boundary of the site at the junction with Orofino Gulch tributary. Reworked tailings in the Bear Gulch floodplain has been deposited from spring runoff floods as recent as 1996/1997 as stringers and lag deposits up to several feet thick, typically interspersed with native alluvium over much of the valley bottom. Test pits FS-MS-05, FS-MS-09, FS-MS-

10, FS-MS-11, and FS-MS-12 document varying thickness of reworked tailings deposition ranging from 0.2 to 4 feet.

One additional test pit (FS-MS-06) was advanced at the junction of FS Road 938 and the Bear Top Mine road in order to assess background sediment characteristics and chemistry. Native sediment consisted of cobble and gravel sized sediment with dark brown silty sand and organics.

3.1.2 MINE WASTE ANALYTICAL RESULTS

Samples of tailings, waste rock, and native material were submitted for chemical analyses from the test pits excavated in the various mine waste deposits. Summary statistics for total metals, leachable metals, and acid base accounting results for the Bear Top/Orofino Millsite are presented in Tables A4, A5, and A6, respectively (Appendix A). Analytical results for these same parameters for individual samples are presented in Tables B1, B2, and B3 (Appendix B). Key findings from analytical testing are discussed below.

Total Metals

Contaminants of concern at the Bear Top/Orofino Millsite are cadmium, copper, lead, mercury, and zinc, as shown in Table B1 (Appendix B). These metals exceed average background soil and rock concentrations by more than three times (Table 2) in most of the samples collected. Arsenic and chromium were not detected at concentrations greater than three times background. Only lead exceeded reference cleanup guidelines for human health risk presented in Table 2. The highest average concentrations of total metals were measured in tailings.

The highest total lead concentration (116,000 mg/kg) was collected from a tailings deposit at the base of the Mill Disturbance Debris area in test pit FS-MS-03 at a depth of 0 to 2 feet bgs (Table B1). The next highest concentration was collected from mine waste (possibly ore concentrate) at the base of the concentrate loading ramp (FS-MS-13) from a depth of 0 to 1.5 feet bgs. The third highest sample concentration was collected from native soil beneath exposed tailings. It is possible that this sample is mixed tailings, as it is difficult to distinguish the mixed alluvial material from the jig tailings. Average total lead concentration was 48,253 milligrams per kilogram (mg/kg) in tailings, 5,568 mg/kg in waste rock, and 3,843 mg/kg for native material beneath waste. One of the native samples was collected below tailings and may have contained some mixed tailings.

The highest total cadmium concentration (188 mg/kg) was detected in a tailings sample collected from the Exposed Tailings area in test pit FS-MS-01 at a depth 0 to 3 feet below ground surface (bgs) (Table B1). The next highest cadmium concentration (135 mg/kg) was collected waste rock beneath the base of the ore concentrate loading ramp (FS MS-13) at a depth of 0 to 1.5 feet bgs. This sample was designated waste rock but may actually be ore concentrate.

Native soil collected upstream of the Mill Disturbance Debris area in test pit FS-MS-06 probably represents background metals concentrations. Both total cadmium and total lead concentrations from this upstream sample location were generally consistent with background soil and rock metals concentrations shown in Table 2.

Leachable Metals

Four waste rock and three tailings samples from the Bear Top/Orofino Millsite were analyzed for leachable metals according EPA Method 1312. Table A2 presents summary statistics according to sample type and Table B2 presents analytical results for each sample.

Table B2 indicates that Idaho's chronic aquatic life standards were exceeded for six metals: cadmium (all samples), copper (all samples), lead (all samples), and zinc (five samples). Neither chromium nor mercury was detected above the practical quantitation limit (PQL) for the method, but the PQL is higher than the chronic aquatic life standards. The highest leachable cadmium and zinc concentrations were measured in the 0.0 to 1.5 foot sample collected from waste rock (possibly ore concentrate) in test pit FS-MS-13. The highest leachable lead concentration was collected from the base of the Mill Disturbance Debris area at a depth of 0 to 2 feet bgs in test pit FS-MS-03 (Figure 3). The highest leachable lead and zinc concentrations were 22.7 milligrams per liter (mg/L) and 3.5 mg/L, respectively.

Acid Base Accounting

Mean acid base accounting results for the 10 waste rock, tailings, and native samples collected from the Bear Top/Orofino Millsite are presented in Tables A3 (summary statistics) and Table B3 (individual samples). Average saturated paste pH in waste rock, tailings, and native materials is near neutral (6.78, 6.63, and 6.50 s.u., respectively). Native samples had an average acid potential of less than 8 tons per thousand tons (t/1000t). The average acid potential for both waste rock and tailings was higher (13.8 and 70 t/1000t, respectively).

Several samples exhibited moderate to high total lime requirements: 29 t/1000t from FS-MSE-01 collected in the 3 to 3.5 feet depth interval; 83 t/1000t from FS-MS-01 in the 0 to 3 feet depth interval; 77 t/1000t from FS-MS-03 in the 0 to 2 feet depth interval; 36 t/1000t from FS-MS-12 in the 0 to 2 feet depth interval; and 58 t/1000t from FS-MS-13 in the 0 to 1.5 feet depth interval. Samples from FS-MS-05, FS-MS-06, FS-MS-101, and FS-MS-102 had excess alkalinity (negative total lime requirements).

3.1.3 SURFACE WATER CHARACTERIZATION

Two surface water and two stream sediment samples, FS-MS-101 (SW, SE) and FS-MS–102 (SW, SE), were obtained from Bear Gulch Creek at locations shown on Figure 3. Surface water samples were clear, free of suspended sediment, and were collected from the approximate stream channel center. Streambed sediment samples consisted of coarse sand and rounded to subrounded gravel with some silt and minor organics. The sample collection sites also include

cobble and boulder sized fractions, which were excluded from the samples submitted for laboratory analysis.

Field parameters measured during sampling collection consisted of pH, specific conductance, and temperature. The upstream surface water (FS-MS-102) exhibited a pH of 7.2 standard units (s.u.), a specific conductance (SC) of 22.4 microsiemens per centimeter (µS/cm), and a temperature of 4 degrees centigrade (°C). The downstream water sample exhibited a pH of 7.4 s.u., an SC of 37.6 µS/cm, and a temperature of 4 °C.

Stream flow measurements were obtained using a pygmy meter. The upstream flow on November 15, 2001 was 2.1 cubic feet per second (cfs) and the downstream flow was 1.6 cfs. Stream gauging results are presented in Table B5 (Appendix B) and copies of field forms for the two surface water samples are included in Appendix C.

Analytical Results

Water quality in Bear Gulch Creek is neutral in pH, slightly alkaline, and contains relatively few dissolved solids and low concentrations of common ions. Surface water samples collected from the Bear Gulch Creek were analyzed for dissolved and total metals, common ions, and nutrients. Complete results are tabulated in Table B6 (Appendix B). Cadmium, iron, lead, and zinc were the only total metals detected in the two surface water samples, and the only dissolved metal above the respective PQLs was zinc. Concentrations of these metals were all higher in the downstream sample (FS-MS-101 (SW)), indicating mine wastes in the Bear Gulch Mine Complex are impacting water quality. Both total and dissolved zinc concentrations exceeded the acute and chronic aquatic life standards.

Mean total metals in the sediment samples (Table B-1, Appendix B) were relatively low, and, except for lead in the downstream sample, were less than three times background concentrations (Table 2). Total copper, lead, and zinc concentrations were considerably higher in the downstream sample than the upstream sample, indicating that the Bear Top/Orofino Millsite and possibly the other mines in the Bear Gulch Mine Complex negatively impact sediment quality in Bear Gulch Creek. Lead was the only metal detected in the leachable fraction of the two sediment samples analyzed. Leachable lead was only detected in the downstream sediment sample.

3.1.4 Estimated Volume of Mine Waste

Areal extent of waste rock was calculated using the lateral extent of waste determined during field reconnaissance. Approximate waste boundaries were surveyed and are shown on Figure 3 by a dashed line. Field staff did not perform a reconnaissance downstream of the Bear Gulch junction with Orofino Gulch, so the volume of Reworked/Redeposited Tailings and Alluvium was only calculated for the study area. Waste rock volumes were calculated using the area of mine waste multiplied by average thickness of the deposit. Estimated average waste rock thickness, area, and volume for the waste areas and reworked/redeposited mixed waste in the Bear Gulch Creek floodplain is shown in Table 4.

TABLE 4
ESTIMATED VOLUME OF MINE WASTE AT THE BEAR TOP/OROFINO MILL SITE
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

Location	Average Thickness (feet)	Area (square feet)	Volume (cubic yards)
Mill Disturbance/Debris	2.2	16,715	1,362
Exposed Tailings	4.7	3,512	611
Former Concentrate Loading Area	1.5	2,204	122
Reworked/Redeposited Waste	2.3	115,869	9,870
Total			**11,966**

3.2 SILVER SCOTT MINE

Investigative work at the Silver Scott Mine included collecting waste rock from nine composite sample locations with hand sampling tools. Access limitations prevented use of the backhoe at the site. Five composite samples were collected from the lower dump and four samples were collected from the upper dump. Figures 4 and 5 present site maps of the lower and upper workings, respectively, showing approximate limits of mapped waste areas, sampling locations, approximate mine waste thickness, and other site features. Table 5 summarizes sample characteristics. Photographs showing representative sampling locations are included in Appendix D.

Neither adit was flowing during the November 2001 site visit. Water was also not present in the ephemeral stream above the upper workings or below the lower workings. Water was present in the drainage between the two dumps but was not flowing into the lower workings.

3.2.1 WASTE DISTRIBUTION, CHARACTER, AND THICKNESS

The lower workings of the Silver Scott mine consist of a well timbered dry mine adit with heavy gauge rails leading from the portal to the dump face, a large waste rock dump that measures 180 feet along its longitudinal axis (north-south) and is roughly 80 feet at its widest point, a partially collapsed building, a partially collapsed loading structure, and a collapsed wooden frame (Figure 4). The adit opening is approximately 7 feet high and 8 feet wide, and is supported by a partially gated timber frame. Waste rock is composed of gray blocky angular boulders and cobbles in dark brown silty sand. Waste thickness ranges up to six feet below the loading structure.

The upper workings of the Silver Scott mine consists of a dry, open adit (4 feet wide and 6 feet high) and an oxide stained dump that measures 90 feet along its longitudinal axis (north-south)

LEGEND

- Hand Sample Site
- Approximate Subsample Location
- Adit
- Ephemeral Stream
- Approximate Edge of Mine Waste
- 4 — Estimated Mine Waste Thickness Contour, Feet
- Ore Cart Tracks
- A — A' Sample Transect with Lateral Traverses
- FS-SC(L)-03 — Sample Number
- 88.63 — Ground Surface Elevation in Feet Relative to Local Datum
- Structure

NOTE: Survey performed by Eli & Associates, Inc., November 2001
Contour Interval - 2 Feet

Approximate Edge of Mine Waste

Partially Collapsed Building

Collapsed Wooden Frame

Adit Structure

Partially Collapsed Loading Structure

Mine Access Road

To Bear Gulch

FS-SC(L)-01
47.03

FS-SC(L)-02
59.79

FS-SC(L)-03
72.25

FS-SC(L)-04
85.04

FS-SC(L)-05

A

A'

110 120 130 100 90 80 70 60 50 40 30 2 4 5 6

N

0 Feet 20

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Date: January 2002
Project #: 1570158
File: projects\beargulch\graphics\lowersilverscott
Sheet: 1 of 1

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Project Title: Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

Sheet Title:
Site Plan
Silver Scott Mine, Lower Workings
FIGURE 4

LEGEND

- Hand Sample Site
- Approximate Subsample Location
- Adit
- Ephemeral Seep
- Creek
- Approximate Edge of Mine Waste
- A — A' Sample Transect With Lateral Traverses
- FS-SC(U)-03 / 88.63 Sample Number / Ground Surface Elevation in Feet Relative to Local Datum
- 4 Estimated Mine Waste Thickness Contour, Feet

NOTE: Survey performed by Eli & Associates, Inc., November 2001, Contour Interval - 2 Feet

Note: Access to site from Lower Workings is via creek channel

N

0 Feet 10

REV	DATE	DESCRIPTION	DRN BY	APP BY

Date: January 2002
Project #: 1570158
File: pro.ects\beargulch\graphics\upperssilverscott
Sheet: 1 of 1

MAXIM TECHNOLOGIES INC

Project Title:
Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

Sheet Title:
Site Plan
Silver Scott Mine, Upper Workings
FIGURE 5

TABLE 5
SILVER SCOTT MINE SITE SAMPLING SUMMARY
LOWER AND UPPER WORKINGS
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

DESCRIPTION						LITHOLOGY	ANALYTICAL TESTING					COMMENTS
Method	Sample Site*	Location	Total Depth[1]	Sample Name	Sample Interval[1]		Total Metals[2]	Total Mercury	Leachable Metals[2]	pH and EC	Acid/Base Accounting[3]	
HS	FS-SC-(L)-01	Approximately 40' up slope of the toe of lower dump, southeast side	0.165	FS-SC-(L)-01-0-0.165(W)	0-0.165	Gray, blocky/angular boulders and cobbles with dark brown silty sand	√	√		√	√	Composite, subsamples from 10' east, 15' west and 30' west of sample site.
HS	FS-SC-(L)-02	Approximately 80' upslope of toe of lower dump, along longitudinal axis of dump	0.165	FS-SC-(L)-02-0-0.165(W)	0-0.165	Gray, blocky/angular boulders and cobbles with dark brown silty sand	√	√	√	√	√	Composite, subsamples from 15' east, 20' west and 40' west of sample site.
HS	FS-SC-(L)-03	Near the center of the lower dump, approximately 25' west of loading structure	0.165	FS-SC-(L)-03-0-0.165(W)	0-0.165	Gray, blocky/angular boulders and cobbles with dark brown silty sand	√	√		√	√	Composite, subsamples from 15' east, 30' west and 55' west of sample site.
HS	FS-SC-(L)-04	Approximately 30' south of access road in axis of lower waste dump	0.165	FS-SC-(L)-04-0-0.165(W)	0-0.165	Gray, blocky/angular boulders and cobbles with dark brown silty sand	√	√	√	√	√	Composite, subsamples from 60' east, 25' west and 60' west of sample site.
HS	FS-SC-(L)-05	At northeast edge of partially collapsed loading structure	0.165	FS-SC-(L)-05-0-0.165(W)	0-0.165	Gray, angular gravel with brown silty sand	√	√	√	√	√	Grab sample.
HS	FS-SC-(U)-01	North (uphill) end of upper dump, approximately 30 feet south of adit	0.165	FS-SC-(U)-01-0-0.165(W)	0-0.165	Blocky to angular, boulder/cobble/gravel with red orange sandy silt	√	√		√	√	Composite, subsamples from 7' east, west and at the sample site.
HS	FS-SC-(U)-02	Center of upper dump, approximately 15 feet south (downslope) of FS-SC-(U)-01	0.165	FS-SC-(U)-02-0-0.165(W)	0-0.165	Blocky to angular, boulder/cobble/gravel with red orange sandy silt	√	√	√	√	√	Composite, subsamples from 7' east, west and at the sample site. Slope angle 41°.
HS	FS-SC-(U)-03	Center of upper dump, approximately 33 feet south (downslope) of FS-SC-(U)-01	0.165	FS-SC-(U)-03-0-0.165(W)	0-0.165	Blocky to angular, boulder/cobble/gravel with red orange sandy silt	√	√		√	√	Composite, subsamples from 7' east, west and at the sample site.
HS	FS-SC-(U)-04	Center of upper dump, approximately 53 feet south (downslope) of FS-SC-(U)-01	0.165	FS-SC-(U)-04-0-0.165(W)	0-0.165	Blocky to angular, boulder/cobble/gravel with red orange sandy silt	√	√	√	√	√	Composite, subsamples from 7' east, west and at the sample site.

Notes:

*(L) = Lower Workings, (U) = Upper Workings

(W) = Waste Rock

1 = Depth in feet below ground surface.

2 = Arsenic, cadmium, chromium, copper, lead, zinc

3 = Sulfur fractionation, neutralization potential, SMP lime requirement

HS = hand sample

NA = Not applicable

Duplicate identified in comments column

NS = Not sampled

by 40 feet at its widest point (Figure 5). Waste rock is composed of blocky angular boulders, cobbles, and gravel in a reddish orange sandy silty matrix. Waste thickness ranges up to four feet in front of the adit.

3.2.2 ANALYTICAL RESULTS

Nine samples of waste rock were submitted for chemical analyses. Summary statistics for total metals, leachable metals, and acid base accounting for the Silver Scott working levels are presented in Tables A7, A8, and A9, respectively. Analytical results for these same parameters for individual samples are presented in Tables B1, B2, and B3. Key findings from chemical testing are discussed below.

Total Metals

Contaminants of concern at the Silver Scott Mine are cadmium, copper (lower workings only), lead, and zinc (Table B1), based on total metals results that are three times higher than the background concentrations for soil shown in Table 2. The highest concentration of total lead was measured in a sample collected from the upper workings (33,000 mg/kg); all but one sample exceeded both referenced lead cleanup guidelines presented in Table 2. Mean total lead concentrations from the composite samples collected from the lower and upper waste rock dumps were 3,566 and 10,135 mg/kg, respectively.

Leachable Metals

Five composite samples from the Silver Scott waste rock dumps were analyzed for leachable metals according to EPA Method 1312. Table A2 presents summary statistics according to sample type and Table B2 presents analytical results for each sample. Cadmium, copper, lead, and zinc were detected in leachate from samples collected from both workings, although the two samples submitted for analysis from the upper workings had the highest concentrations of lead and zinc. Leachable cadmium, lead, and zinc concentrations exceeded the chronic aquatic life standards.

Acid Base Accounting

Acid base accounting results for the nine waste rock samples collected from the Silver Scott Mine are presented in Table A3 (summary statistics) and Table B3 (individual samples). The average saturated paste pH in waste rock samples is slightly acid at 6.1 s.u. The average acid potential is 43.2 t/1000t, and the mean total lime requirement is 32.5 t/1000t. Several individual samples exhibited a relatively high acid potential: 54 t/1000t from FS-SC-(U)-01-0-0.165, 86 t/1000t from FS-SC-(L)-03-0-0.165, and 100 t/1000t from FS-SC-(L)-05-0-0.165. The highest total lime requirement (77.7 t/1000t) was from the upper dump site (FS-SC-(U)-01-0-0.165).

3.2.3 ESTIMATED VOLUME OF MINE WASTE MATERIAL

Areal extent of waste rock was determined in the field and surveyed (Figures 4 and 5). An estimate of waste rock thickness was based on topographic profiling using the surveyed surface of the dump across the transverse axis of the waste pile. The estimated average thickness, area, and volume of mine waste is summarized in Table 6.

TABLE 6
ESTIMATED VOLUME OF MINE WASTE AT THE SILVER SCOTT MINE
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

Location	Average Thickness (feet)	Area (square feet)	Volume (cubic yards)
Upper Workings	4	387	57
	2	745	83
	1	1,692	63
Lower Workings	6	345	77
	5	836	171
	4	1,447	241
	2	5,354	595
	1	11,319	419
Total			**1,706**

3.3 BEAR TOP MINE

Investigative work at the Bear Top Mine involved collecting waste rock samples from a single backhoe test pit and 11 composite sample locations with hand sampling tools. Two surface water samples were collected from the Bear Top Mine complex; one from the middle workings adit and one from the main adit at the upper workings level. The adit at the lower workings was dry. Figures 6, 7, and 8 are maps of the lower, middle, and upper workings, respectively, at the Bear Top Mine. Photographs showing representative sampling locations are included in Appendix D. Table 7 summarizes sample characteristics.

3.3.1 WASTE DISTRIBUTION, CHARACTER, AND THICKNESS

The lower workings level consists of a very large waste rock dump that measures approximately 300 feet by 300 feet, fuel tanks, various collapsed structures, a large sheet metal building, two cabins (core shack), and a dry, well timbered adit with an open portal and a gate (Figure 6).

enviro\usfs\beargulch\all_mines.dwg

LEGEND

- Hand Sample Site
- Approximate Subsample Location
- Adit
- Ephemeral Drainage
- Slope
- FS-(L)-BT-03 — Sample Number
- A — A' — Sample Transect with Lateral Traverses
- Test Pit Location
- Structure
- Approximate Edge of Mine Waste
- 4 — Estimated Mine Waste Thickness Contour, Feet

N

0 Feet 40

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Date: July 2002
Project #: 1570158
File: projects:beargulch\graphics:all_mines.dwg
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Project Title: Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

Sheet Title: Site Plan
Bear Top Mine, Lower Workings
FIGURE 6

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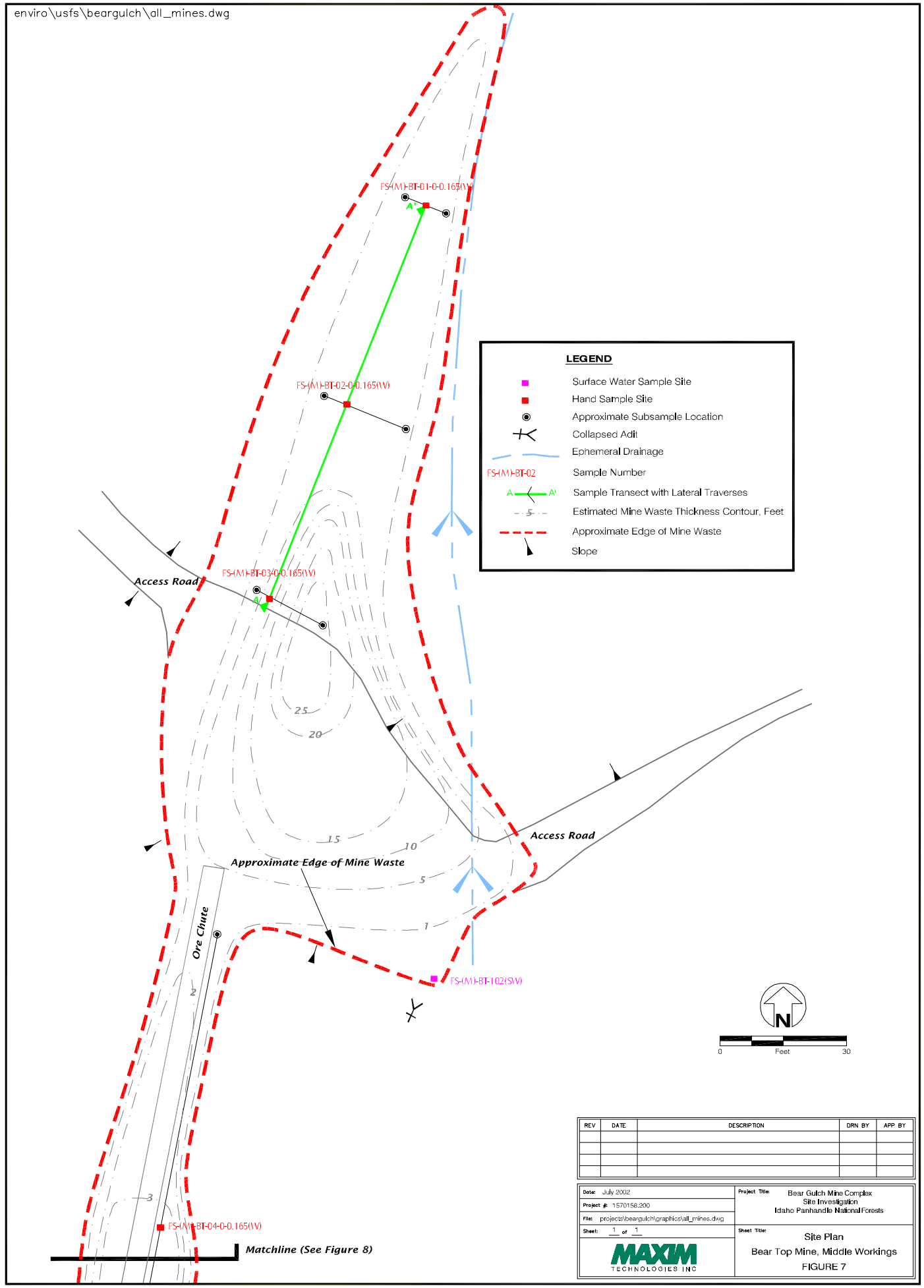
enviro\usfs\beargulch\all_mines.dwg
FS-(M)-BT-01-0-0.165(W)
FS-(M)-BT-02-0-0.165(W)
FS-(M)-BT-03-0-0.165(W)
FS-(M)-BT-04-0-0.165(W)
FS-(M)-BT-102(SW)
A
A'
Access Road
Access Road
Approximate Edge of Mine Waste
Ore Chute
25
20
15
10
5
1
2
3
LEGEND
Surface Water Sample Site
Hand Sample Site
Approximate Subsample Location
Collapsed Adit
Ephemeral Drainage
FS-(M)-BT-02
Sample Number
Sample Transect with Lateral Traverses
Estimated Mine Waste Thickness Contour, Feet
Approximate Edge of Mine Waste
Slope
N
0
Feet
30
Matchline (See Figure 8)
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DESCRIPTION
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APP BY
Date: July 2002
Project #: 1570158.200
File: projects\beargulch\graphics\all_mines.dwg
Sheet: 1 of 1
MAXIM TECHNOLOGIES INC
Project Title: Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests
Sheet Title:
Site Plan
Bear Top Mine, Middle Workings
FIGURE 7

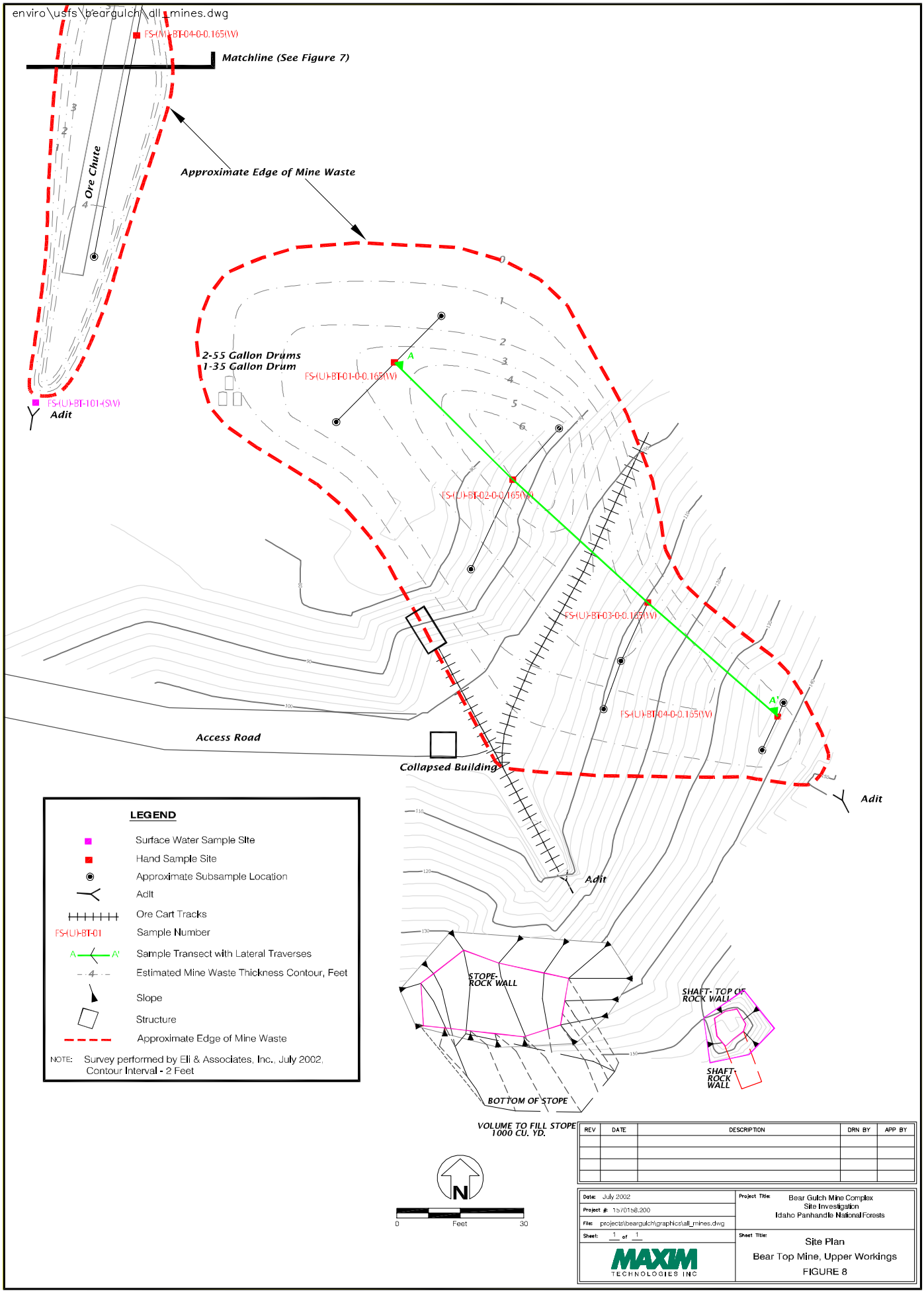
enviro\usfs\beargulch\all_mines.dwg
FS-(M)-BT-04-0-0.165(W)
Matchline (See Figure 7)
Ore Chute
Approximate Edge of Mine Waste
2-55 Gallon Drums
1-35 Gallon Drum
FS-(U)-BT-101-(SW)
Adit
FS-(U)-BT-01-0-0.165(W)
FS-(U)-BT-02-0-0.165(W)
FS-(U)-BT-03-0-0.165(W)
FS-(U)-BT-04-0-0.165(W)
A
A'
Access Road
Collapsed Building
Adit
Adit
STOPE-
ROCK WALL
SHAFT- TOP OF
ROCK WALL
SHAFT-
ROCK
WALL
BOTTOM OF STOPE
VOLUME TO FILL STOPE
1000 CU. YD.
LEGEND
Surface Water Sample Site
Hand Sample Site
Approximate Subsample Location
Adit
Ore Cart Tracks
FS-(U)-BT-01 Sample Number
A A' Sample Transect with Lateral Traverses
4 Estimated Mine Waste Thickness Contour, Feet
Slope
Structure
Approximate Edge of Mine Waste
NOTE: Survey performed by Eli & Associates, Inc., July 2002.
Contour Interval - 2 Feet
N
0
Feet
30
REV
DATE
DESCRIPTION
DRN BY
APP BY
Date: July 2002
Project #: 157015.8.200
File: projects\beargulch\graphics\all_mines.dwg
Sheet: 1 of 1
Project Title: Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests
Sheet Title:
Site Plan
Bear Top Mine, Upper Workings
FIGURE 8
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TABLE 7
BEAR TOP MINE SITE SAMPLING SUMMARY
LOWER, MIDDLE, AND UPPER WORKINGS
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

DESCRIPTION						LITHOLOGY	ANALYTICAL TESTING					COMMENTS
Method	Sample Site*	Location	Total Depth[1]	Sample Name	Sample Interval[1]		Total Metals[2]	Total Mercury	Leachable Metals[2]	pH and EC	Acid/Base Accounting[3]	
BH	FS-(L)BT-01	Collected from a backhoe trench which was approximately 10 feet from adit opening	10	FS-(L)BT-01-0-10(W)	0-10	Tannish brown, blocky, very angular rock fragments from 2" to 1' in a brown silty sand matrix	√	√	√	√	√	Water entering test pit at 2.5 feet. Unable to dig deeper than 10 feet due to sloughing.
HS	FS-(L)BT-01	100' from toe of waste rock dump.	0.165	FS-(L)BT-01-0-0.165(W)	0-0.165	Slightly tan (at the ground surface) to gray, angular gravel and cobbles. Minor amounts of dark grey sand.	√	√	√	√	√	Estimated waste rock thickness of 5 feet. Transect on main (eastern) lobe of lower waste dump.
HS	FS-(L)BT-02	200' from toe of waste rock dump.	0.165	FS-(L)BT-02-0-0.165(W)	0-0.165	Slightly tan (at the ground surface) to gray, angular gravel and cobbles. Minor amounts of dark grey sand.	√	√	√	√	√	Test pits greater than 1.25 feet deep will collapse. Estimated thickness of 5 feet.
HS	FS-(L)BT-03	300' from toe of waste rock dump.	0.165	FS-(L)BT-03-0-0.165(W)	0-0.165	Slightly tan (at the ground surface) to gray, angular gravel and cobbles. Minor amounts of dark grey sand.	√	√	√	√	√	Duplicate of FS-(L)BT-04.
HS	FS-(M)BT-01	50' from toe of waste rock dump.	0.165	FS-(M)BT-01-0-0.165(W)	0-0.165	Blocky very angular boulders, and cobbles consisting of dark gray to greenish gray argillite with quartz filled fractures. Coarse fragments mixed with finer material that is a fine to coarse grained brown sand .	√	√	√	√	√	Composite along transect of the middle waste rock dump of the Bear Top mine, 50' upslope from the toe, subsamples from 3' left of transect line (looking up-hill), on the center-line, and 6' right of transect. Waste rock thicknesses vary from 1' to 3'.
HS	FS-(M)BT-02	100' from toe of waste rock dump.	0.165	FS-(M)BT-02-0-0.165(W)	0-0.165	Blocky very angular boulders, and cobbles consisting of dark gray to greenish gray argillite with quartz filled fractures. Coarse fragments mixed with finer material that is a fine to coarse grained brown sand .	√	√		√	√	Composite along transect of the middle waste rock dump of the Bear Top mine, 100' upslope from the toe, subsamples from 15' left of transect line, on the center-line, and 8' right of transect. Waste rock thickness averaged approximately 1.5' along this cross section.
HS	FS-(M)BT-03	150' from toe of waste rock dump.	0.165	FS-(M)BT-03-0-0.165(W)	0-0.165	Blocky very angular boulders, and cobbles consisting of dark gray to greenish gray argillite with quartz filled fractures. Coarse fragments mixed with finer material that is a fine to coarse grained brown sand .	√	√	√	√	√	Composite along transect of the middle waste rock dump of the Bear Top mine, 150' upslope from the toe, subsamples from 10' left of transect line, on the center-line, and 8' right of transect. Waste rock thicknesses vary from 2' to 30' along this cross section.
HS	FS-(M)BT-04	3 subsamples collected from the upper 0.165 feet of material adjacent to the ore chute.	0.165	FS-(M)BT-04-0-0.165(W)	0-0.165	Gray argillitic cobbles, boulders, gravels, and grey brown sands.	√	√	√	√	√	Composite sample from a lobe of material present at the top of a 150' long ore chute. Composite sampled from top, middle, and lower center sections of the 20' by 20' lobe of waste rock material. The lobe thickness is estimated to be 4'.
HS	FS-(M)BT-102	Collected from mouth of middle Bear Top adit.	NA	FS-(M)BT-102(SW)	NA	NA						
HS	FS-(U)BT-01	50' from toe of waste rock dump.	0.165	FS-(U)BT-01-0-0.165(W)	0-0.165	Coarse grained material consists of angular boulders and cobbles of light gray to gray argillite with quartz filled fractures with occurances minor gray green colored massive carbonate rock fragments. Finer grained material consists of and gray brown fine to coarse grained sandy gravel.	√	√		√	√	Composite along transect of the upper waste rock dump of the Bear Top mine, 50' upslope from the toe, subsamples from 15' left of the transect (looking upslope), the center-line of the transect, and 16' right of transect. The waste rock thickness along this cross section was approximately 3'
HS	FS-(U)BT-02	100' from toe of waste rock dump.	0.165	FS-(U)BT-02-0-0.165(W)	0-0.165	Material consistant with above (FS-(U)BT-01) location with the exception of lesser amounts of boulders and cobbles.	√	√	√	√	√	Composite along transect of the upper waste rock dump of the Bear Top mine, 100' upslope from the toe, subsamples from 15' left of the transect, the center-line of the transect, 20' right, and 33' right of transect. The waste rock thickness along this cross section varied from 2' to 6'.

TABLE 7 (Continued)

BEAR TOP MINE SITE SAMPLING SUMMARY
LOWER, MIDDLE, AND UPPER WORKINGS
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

DESCRIPTION						LITHOLOGY	ANALYTICAL TESTING					COMMENTS
Method	Sample Site*	Location	Total Depth[1]	Sample Name	Sample Interval[1]		Total Metals[2]	Total Mercury	Leachable Metals[2]	pH and EC	Acid/Base Accounting[3]	
HS	FS-(U)BT-03	150' from toe of waste rock dump.	0.165	FS-(U)BT-03-0-0.165(W)	0-0.165	Material consistant with above (FS-(U)BT-01) location with the exception of lesser amounts of boulders and cobbles.	√	√	√	√	√	Composite along transect of the upper waste rock dump of the Bear Top mine, 150' upslope from the toe, subsamples from the center-line of the transect, 13' right, and 22' right of transect. The waste rock thickness along this cross section varied from 1' to 3'.
HS	FS-(U)BT-04	200' from toe of waste rock dump.	0.165	FS-(U)BT-04-0-0.165(W)	0-0.165	Predominantly angular argillitic boulders and cobbles.	√	√		√	√	Composite along transect of the upper waste rock dump of the Bear Top mine, 200' upslope from the toe, subsamples from 3' left of transect line, on the center-line, and 7' right of transect. The waste rock thickness along this cross section is approximately 1'.
HS	FS-(U)BT-101		NA	FS-(U)BT-101(SW)	NA	NA						

Notes:

1 = Depth in feet below ground surface.
2 = Arsenic, cadmium, chromium, copper, lead, zinc
3 = Sulfur fractionation, neutralization potential, SMP lime requirement
BH = backhoe
HS = hand sample
NA = Not applicable

Duplicate identified in comments column
NS = Not sampled
N = Native
T = Tailings
W = Waste Rock
SW = Surface Water
SE = Sediment

*(L) = Lower Dump
*(M) = Middle Dump
*(U) = Upper Dump

Heavy gauge rail lines emerge from the portal of the adit which has a rough opening of 6 feet by 6 feet. Waste rock dump material consists of tan to gray, angular, blocky rock fragments in a brown sandy matrix. The thickest area of the waste rock dump is in the level area in front of the buildings near the adit mouth where an estimated 40 feet is present.

The middle workings are located about 420 feet up slope from the lower workings level. A large, wooden ore shoot extends uphill to the upper workings level. An open, flowing adit is located at the top of the ore chute waste rock dump. A second caved-in adit is located due east of the bottom of the ore chute and discharging water was observed during the July 2002 sampling event. The adit dimensions are approximately 5 feet wide by 6 feet high. Sulfide ore is stockpiled near the bottom of the loading chute. The middle workings level waste rock dump fills the drainage and is approximately 150 feet in length down its longitudinal axis (Figure 7). Waste rock from the middle workings consists of angular dark gray to green argillitic boulders with some fine to coarse grained brown sand. The thickest area of the waste rock dump is northwest of the adit where an estimated 25 feet of material is present.

The upper workings level is located about 600 feet above the lower workings and has three adits each with rough openings approximately 4 to 5 feet wide by 6 feet high. The access road to the upper workings crosses the main adit dump to a collapsed building (Figure 8). Heavy gauge rails extend out of the main adit portal to the main dump. The remnants of a wooden ore chute extend from this level down to middle workings. The presence of drill steel and hoses on the main dump indicate relatively recent activity. The main adit was stoped to the surface about 30 feet in from the portal. Another stope daylights a little further in from the first. The open stopes are safety concerns as there are no restrictions on the steep slopes that prevent a person from falling into the stope. The main adit is dry and gated open. Sulfide material is present on the surface of the main adit dump. Another dry adit and waste rock dump are located just east of the main adit. This waste rock dump slopes down and joins with the main adit waste rock dump. Approximately 160 feet below and west of the main adit is a third adit and dump that is associated with the ore chute (part of the middle workings). Waste rock from the upper Bear Top Mine workings consists of predominantly angular argillitic cobbles and boulders. The thickest area of the waste rock dump is about six feet thick where the rail bed crosses the dump.

3.3.2 MINE WASTE ANALYTICAL RESULTS

Twelve composite samples of waste rock were submitted for chemical analyses. Summary statistics for the working levels of the Bear Top Mine Complex for total metals, leachable metals, and acid base accounting are presented in Tables A10, A11, and A12, respectively. Analytical results for these same parameters for individual samples are presented in Tables B1, B2, and B3. Key findings from chemical testing are discussed below.

Total Metals

As shown in Table B1, contaminants of concern at the Bear Top Mine include copper, lead, mercury, and zinc in waste rock, as concentrations of these metals in some samples are greater

than three times background soil concentrations shown in Table 2. The highest total lead (89,400 mg/kg), mercury (2.2 mg/kg), and zinc (52,400 mg/kg) concentrations were measured in samples collected from the middle and upper workings, although only total lead exceeds the reference recreational scenario cleanup guidelines listed in Table 2.

Leachable Metals

Nine composite samples from the Bear Top Mine complex waste rock dumps were analyzed for leachable metals according EPA Method 1312. Table A2 presents summary statistics according to sample type and Table B2 presents analytical results for each sample. Leachable concentrations of cadmium, copper, lead, and zinc were detected in samples from each of the three mine waste dumps (Table B2). When detected, leachable concentrations exceeded chronic aquatic life standards. The highest leachable cadmium (0.031 mg/L), lead (20.1 mg/L), and zinc (23.4 mg/L) concentrations were measured in samples collected from the upper waste rock dump location.

Acid Base Accounting

Acid base accounting results for the 12 waste rock samples collected from the Bear Top Mine workings are presented in Table A3 (summary statistics) and Table B3 (individual samples). The average saturated paste pH in waste rock samples from the three working levels ranges from 6.3 to 7.3 s.u. The average acid potential in the three working levels is 23.6 t/ton, and the mean total lime requirement is 23.8 t/ton. Several individual samples exhibited a relatively high acid potential: 89 t/1000t from FS-(M)-BT-04-0-0.165, and 85 t/1000t from FS-(M)-BT-03-0-0.165. The highest total lime requirement (92.6 t/1000t) was from the middle workings dump site (FS-(M)-BT-04-0-0.165).

3.3.3 ADIT DISCHARGES

Two surface water samples were collected from the Bear Top Mine complex; one from the middle workings adit (Figure 7) and one from the adit associated with the ore chute waste rock dump that joins the upper and middle workings (Figure 8). Flow from these two adits was less than one gallon per minute (Table B5).

Samples were analyzed for dissolved and total metals, common ions, and physical parameters. Complete results are listed in Table B6. The pH of the water was neutral in both adits and electrical conductivity and TDS was relatively low, reflecting the generally low concentrations of common ions such as calcium, magnesium, sodium, and sulfate. For dissolved metals, water quality in the two adits is similar, although the dissolved zinc concentration in the sample from the middle workings was much higher than the sample from the upper workings. Total and dissolved concentrations of cadmium, lead, and zinc, exceeded the chronic aquatic life standards in both adits, but only cadmium and zinc exceeded the acute standards.

3.3.4 ESTIMATED VOLUME OF MINE WASTE MATERIAL

Areal extent of waste rock was determined using edges of waste determined during field reconnaissance. These approximate limits were surveyed at the upper workings but not at the lower and middle workings. Areal extent was measured with a tape at the lower and middle workings as shown by the red dashed lines on Figures 6 and 7.

Waste rock volume estimates for the middle and upper waste rock dumps were calculated using estimated thickness contours from the topographic profiles established at each subsample location. Results from this transverse profiling method for thickness estimation were then contoured as topographic surface plots. Due to its large size and shape, a volume estimate for the lower workings waste rock dump was calculated from the surface topography of both the waste rock pile and an extrapolated native surface. The 3-D surfaces were modeled with a surface contouring program and a volume was calculated from integration of the two modeled surfaces. Results of the 3-D surface modeling are shown in Appendix E. The volume of waste rock based on estimated thickness and the surrounding topography for the three working levels of the Bear Top Mine is shown in Table 8.

TABLE 8
ESTIMATED VOLUME OF MINE WASTE AT THE BEAR TOP MINE
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

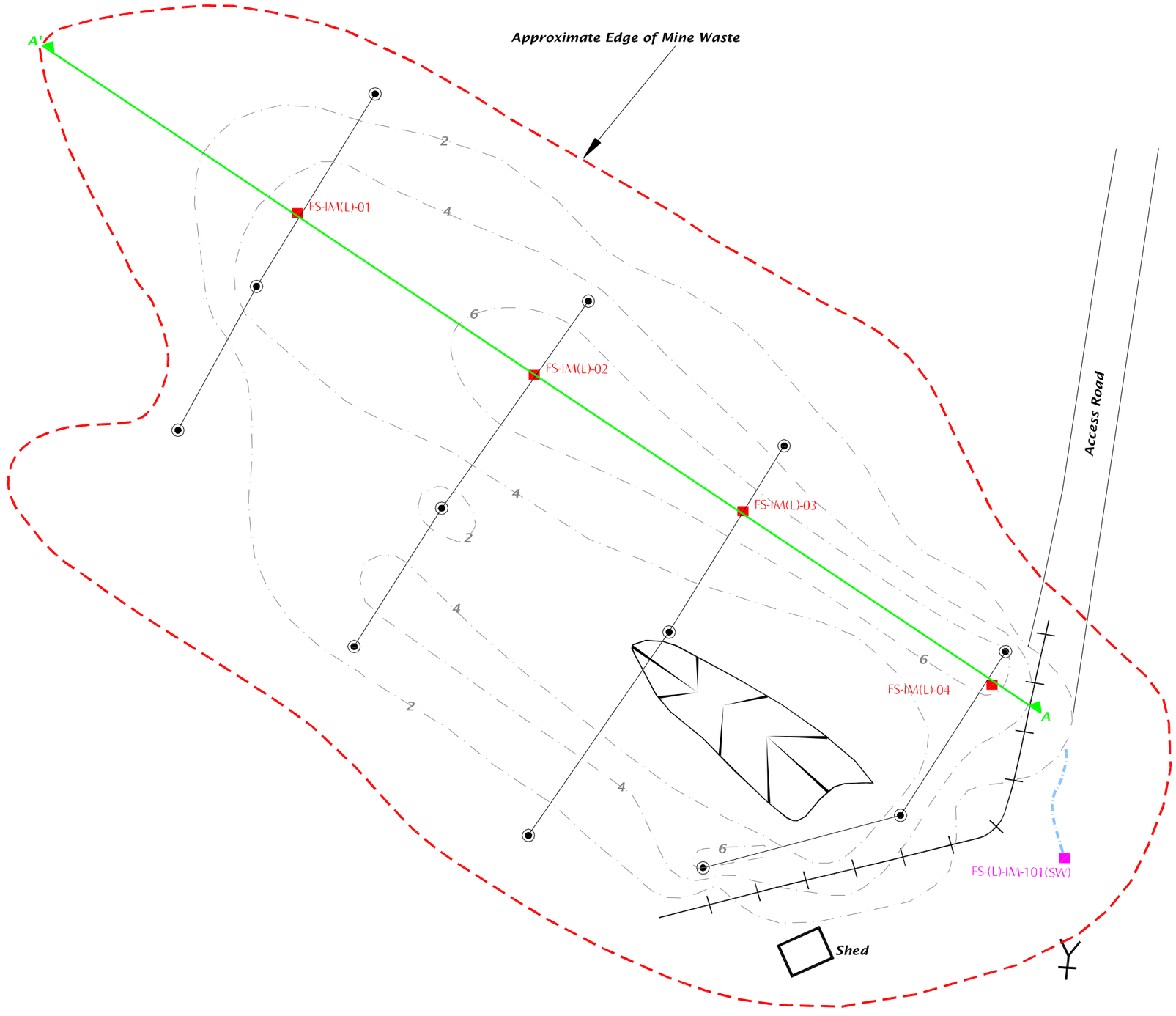
Location	Volume (cubic yards)
Lower Workings	9,700
Middle Working	2,643
Upper Workings	800
Total	**13,143**

3.4 IONE MINE

The Ione Mine is located above and south of the Bear Top and Orofino mines on a steep hillside (Figure 2a). The Ione Mine site consists of three main working levels and four waste rock dumps. Figures 9, 10, 11, and 12 are site maps of the Ione Mine workings. Investigative work at the Ione Mine included collecting waste rock samples from 11 composite sample locations and a surface water sample from a discharging adit at the lower workings. Photographs showing representative sampling locations are included in Appendix D. Table 9 summarizes sample characteristics.

3.4.1 WASTE DISTRIBUTION, CHARACTER, AND THICKNESS

The lower workings consists of an improved adit with a collapsed portal (approximately 5 feet wide by 6 feet high) and a small building on the west end of the dump (Figure 9). Water seeps



LEGEND

- Surface Water Sample Site
- Hand Sample Site
- Approximate Subsample Location
- Caved/Collapsed Adit
- Seep
- Ore Cart Tracks
- FS-IM(L)-03 — Sample Number
- 4 — Estimated Mine Waste Thickness Contour, Feet
- Structure
- Approximate Edge of Mine Waste
- A — A' Sample Transect with Lateral Traverses

N

0 Feet 20

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Date: January 2002
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MAXIM TECHNOLOGIES INC

Project Title: Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

Sheet Title:
Site Plan
Ione Mine, Lower Workings
FIGURE 9

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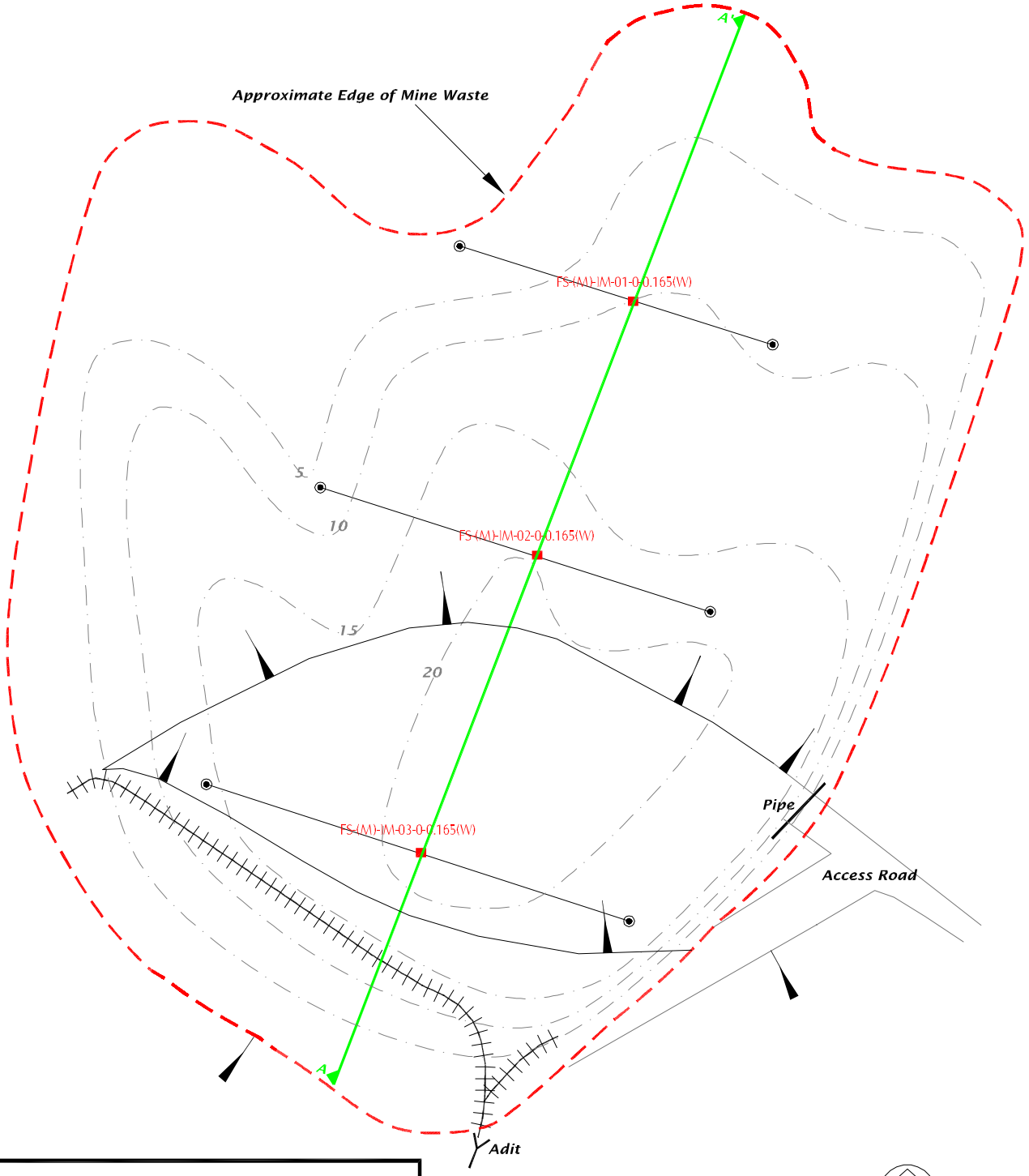

LEGEND

- Hand Sample Site
- Approximate Subsample Location
- Adit
- Seep
- A — A' Sample Transect with Lateral Traverses
- 4 Estimated Mine Waste Thickness Contour, Feet
- Ore Cart Tracks
- FS-(M)-IM-01 Sample Number
- Slope
- Approximate Edge of Mine Waste

N

0 Feet 25

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Date: July 2002
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Sheet: 1 of 1

MAXIM TECHNOLOGIES INC

Project Title: Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

Sheet Title:
Site Plan
Ione Mine, Middle Workings
FIGURE 10

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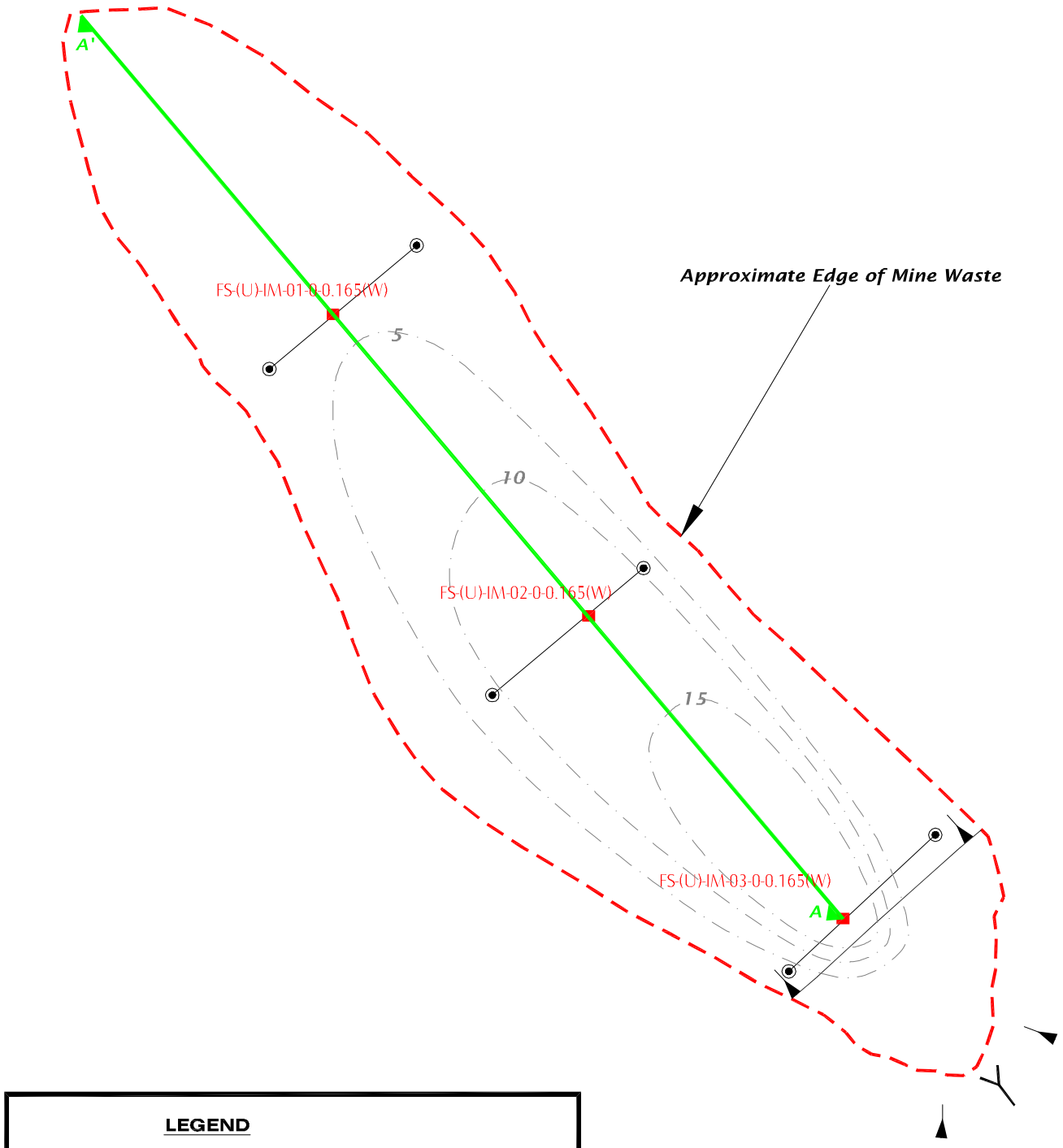

LEGEND

- Hand Sample Site
- Approximate Subsample Location
- Adit
- FS-(U)-IM-03 — Sample Number
- A — A' — Sample Transect with Lateral Traverses
- 4 — Estimated Mine Waste Thickness Contour, Feet
- Slope
- Approximate Edge of Mine Waste

REV	DATE	DESCRIPTION	DRN BY	APP BY

Date: July 2002
Project #: 1570158.200
File: projects\beargulch\graphics\all_mines.dwg
Sheet: 1 of 1

MAXIM TECHNOLOGIES INC

Project Title: Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

Sheet Title:
Site Plan
Ione Mine, Upper Workings
FIGURE 11

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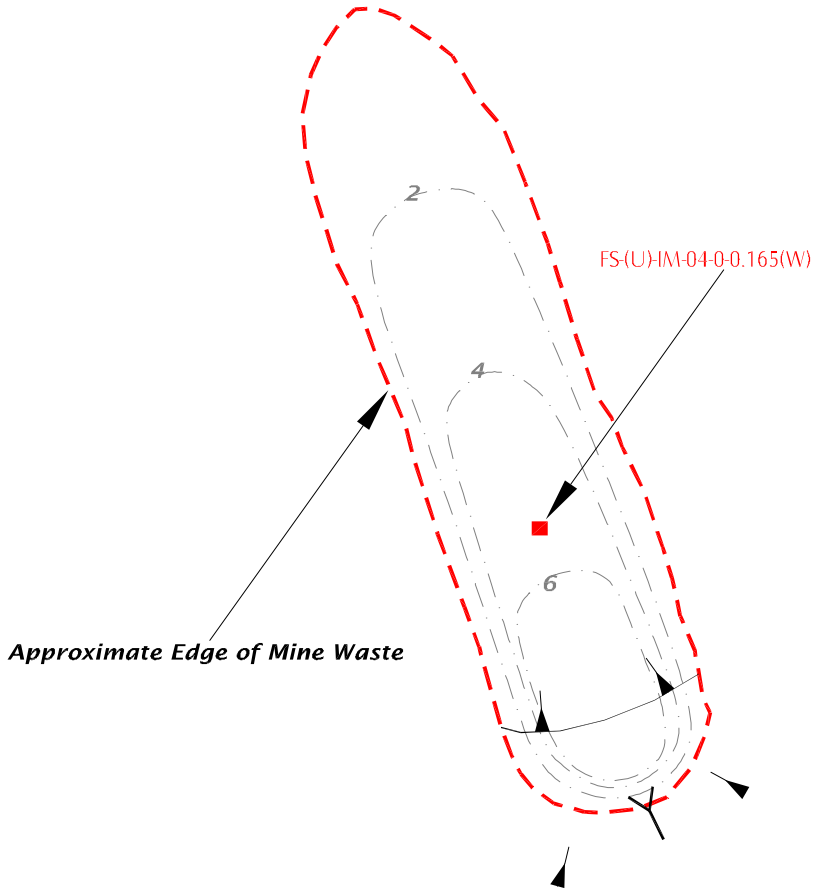

LEGEND

- Hand Sample Site
- Adit
- FS-(U)-IM-04 — Sample Number
- 4 — Estimated Mine Waste Thickness Contour, Feet
- Slope
- Approximate Edge of Mine Waste

N

0 Feet 20

REV	DATE	DESCRIPTION	DRN BY	APP BY

Date: July 2002
Project #: 1570158
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Sheet: 1 of 1

MAXIM TECHNOLOGIES INC

Project Title: Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

Sheet Title:
Site Plan
Ione Mine, (Upper) Upper Workings
FIGURE 12

TABLE 9
IONE MINE SITE SAMPLING SUMMARY
LOWER, MIDDLE, AND UPPER WORKINGS
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

DESCRIPTION						LITHOLOGY	ANALYTICAL TESTING					COMMENTS
Method	Sample Site*	Location	Total Depth[1]	Sample Name	Sample Interval[1]		Total Metals[2]	Total Mercury	Leachable Metals[2]	pH and EC	Acid/Base Accounting[3]	
HS	FS-IM-(L)-01	Approximately 50' upslope of toe of lower dump and approximately 150 feet downslope of ore car tracks	0.165	FS-IM-(L)-01-0-0.165(W)	0-0.165	Slightly tan (at the ground surface) to gray, angular gravel and cobbles. Minor amounts of dark grey sand.	√	√		√	√	Estimated waste rock thickness of 5 feet. Transect on main (eastern) lobe of lower waste dump.
HS	FS-IM-(L)-02	Approximately 50 feet upslope of FS-IM-(L)-01, and 110 feet downslope of ore car tracks	0.165	FS-IM-(L)-02-0-0.165(W)	0-0.165	Slightly tan (at the ground surface) to gray, angular gravel and cobbles. Minor amounts of dark grey sand.	√	√	√	√	√	Test pits greater than 1.25 feet deep will collapse. Estimated thickness of 5 feet.
HS	FS-IM-(L)-03	60 feet downslope of ore car tracks	0.165	FS-IM-(L)-03-0-0.165(W)	0-0.165	Slightly tan (at the ground surface) to gray, angular gravel and cobbles. Minor amounts of dark grey sand.	√	√		√	√	Estimated waste rock thickness of 7 feet.
HS	FS-IM-(L)-04	10 feet below ore car tracks	0.165	FS-IM-(L)-04-0-0.165(W)	0-0.165	Slightly tan (at the ground surface) to gray, angular gravel and cobbles. Minor amounts of dark grey sand.	√	√		√	√	Estimated waste rock thickness of 7 feet.
HS	FS-IM-(L)-04	10 feet below ore car tracks	0.165	FS-IM-(L)-04-0-0.165(W)D	0-0.165	Slightly tan (at the ground surface) to gray, angular gravel and cobbles. Minor amounts of dark grey sand.	√	√	√	√	√	Duplicate of FS-IM-(L)-04.
HS	FS-(L)IM-101(SW)	Collected from 15' below the mouth of lower Ione Mine adit.	NA	FS-(M)BT-102(SW)	NA	NA						
HS	FS-(M)IM-01	50' from toe of waste rock dump.	0.165	FS-(M)IM-01-0-0.165(W)	0-0.165	Gray blocky to very angular cobbles and boulders to gravels w/ gray and brown medium grained sand. Some wood debris and waste metal present in the waste rock dump.	√	√		√	√	Composite along transect of the middle waste rock dump, 50' upslope from the toe, subsamples from 60' left of transect line (looking up-hill), on the center-line, and 80' right of transect. Waste rock thicknesses range from 0' to 20' along this cross sectional profile.
HS	FS-(M)IM-02	100' from toe of waste rock dump.	0.165	FS-(M)IM-02-0-0.165(W)	0-0.165	Gray blocky to very angular cobbles and boulders to gravels w/ gray and brown medium grained sand. Some wood debris and waste metal present in the waste rock dump.	√	√	√	√	√	Composite along transect of the middle waste rock dump, 100' upslope from the toe, subsamples from 60' left of transect line , on the center-line, and 80' right of transect. Waste rock thicknesses range form 4' to 12' along this cross section.
HS	FS-(M)IM-03	150' from toe of waste rock dump.	0.165	FS-(M)IM-03-0-0.165(W)	0-0.165	Gray blocky to very angular cobbles and boulders to gravels w/ gray and brown medium grained sand. Some wood debris and waste metal present in the waste rock dump.	√	√		√	√	Composite along transect of the middle waste rock dump, 150' upslope from the toe, subsamples from 70' left of transect line, on the center-line, and 80' right of transect. Waste rock thicknesses range form 10 to 20' thick along this cross section.
HS	FS-(U)IM-01	50' from toe of waste rock dump.	0.165	FS-(U)IM-01-0-0.165(W)	0-0.165	Blocky very angular boulders, cobbles, and gravelly gray to brown fine to coarse grained sand. Surficial material typically grayer color than underlying fine grained material with is much browner.	√	√		√	√	Composite along transect of the upper mine waste dump, 50' upslope from the toe, subsamples from 10' left of transect line (looking up-hill), on the center-line, and 10' right of transect. Average thickness of waste rock is 5'.
HS	FS-(U)IM-02	100' from toe of waste rock dump.	0.165	FS-(U)IM-02-0-0.165(W)	0-0.165	Blocky very angular boulders, cobbles, and gravelly gray to brown fine to coarse grained sand. Surficial material typically grayer color than underlying fine grained material with is much browner.	√	√	√	√	√	Composite along transect of the upper mine waste dump, 100' upslope from the toe, subsamples from 15' left of transect line, on the center-line, and 20' right of transect. Average thickness of waste rock is 10'.
HS	FS-(U)IM-03	150' from toe of waste rock dump.	0.165	FS-(U)IM-03-0-0.165(W)	0-0.165	Blocky very angular boulders, cobbles, and gravelly gray to brown fine to coarse grained sand. Surficial material typically grayer color than underlying fine grained material with is much browner.	√	√		√	√	Composite along transect of the upper mine waste dump, 150' upslope from the toe, subsamples from 15' left of transect line, on the center-line, and 10' right of transect. Average thickness of waste rock is 15'.
HS	FS-(U)IM-04	(Upper) Upper waste rock dump associated with upper workings. Collected from center of dump.	0.165	FS-(U)IM-04-0-0.165(W)	0-0.165	Blocky very angular boulders, cobbles, and gravelly gray to brown fine to coarse grained sand. Surficial material typically grayer color than underlying fine grained brown material with is much browner.	√	√		√	√	Collected a grab sample from the center of the upper upper waste rock dump of the Ione Mine. Material thickness range from 1' to 10' .

NOTES:

1 = Depth in feet below ground surface.
2 = Arsenic, cadmium, chromium, copper, lead, zinc
3 = Sulfur fractionation, neutralization potential, SMP lime requirement

HS = hand sample
NA = Not applicable

W = Waste Rock
SW = Surface Water
SE = Sediment

Duplicate identified in comments column
NS = Not sampled
N = Native

*(L) = Lower Dump
*(M) = Middle Dump
*(U) = Upper Dump

from the portal mouth. The waste rock dump consists of two lobes of material extending below the adit that combine near the bottom. The dump slopes downhill steeply (40°) and is approximately 200 feet long along its longitudinal access. An overturned ore cart was observed next to heavy gauge rail line that exits the adit portal. Waste rock is composed of tan to gray angular gravel and cobbles with minor amounts of dark gray sand. Thickness of waste rock is estimated to exceed six feet.

The middle workings of the Ione Mine contain an improved, but partially collapsed, dry adit, a heavy gauge rail line that exits the adit portal, an access road to the southeast, a large waste rock pile, and various piles of rail ties, timbers, and debris scattered on the surface (Figure 10). The adit opening is approximately 3 feet square. The waste rock dump consists of three lobes of material extending below the adit that combine downslope. The dump is approximately 150 feet long along its longitudinal access, and 160 feet wide at its widest point. Waste rock is composed of gray angular blocky cobbles and boulders with gray and brown medium grained sand. Thickness of waste rock at the middle workings ranges up to 20 feet along the flat surface in front of the adit.

The upper workings consist of two sub-levels, termed the upper and the (upper) upper. The main upper workings sub-level consists of a dry adit with open portal (5 feet wide by 6 feet high), a pile of rail tracks, and waste rock dump (Figure 11). The waste rock dump is approximately 175 feet long by 30 feet wide. Waste rock is comprised of blocky, very angular boulders, cobbles, and gravelly, gray to brown, fine to coarse grained sand. Surficial dump materials typically exhibit a grayer coloration as compared to the underlying material, which is browner in color. Waste rock thickness on this dump ranges up to 15 feet.

The (upper) upper workings consist of an open adit with and an associated waste rock pile (Figure 12). A metal gear and pulley assemblage are located immediately outside of the portal entrance. A small water filled pit or shaft is located just inside the portal mouth, but no flow emanates from the adit opening. The road/trail to the upper workings has been washed out and access is limited to foot travel. The (upper) upper workings dump measures 80 feet along its longitudinal axis (north-south) by 25 feet at its widest point, and is likely no thicker than six feet at its deepest point. The waste rock material is similar in size, angularity, and composition to the upper workings dump mentioned above.

3.4.2 MINE WASTE ANALYTICAL RESULTS

Twelve composite samples of waste rock were submitted for chemical analyses. Summary statistics for the working levels of the Ione Mine for total metals, leachable metals, and acid base accounting are presented in Tables A13, A14, and A15, respectively. Analytical results for these same parameters for individual samples are presented in Tables B1, B2, and B3. Key findings from chemical testing are discussed below.

Total Metals

Except for one arsenic measurement (Table B1), metals concentrations in samples collected from the lower workings were similar to background soil concentrations shown in Table 2. There were no exceedances of reference cleanup guidelines presented in Table 2 in samples collected from the lower workings.

At the middle and upper workings, lead and zinc concentrations in all samples (Table B1) are greater than three times background concentrations and lead exceeds reference cleanup guidelines for a recreational exposure (Table 2). The highest total copper (169 mg/kg) and lead (104,000 mg/kg) concentrations were measured in a grab sample collected from the (upper) upper workings. Total mercury is elevated above three times background in the two upper workings dumps, although it does not approach the reference cleanup guideline for mercury shown in Table 2.

Leachable Metals

Four composite samples from the Ione waste rock dumps were analyzed for leachable metals. Table A2 presents summary statistics according to sample type and Table B2 presents analytical results for each sample. Leachable cadmium was detected in the samples analyzed from the middle and upper workings at concentrations greater than chronic aquatic life standard. Leachable zinc was detected in samples analyzed from all three dumps, although the low concentrations detected in the lower waste dump samples may be attributed to laboratory blank contamination. It should be noted, that all of the leachable zinc laboratory results for the Ione Mine samples were flagged by the laboratory because zinc was present in the extraction blank or preparation blank at or above reporting limit. Leachable zinc does appear at concentrations that exceed the chronic aquatic life standard in the samples from the middle and upper dump. The highest leachable zinc concentration (3.26 mg/L) was measured in the sample collected from the upper workings. Sample results for all leachable zinc concentrations were less than ten times the blank concentration.

Acid Base Accounting

Acid base accounting results for the twelve waste rock samples collected from the Ione Mine are presented in Table A3 (summary statistics) and Table B3 (individual samples). Average saturated paste pH in samples collected from the four levels is very slightly acid to near neutral. lower workings waste rock samples is slightly acid (6.5 s.u.). Average acid potential 11.5 t/1000t, 26.7 t/1000t, and 36.5 t/1000t, respectively. Mean total lime requirement for the lower, middle, and upper workings is 3.6 t/1000t, 14.0 t/1000t, and 25.1 t/1000t.

3.4.3 ADIT DISCHARGES

Flow from the adit sampled at the lower workings, the only one to be flowing in July 2002, was less than one gallon per minute (Table B5). The sample was analyzed for dissolved and total metals, common ions, and physical parameters. Complete results are listed in Table B6

(Appendix B). The pH of the water was near-neutral, and electrical conductivity and TDS was relatively low, reflecting the generally low concentrations of common ions including calcium, magnesium, sodium, and sulfate. Total and dissolved concentrations of cadmium, copper, lead, and zinc were detected in the sample, with cadmium, lead, and zinc exceeding the chronic aquatic life standards. Total and dissolved zinc and lead also exceeded the acute standards.

3.4.4 Estimated Volume of Mine Waste Material

Areal extent of waste rock was determined using margins of waste observed in the field and are shown on Figures 9 through 12 by a dashed line. Volume estimates for the four waste dumps were calculated from the field topographic profiles of waste rock thickness and are shown in Table 10.

TABLE 10
ESTIMATED VOLUME OF MINE WASTE AT THE IONE MINE
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

Location	Volume (cubic yards)
Lower Workings	2,228
Middle Workings	7,676
Upper Workings	1,368
(Upper) Upper Workings	228
Total	**11,500**

3.5 OROFINO MINE

The Orofino Mine is located adjacent to a north flowing tributary to Bear Gulch, west of the Bear Top/Orofino Millsite. The Orofino Mine site consists of two main working levels (lower and upper), and four waste rock dumps (lower, upper, other upper workings). Investigative work at the Orofino Mine included collecting waste rock samples and surface water samples from two discharging adits. Figures 13, 14, and 15 are site maps of the workings and Table 11 is a summary of samples collected at the waste dumps. Photographs showing representative sampling locations are included in Appendix D.

3.5.1 Waste Distribution, Character, and Thickness

The lower workings consist of an adit with an open portal and flowing water, a large waste rock dump, a collapsed ore bin, and concrete footings from another former structure (Figure 13). The lower workings portal has a fair amount of clear water flowing from it (about 4 gpm) that collects in a sunken concrete cistern in front of the portal. The lower workings waste rock

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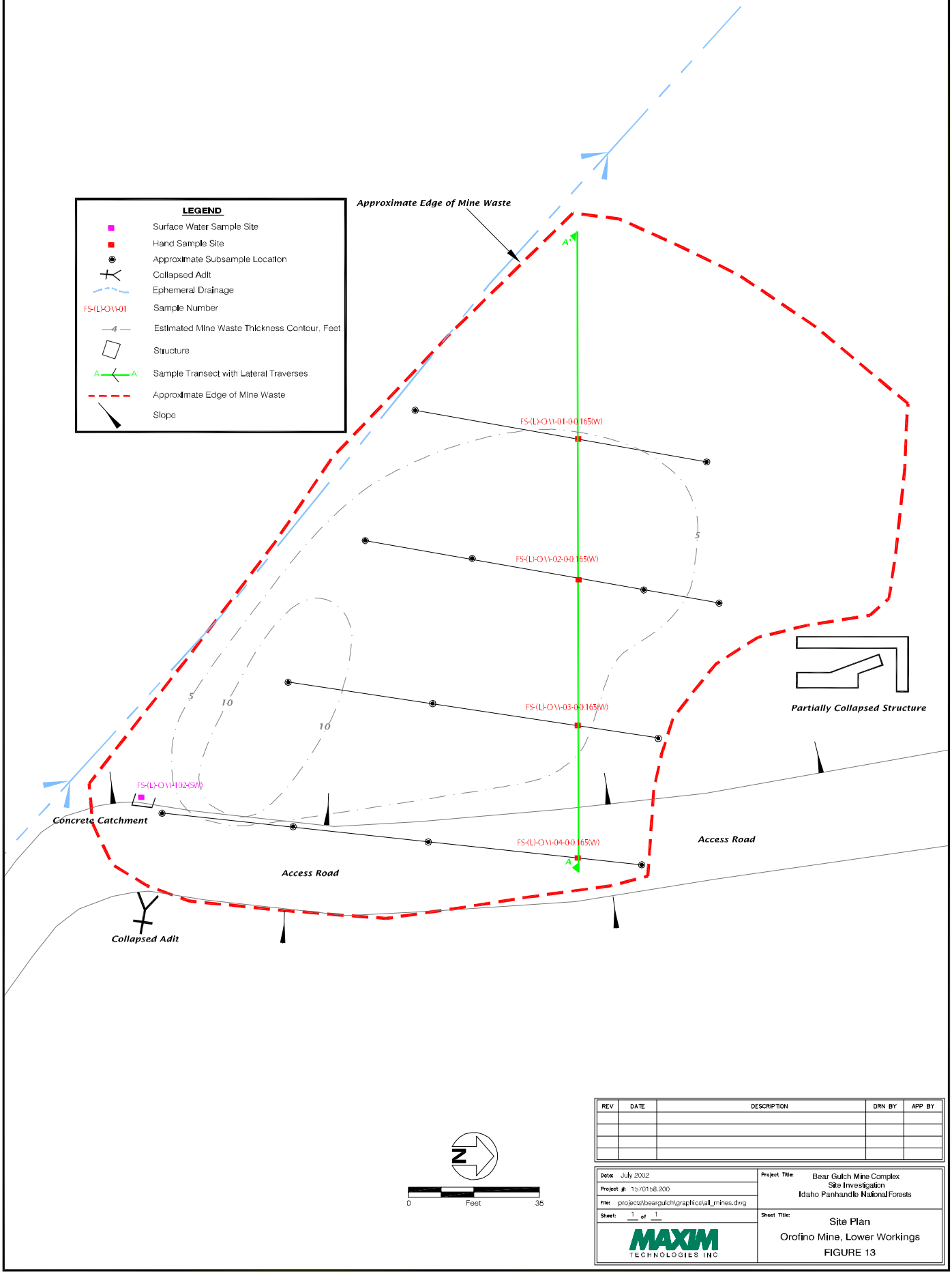

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Project Title: Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

Sheet Title:
Site Plan
Orofino Mine, Lower Workings
FIGURE 13

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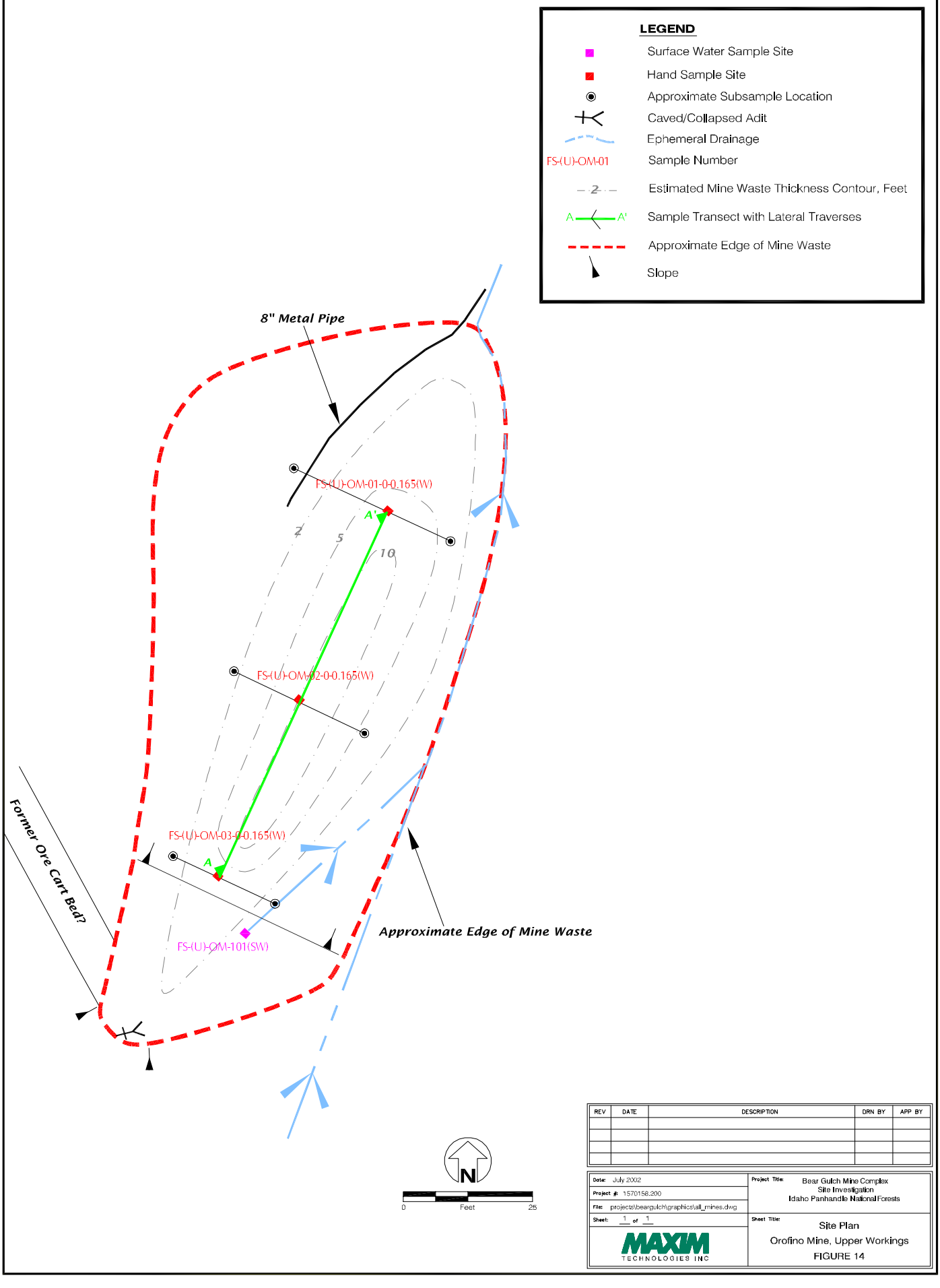

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Project #: 1570158.200
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Sheet: 1 of 1

Project Title: Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

Sheet Title:
Site Plan
Orofino Mine, Upper Workings
FIGURE 14

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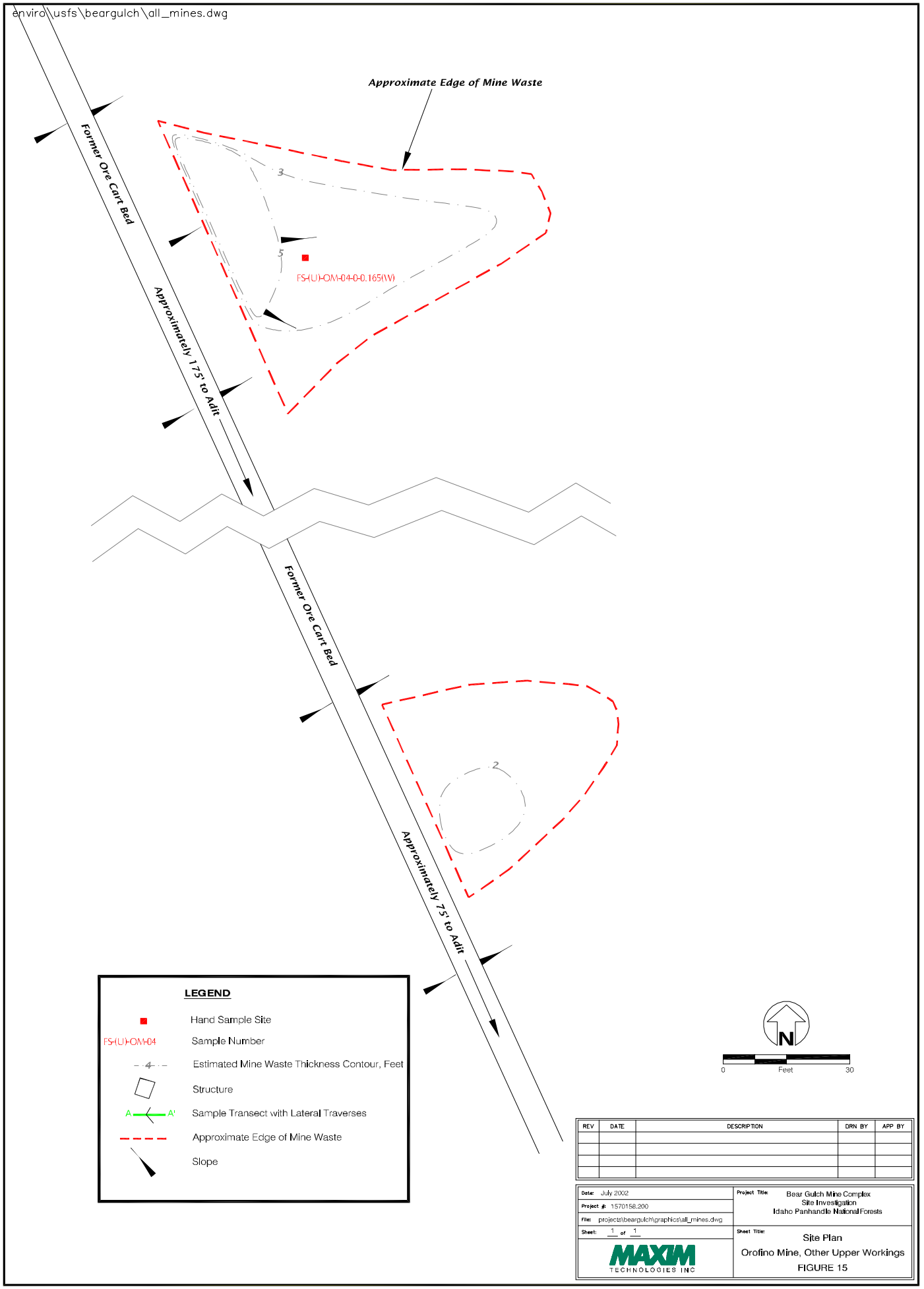
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Approximate Edge of Mine Waste
Former Ore Cart Bed
Approximately 175' to Adit
3
5
FS-(U)-OM-04-0-0.165(W)
Former Ore Cart Bed
2
Approximately 75' to Adit
LEGEND
Hand Sample Site
FS-(U)-OM-04
Sample Number
4
Estimated Mine Waste Thickness Contour, Feet
Structure
A
A'
Sample Transect with Lateral Traverses
Approximate Edge of Mine Waste
Slope
N
0
Feet
30
REV
DATE
DESCRIPTION
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Sheet: 1 of 1
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Project Title: Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests
Sheet Title:
Site Plan
Orofino Mine, Other Upper Workings
FIGURE 15

TABLE 11
OROFINO MINE SITE SAMPLING SUMMARY
LOWER AND UPPER WORKINGS
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

DESCRIPTION						LITHOLOGY	ANALYTICAL TESTING					COMMENTS
Method	Sample Site*	Location	Total Depth[1]	Sample Name	Sample Interval[1]		Total Metals[2]	Total Mercury	Leachable Metals[2]	pH and EC	Acid/Base Accounting[3]	
HS	FS-(L)OM-01	50' from toe of waste rock dump.	0.165	FS-(L)OM-01-0-0.165(W)	0-0.165	Slightly tan (at the ground surface) to gray, angular gravel and cobbles. Minor amounts of dark grey sand.	√	√	√	√	√	Composite along transect of the lower dump, 50' up from the toe, subsamples from 45' left of transect line (looking up-hill), on the center-line, 45' right, and 50' right at edge of ephemeral creek (dry).
HS	FS-(L)OM-02	100' from toe of waste rock dump.	0.165	FS-(L)OIM-02-0-0.165(W)	0-0.165	Slightly tan (at the ground surface) to gray, angular gravel and cobbles. Minor amounts of dark grey sand.	√	√		√	√	Composite 100' up from the toe, subsamples from 65' left, 35' left, center-line, 31' right and 62' right of transect line. Waste rock thickness varies from 3' to 10'. Abundant material (pipes, corrugated roofing material, etc.) present in the ephemeral stream channel.
HS	FS-(L)OM-03	150' from toe of waste rock dump.	0.165	FS-(L)OM-03-0-0.165(W)	0-0.165	Slightly tan (at the ground surface) to gray, angular gravel and cobbles. Minor amounts of dark grey sand.	√	√	√	√	√	Composite 150' upslope from toe of dump, subsamples from 18' left of transect, on the center-line of the transect, 42' right, and 80' right of the transect. Waste rock thickness varies from 4' to 10'.
HS	FS-(L)OM-04	175' from toe of waste rock dump.	0.165	FS-(L)OM-04-0-0.165(W)	0-0.165	Slightly tan (at the ground surface) to gray, angular gravel and cobbles. Minor amounts of dark grey sand.	√	√		√	√	Composite 175' upslope from toe of dump, subsamples from 15' left of transect, on the center-line of the transect, 35' right, 70' right, and 115' right of the transect. Waste rock thickness varies from 1' to 3'.
HS	FS-(L)OM-102	Collected from concrete vault below mouth of lower Orofino Mine adit.	NA	FS-(L)OM-102(SW)	NA	NA						
HS	FS-(U)OM-01	40' from toe of waste rock dump.	0.165	FS-(U)OM-01-0-0.165(W)	0-0.165	Blocky angular argillitic boulders, cobbles, and gravels ranging from gray to orange gray color with brown fine to coarse grained sand.	√	√	√	√	√	Composite along transect of the main upper dump, 40' up from the toe, subsamples from 12' left of transect line (looking up-hill), on the center-line, 22' right, and 45' right at edge of waste. Waste rock varies in thickness from 2' to 5'.
HS	FS-(U)OM-02	80' from toe of waste rock dump.	0.165	FS-(UL)OM-02-0-0.165(W)	0-0.165	Blocky angular argillitic boulders, cobbles, and gravels ranging from gray to orange gray color with brown fine to coarse grained sand.	√	√		√	√	Composite 80' up from the toe, subsamples from 15' left, center-line, and 18' right of transect line. Waste rock thickness varies from 2' to 10'. Flowing stream channel present at edge of waste rock pile approximately 25' left of centerline.
HS	FS-(U)OM-03	120' from toe of waste rock dump.	0.165	FS-(UL)OM-03-0-0.165(W)	0-0.165	Blocky angular argillitic boulders, cobbles, and gravels ranging from gray to orange gray color with brown fine to coarse grained sand.	√	√		√	√	Composite 120' up from the toe, subsamples from 8' left, center-line, and 12' right of transect line. Waste rock thickness varies from 1' to 2'. Stream on left side of waste rock pile (east) daylight approximately 28' below the mouth of the adit at an estimated 3 to 4 gpm.
HS	FS-(U)OM-04	Western-most waste rock dump associated with the upper adit. Collected from upper 1/3 of dump.	0.165	FS-(U)OM-04-0-0.165(W)	0-0.165	Blocky angular argillitic cobbles, and gravels ranging from gray to orange gray color with brown fine to coarse grained sand. Occassional galena and quartz crystals present on dump surface.	√	√	√	√	√	Grab sample from the western-most waste rock dump of the upper Orofino Mine. This waste rock pile varies in thickness from 3' to 5'. The middle waste rock pile of the upper Orofino appeared to be similiar to this pile, however samples were not collected.
HS	FS-(U)OM-04	Western-most waste rock dump associated with the upper adit. Collected from upper 1/3 of dump.	0.165	FS-(U)OM-04-0-0.165(W)(D)	0-0.165	Blocky angular argillitic cobbles, and gravels ranging from gray to orange gray color with brown fine to coarse grained sand. Occassional galena and quartz crystals present on dump surface.	√	√	√	√	√	Duplicate Sample
HS	FS-(U)OM-101	Collected from 2" pipe at foot of upper Orofino Mine adit.	NA	FS-(U)OM-101(SW)	NA	NA						

Notes:

1 = Depth in feet below ground surface.

2 = Arsenic, cadmium, chromium, copper, lead, zinc

3 = Sulfur fractionation, neutralization potential, SMP lime requirement

Duplicate identified in comments column

NS = Not sampled

N = Native

HS = hand sample

W = Waste Rock

SW = Surface Water

NA = Not applicable

*(L) = Lower Dump

*(U) = Upper Dump

dump slopes steeply down hill and measures 210 feet down its longitudinal axis by 125 feet wide. Waste rock is estimated to range up to 10 feet in thickness. Waste rock is comprised of tan to gray, angular gravel and cobbles with minor amounts of dark gray sand.

The main upper workings level is located approximately 200 feet up-slope from the lower workings in the next tributary canyon to the west (Figure 2a). An 8-inch diameter pipe slopes down the face of the dump to the lower workings. Less than one gpm of water flows from this open adit. The main upper workings dump measures 150 feet along its longitudinal axis and is approximately 40 feet wide.

Waste rock dump material in the main upper working is comprised of tan to gray, angular gravel and cobbles with minor amounts of dark gray sand. The thickness of waste rock in this dump ranges up to ten feet.

Two other small waste rock dumps were discovered during the July 2002 field event and are shown on Figure 15. The dumps are located approximately 75 and 175 feet west and above the main upper working dump. These two upper workings dumps measure 50 to 75 feet down their longitudinal axis and are approximately 30 feet wide. Dump thickness is estimated to be no greater than five feet. Both waste rock piles appear to be homogenized mixture of blocky angular argillic boulders, cobbles, and gravels ranging from gray to orange-gray in color with minor amounts of brown, fine to coarse grained sand.

3.5.2 MINE WASTE ANALYTICAL RESULTS

Seven composite waste rock samples, a grab sample, and its duplicate were submitted for chemical analyses. Summary statistics for total metals, leachable metals, and acid base accounting are presented in Tables A16, A17, and A18, respectively. Analytical results for these same parameters for individual samples are presented in Tables B1, B2, and B3. Key findings from chemical testing are discussed below.

Total Metals

Contaminants of concern at the Orofino Mine include cadmium, copper, lead, mercury, and zinc, as these metals were detected in some or all samples greater than the background concentrations for soil shown in Table 2. Total lead concentrations exceeded both referenced cleanup guidelines presented in Table 2 in all but one of the samples. The highest total lead concentration (74,700 mg/kg) was collected from the surface of the western-most small dump above the main upper workings (Figure 15). No other total metals reference cleanup guidelines were exceeded.

Total metals concentrations were considerably higher in the upper workings than in the lower workings. Total mercury was only detected above the PQL at the upper workings.

Leachable Metals

Six samples from the Orofino Mine site were analyzed for leachable metals. Table A2 presents summary statistics according to sample type and Table B2 presents analytical results for each sample. Leachable zinc was the only metal detected above the PQL in the lower workings (Table B2) although this result is qualified due to laboratory blank contamination. Leachable cadmium, copper, lead, mercury, and zinc were detected in the samples from the upper workings. Idaho's chronic aquatic life standards were exceeded for each of these metals in the upper workings. The highest leachable cadmium, copper, lead, and zinc concentrations (0.034 mg/L, 0.43 mg/L, 21.6 mg/L, and 12.2 mg/L respectively) were measured in the sample collected from the other upper workings waste rock dump (Figure 15). The single detection of leachable mercury above method PQLs was also collected from this sample location.

Acid Base Accounting

Acid base accounting results for the waste rock samples collected from the Orofino Mine are presented in Table A3 (summary statistics) and Table B3 (individual samples). The average saturated paste pH in lower workings waste rock samples is 6.8 s.u. The average acid potential is 16.8 t/1000t, and the mean total lime requirement is 12.5 t/1000t. The average saturated paste pH in upper workings (including the other upper workings waste rock dumps) is 6.5 s.u. The average acid potential is 69.2 t/1000t, and the mean total lime requirement is 69.9 t/1000t.

3.5.3 ADIT DISCHARGES

Surface water samples were collected in July 2002 from the two adits present at the Orofino Mine. As discussed above, flow from the lower adit was estimated to be about 4 gpm, and less than one gpm was measured in the upper workings adit. Samples were analyzed for dissolved and total metals, common ions, and physical parameters. Complete results are listed in Table B6 (Appendix B).

The pH of the water in both samples was near-neutral, and electrical conductivity and TDS was relatively low, reflecting the generally low concentrations of common ions in the samples. Total and dissolved concentrations of cadmium, copper, lead, manganese, and zinc were detected in the samples, with cadmium, lead, and zinc exceeding the acute and chronic aquatic life standards. Of the five adit water samples collected during the Bear Gulch Mine Complex investigation, the two adit discharges at the Orofino Mine exhibited the highest concentrations of total and dissolved zinc by nearly an order of magnitude. Concentrations of metals were similar in both samples, although the sample from the lower workings site exhibited higher concentrations.

3.5.4 ESTIMATED VOLUME OF MINE WASTE MATERIAL

Areal extent of waste rock was determined using edges of waste observed in the field and are shown on Figures 13, 14, and 15 by a dashed line. Volume estimates for the four waste dumps

were calculated from the field topographic profiles of waste rock thickness and are shown in Table 12.

TABLE 12
ESTIMATED VOLUME OF MINE WASTE AT THE OROFINO MINE
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

Location	Volume (cubic yards)
Lower Workings	4,225
Upper Workings	703
Other Upper Workings	119 + 372
Total	**5,419**

4.0 ANALYTICAL DATA QA/QC ASSESSMENT

This section presents an assessment of quality control/quality assurance (QA/QC) associated with the analytical data collected during the site investigation and characterization of the five sites in the Bear Gulch drainage. These data were collected to help fulfill the project's decision statement, which was to determine the quantity and characteristics of mine waste present at the five sites to support potential cleanup actions (Maxim, 2001). Data quality objectives for the project were developed to provide a systematic planning effort to establish data quality criteria and for data collection activities. Data quality objectives were:

- Determine chemical characteristics of mine wastes.
- Collect data that reflect the average current condition of the sites.
- Use mean concentrations of metals in mine waste materials to access risks presented to human health and the environment.
- Minimize decision error by obtaining a relatively large number of mine waste samples that represent the range of concentrations present in the mine wastes.
- Apply a stratified biased sampling method that partitions wastes into three strata (waste rock, mill tailings, and native soil).

During this investigation, 54 material samples (waste rock, mill tailings, sediment, and native soil), and seven water samples were collected and analyzed. Samples were collected and submitted for analysis in the following periods:

- Twenty-seven soil samples were collected from November 13 to 15, 2001 and sent to the laboratory on November 21, 2001.
- Two water samples collected on November 15, 2001 were sent to the laboratory on November 21, 2001.
- Twenty-seven soil samples were collected from July 8 to 10, 2002 and sent to the laboratory on July 16, 2002.
- Five water samples collected on July 11 and 12, 2002 were sent to the laboratory on July 16, 2002.

4.1 SAMPLING AND ANALYTICAL SUMMARY

This subsection describes the sample set, lists analytical methods, and presents the eight sample digestion groups (SDGs) generated during the project.

4.1.1 SAMPLE SET

A total of 54 soil samples were sent to the laboratory for analysis. Of the total, 52 were natural samples and two were field duplicates. A total of seven water samples were sent to the laboratory for analysis. Northern Analytical Laboratories, Inc. (NAL) of Billings, Montana completed soil and water analyses. Analytical data from NAL were electronically transferred into a Microsoft Access database. Appendix N contains analytical laboratory reports for the samples.

4.1.2 ANALYTICAL METHODS

Tests were conducted by NAL in accordance with several method references including: SW-846 Test Methods for Evaluating Solid Waste, 3rd Edition, updates, I, II, IIA, IIB, III; Western States Laboratory Proficiency Testing Program, Soil & Plant Analytical Methods; EPA/540/R95/121 USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multimedia, Multiconcentration, ILM04.0, and Field and Laboratory Methods Applicable to Overburdens and Mine Soils by A. Sobek et al. Soil samples were analyzed for aluminum, antimony, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver and zinc. In addition, pH, sulfur fractions, neutralization potential, SMP, and acid/base accounting were analyzed by the laboratory.

4.1.3 SAMPLE DIGESTION GROUPS

Samples were sent to the laboratories in eight SDGs. Table 13 lists key information for each SDG.

TABLE 13
SUMMARY OF SAMPLE DIGESTION GROUPS
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

SDG	Year	Lab	Parameters	No. of Samples	Field Duplicate
2001110187	2001	NAL	Metals, pH/EH, S-Fract., N-Poten., SMP, Acid/Base	2	
2001110188	2001	NAL	Metals, pH/EH, S-Fract., N-Poten., SMP, Acid/Base	1	
2001110189	2001	NAL	Metals, pH/EH, S-Fract., N-Poten., SMP, Acid/Base	5	FS-IM(L)-04-0-0.165(W)
2001110190	2001	NAL	Metals, pH/EH, S-Fract., N-Poten., SMP, Acid/Base	5	
2001110191	2001	NAL	Metals, pH/EH, S-Fract., N-Poten., SMP, Acid/Base	4	
2001110192	2001	NAL	Metals, pH/EH, S-Fract., N-Poten., SMP, Acid/Base	10	
2001110187	2001	NAL	Metals (total and dissolved), pH/EH, Common Ions, TDS, acidity, alkalinity	2	
2002070160	2002	NAL	Metals (total and dissolved), pH/EH, Common Ions, TDS, acidity, alkalinity	5	
2002070204	2002	NAL	Metals, pH/EH, S-Fract., N-Poten., SMP, Acid/Base	27	FS-(U)OM-04-0-0.165(W)
Totals				**61**	**2**

4.2 DATA VALIDATION

Results of Maxim's data validation are presented below. A review of both laboratory QA/QC and field quality control are discussed.

4.2.1 LABORATORY QA/QC

NAL received soil samples from Bear Gulch project on November 21, 2001, and July 16, 2002. Chain of custody documents accompanied the samples from sample collection to receipt at the laboratory. Water samples were received at the laboratory cool (1.3 ºC). All samples were received within holding time.

NAL's quality assurance coordinator reviewed all analytical data associated with these samples. This review included calibration standards, calibration verification, laboratory controls, laboratory duplicates, and laboratory spikes on a daily basis. Review of these quality indicators showed that all analyses were in compliance with NAL's published QA/QC criteria.

Certain data were qualified by NAL. Table 14 lists the flags (qualifiers) assigned by NAL to describe the circumstances of the test or to qualify the usability of the data. Cover sheets for each SDG (Appendix N) contain details for specific samples.

TABLE 14
LABORATORY RESULT AND DATA QUALIFIERS
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

Flag	Description
B	This analyte contained in the preparation blank at or above the reporting limit
U	Not detected at the concentration reported (NAL)
<	Not detected at the concentration reported
(1)	Insufficient sample was available to perform the test
M	Matrix effects are present. The matrix spike recovery was not within control limits
J	Estimated concentration - the duplication was not within 20 percent RPD
NA	Not analyzed or applicable
B	This analyte was found in the SPLP extraction blank

4.2.2 DATA ASSESSMENT

Portions of the soil samples were dried in an oven at less than 60º C. Subsamples of this material were ground to -10 mesh and were used to prepare saturated pastes. The pH of the pastes was measured and the pastes vacuum filtered to obtain the saturation liquid. The electrical conductivity of the saturation liquid was measured and reported. Additional subsamples of the -10 mesh material were used to measure pH in the SMP buffer solution.

Acid potential, neutralization potential, metals, and extractable and total sulfur were determined on subsamples of the -10 mesh material, which were reduced in particle size with a mortar and pestle to -60 mesh. Samples for metals analysis were digested in accordance with EPA Method 3050B and analyzed using EPA Method 6010B (inductively coupled plasma emission) for all metals except mercury and selenium. Selenium analysis was performed using EPA Method 7762, hydride generation. Mercury determinations were performed in accordance with EPA Method 245.5CLP-M. Three mercury measurements were made for each sample and the average of the three determinations was reported. Determination of the various forms of sulfur was performed using a LECO sulfur analyzer. The extractable sulfur data is Level II, screening data only. The results of these tests, along with the SMP buffer pH, were used to calculate the lime requirement.

Portions of the samples were not dried but were reduced in particle size (if necessary) in accordance with EPA Method 1312, the SPLP. The extractions were performed using Extraction Fluid 2 for projects located west of the Mississippi River. The extracts were digested using EPA Methods 3010A and 3020 and analyzed using EPA Method 6010B and EPA Method 6020

(inductively coupled plasma with mass spectral detection). Mercury determinations were made using EPA Method 7470A.

Holding Times

Mercury dry basis in SDG 2001110191 samples 1-4 exceeded the holding time and were flagged as estimated. Holding time summaries are shown in Appendix M.

Calibration

NAL and analytical method calibration criteria were met for all data. Appendix F contains calibration verification data.

Laboratory Blanks

Laboratory blank results were assessed to determine the existence and magnitude of contamination. Arsenic was found in the dry basis blank in SDG 2001110189; zinc was found in the SPLP extraction blanks in SDG 2001110187, 2001110189, 2001110190, 2001110191 and 2002070204. These were flagged as B. Laboratory blank data are presented in Appendix G.

Inductively Coupled Plasma Interference Check Sample

The inductively coupled plasma interference check sample (ICP ICS) consists of two solutions (solution A and solution B) that are analyzed to verify inter-element and background correction factors. The ICP ICS did not exceed the RPD of 20 percent for any analysis. Appendix H contains ICP ICS data.

Inductively Coupled Plasma Serial Dilution

The ICP serial dilution monitors physical or chemical interferences due to the sample matrix. Zinc dry basis in SDG 2001110190 and copper dry basis and lead dry basis in SDG 2001110192 exhibited interference due to the sample matrix and were flagged as estimated quantities. ICP serial dilution data are presented in Appendix I.

Laboratory Control Sample

The laboratory control sample (LCS) monitors the overall performance of the analysis, including sample preparations. All LCS results were within established control limits. Appendix J contains LCS data.

Laboratory Duplicate Sample

Duplicate sample results are a measure of laboratory precision. A sample is considered estimated if the RPD is in excess of 20 percent. Arsenic dry basis and copper dry basis in SDG

2001110189 and cadmium dry basis and SPLP zinc in SGD 2001110192 exhibited an RPD greater than 20 percent and were flagged J. Appendix K presents LDS data.

Matrix Spike Sample

The matrix spike sample results are used to assess the effect of the matrix on the accuracy of the reported data. The following elements/parameters in several samples exceeded the matrix spike recovery control limits:

- Arsenic dry basis, chromium dry basis and copper dry basis in SGD 2002070204 had matrix effects present and the results were not within control limits. Results for these analytes in these SDGs were flagged with a "M" indicating they were qualified due to a peculiarity with the sample matrix. However, NAL's data validator did not believe there was any doubt as to precision or accuracy. Appendix L presents matrix spike data.

4.2.3 FIELD QUALITY CONTROL

Field duplicate samples were collected at sites FS-IM(L)-04-0-0.165(W) and FS-(U)OM-04-0-0.165(W). Duplicate samples were analyzed for aluminum, antimony, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, and zinc, pH, sulfur fractions, neutralization potential, SMP, and acid/base accounting. Analytical results for the original and field duplicate samples were evaluated using the following criteria:

- The RPD between the two samples was calculated when both values of the natural/duplicate pair were greater than 5 times the laboratory PQL for a given analyte,

- The absolute value difference (AVD) between the natural and duplicate sample for a given analyte was calculated when one or both values were less than five times the PQL.

RPDs are calculated by dividing the difference between the two reported values for a given parameter by the average of the two parameters. Analytical results of parameters where the RPD was greater than 35 percent are considered estimated concentrations. Results from natural/duplicate pairs with values less than five times the PQL are considered estimated when the AVD exceeds the PQL.

Table 15 presents the natural/duplicate sample pairs that failed either the RPD and/or the AVD tests. The following summarizes these failures:

- Neutralization potential in SDG 200110189 and cadmium as Cd, copper dry basis, electrical conductivity, lead as Pb, neutralization potential, sulfur residual, and zinc as Zn in SDG 2002070204 failed the RPD test and all associated natural samples were flagged as estimated (JF%).

- Copper as Cu in SDG 2002070204 failed the AVD test, and all associated natural samples were flagged as estimated (JF).

TABLE 15
FIELD DUPLICATE RPD and AVD EXCEEDENCES
Bear Gulch Mine Complex Site Investigation
Idaho Panhandle National Forests

SDG	Sample ID	Parameter	N Value	D Value	RPD		Qualifier
2001110189	FS-IM-(L)-04-0-0-0.165(W)	Neutralization Potential	9	15	50%		JF%
2002070204	FS-(U)-OM-04-0-0.165(W)	Cadmium as Cd	0.018	0.034	61%		JF%
		Copper Dry Basis	1530	907	51%		JF%
		Electrical Conductivity	0.42	0.84	66%		JF%
		Lead as Pb	21.6	3.79	140%		JF%
		Neutralization Potential	7	19	92%		JF%
		Sulfur Residual	1.3	0.9	36%		JF%
		Zinc as Zn	7.96	12.2	42%		JF%
SDG	**Sample ID**	**Parameter**	**N Value**	**D Value**	**AVD**	**PQL**	**Qualifier**
2002070204	FS-(U)-OM-04-0-0.165(W)	Copper as Cu	0.43	0.06	0.37	0.02	JF

Notes:
N value = Natural sample value
D value = Duplicate sample value
RPD = Relative percent difference
AVD = Absolute value difference
PQL = Laboratory practical quantitation limit
JF% = Estimated value, field duplicate results exceed allowable limits – RPD determination
JF = Estimated value, field duplicate results exceed acceptable limits – PQL determination

4.3 PARCC STATEMENT

Data collected during the Bear Gulch investigation generally met project data quality objectives presented at the beginning of Section 4.0 and in the QAPP (Maxim, 2001). An assessment of the precision, accuracy, representativeness, completeness, and comparability (PARCC) of the data follows:

- *Precision:* Precision acceptance and rejection for this project was based on the RPD of laboratory duplicates for metals analysis (Maxim, 2001). Of the metals analyzed, arsenic dry basis and copper dry basis in SDG 2001110189, and cadmium dry basis and zinc dry basis in SDG 2001110192 had to be qualified (Appendix K). However, the result of a pooled standard deviation of RPDs was within the acceptable range of 35%. Therefore, the precision objective was met.

- *Accuracy:* Accuracy acceptance or rejection was primarily based on the percent recovery of the laboratory control sample for solid samples (Maxim, 2001). Because all laboratory control samples were within control limits (Appendix L), the data are considered accurate with one exception. One matrix sample in SDG 2002070204 was flagged with an "M" because matrix effects were present and the analytical results were not within control limits (Section 4.2.2 and Appendix L). However, the sample result was more than four times the amount of spike added. Corrective action was not required and the natural sample was not flagged. Therefore, based on the goal of characterizing mine wastes using these data, the interpretations made as a result of the investigation should not be affected.

- *Representativeness:* Our objective in addressing representativeness was to assess whether information obtained during the investigation accurately represents site conditions. We believe this data quality objective was met because a relatively large number of samples were collected and analyzed (54 soil samples) to represent the range of concentrations present at the sites, the majority of unique/discrete mine waste areas at each of the five sites were sampled, and samples of waste rock, tailings, and native materials were collected when present at the sites.

- *Completeness:* The completeness goal for the project was 90 percent. Completeness was assessed by comparing both the number samples collected to that proposed in the SAP (Maxim, 2001) and the number of valid sample results to the total number of samples collected. At five of the sites, Maxim collected and analyzed the same or more than the number of samples for total metals and acid/base account listed in the SAP. For leachable metals analyses, the number of samples collected equaled the number proposed in the SAP (Maxim, 2001). Based on site conditions and field observations, fewer samples than originally proposed were collected from the adit discharges, but the reason for this was the adits were either dry or not flowing. Based on the foregoing, the completeness objective was met.

- *Comparability:* The objective for comparability was to assess if data collected during the Bear Gulch Mine Complex investigation could be compare to another set of data. We believe this objective was fulfilled because standard EPA methods were used, industry standard data units/values were used, and standard field collection methods were used.

5.0 REFERENCES

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Appendix A

Tables - Chemical and Physical Data

Summary Statistics

TABLE A1

Mean Total Metals Results

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Arsenic Dry Basis (mg/kg)	Cadmium Dry Basis (mg/kg)	Chromium Dry Basis (mg/kg)	Copper Dry Basis (mg/kg)	Lead Dry Basis (mg/kg)	Mercury Dry Basis (mg/kg)	Zinc Dry Basis (mg/kg)
Lower Bear Top Mine							
W (n = 4)	11.0	2.3	9.3	40.0	7,435.8	0.1	817.8
Middle Bear Top Mine							
W (n = 4)	10.0	36.0	4.4	110.5	24,120.0	0.7	14,047.8
Upper Bear Top Mine							
W (n = 4)	11.3	44.0	8.3	122.8	34,160.0	0.6	14,140.0
Lower Ione Mine							
W (n = 4)	56.5	1.0	13.0	38.5	69.8	0.1	96.0
Middle Ione Mine							
W (n = 3)	12.0	23.3	2.5	31.3	13,980.0	0.2	8,876.7
Upper Ione Mine							
W (n = 4)	17.8	56.3	2.5	80.3	33,042.5	0.8	17,717.5
Mill Site							
W (n = 4)	9.3	36.8	8.8	92.5	5,567.5	0.4	9,695.0
T (n = 3)	12.0	90.7	4.7	463.3	48,253.3	1.1	25,133.3
SE (n = 2)	3.0	2.0	11.5	22.0	296.0	0.1	336.0
N (n = 3)	8.0	12.3	7.7	80.0	3,843.3	0.2	2,173.3
Lower Orofino Mine							
W (n = 4)	12.5	8.0	2.5	262.5	17,650.0	0.1	6,130.0
Upper Orofino Mine							
W (n = 4)	23.5	53.0	2.5	837.5	61,875.0	1.4	33,350.0
Lower Silver Scott Mine							
W (n = 5)	11.0	41.6	3.2	89.8	3,566.0	0.1	4,114.0
Upper Silver Scott Mine							
W (n = 4)	16.5	4.3	2.5	40.0	10,135.0	0.3	727.5

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

D - Duplicate sample

mg/kg - Milligrams per kilogram

Where n = 1, concentration reported for the sample collected

Average values calculated using < pql values as one half pql

TABLE A2

Mean Leachable Metals Results

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Arsenic SPLP (mg/L)	Cadmium SPLP (mg/L)	Chromium SPLP (mg/L)	Copper SPLP (mg/L)	Lead SPLP (mg/L)	Mercury SPLP (mg/L)	Zinc SPLP (mg/L)
Chronic Aquatic Life Standard	**0.19**	**0.00037 [1]**	**0.057 [1,2]**	**0.0035 [1]**	**0.00054 [1]**	**0.000012 [1]**	**0.032 [1]**
Lower Bear Top Mine							
W (n = 4)	0.003	0.005	0.010	0.015	0.183	0.0002	1.863
Middle Bear Top Mine							
W (n = 3)	0.003	0.021	0.010	0.117	3.517	0.0003	8.933
Upper Bear Top Mine							
W (n = 2)	0.003	0.018	0.010	0.010	10.085	0.0003	4.220
Lower Ione Mine							
W (n = 1)	0.003	0.003	0.010	0.010	0.025	0.0001	0.150
Middle Ione Mine							
W (n = 1)	0.003	0.034	0.010	0.010	0.025	0.0003	1.780
Upper Ione Mine							
W (n = 1)	0.003	0.028	0.010	0.010	0.025	0.0003	3.260
Mill Site							
W (n = 2)	0.003	0.041	0.010	0.040	3.460	0.0001	6.700
T (n = 3)	0.003	0.032	0.010	0.060	8.183	0.0001	9.610
SE (n = 2)	0.003	0.003	0.010	0.010	0.063	0.0001	0.390
N (n = 0)							
Lower Orofino Mine							
W (n = 2)	0.003	0.003	0.010	0.010	0.025	0.0003	1.370
Upper Orofino Mine							
W (n = 3)	0.003	0.021	0.010	0.150	12.040	0.0003	7.397
Lower Silver Scott Mine							
W (n = 3)	0.003	0.009	0.010	0.010	0.093	0.0001	0.457
Upper Silver Scott Mine							
W (n = 2)	0.003	0.006	0.010	0.020	6.010	0.0001	6.245

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

Chronic Aquatic Life Standard from Idaho Administrative Procedures Act (IDAPA) 16.01.02.250 (Surface water quality criteria)

1 - Based on hardness of 25 mg/L $CaCO_3$ - see IDAPA 58.01.02.210.07
2 - Standard posted for Chromium III. Standard for Chromium VI is 0.011.

mg/L - Milligrams per liter

Where n = 1, concentration reported for the sample collected

Average values calculated using < pql values as 1/2 pql

TABLE A3

Mean Acid Base Accounting

Bear Gulch Mine Complex

Site Investigation

IPNF

Site		Acid Potential (tons/1000 tons)	Acid/ Base Potential (tons/1000 tons)	Neutral-ization Potential (tons/1000 tons)	EC, Saturated Paste (mmhos/ cm)	pH, Saturated Paste (s.u.)	pH SMP Buffer (s.u.)	SMP Lime Requirement (tons/1000 tons)	Sulphur (%)					Total Lime Requirement (tons/1000 tons)
									HCL	HNO_3	Residual	Water Extractable	Total	
Lower Bear Top Mine														
W	(n = 4)	6.750	1.000	8.750	0.900	7.275	7.375	0.000	0.063	0.1000	0.213	0.100	0.241	2.490
Middle Bear Top Mine														
W	(n = 4)	27.500	0.000	9.750	0.908	6.875	7.275	0.250	0.088	0.1750	0.700	0.100	0.890	25.967
Upper Bear Top Mine														
W	(n = 4)	30.500	0.000	7.875	0.470	6.300	6.925	2.225	0.125	0.1000	0.900	0.100	0.970	36.239
Lower Ione Mine														
W	(n = 4)	11.500	3.000	12.000	1.698	6.475	7.325	0.000	0.063	0.1000	0.300	0.100	0.353	3.555
Middle Ione Mine														
W	(n = 3)	26.667	0.000	20.000	1.157	6.667	7.133	1.767	0.083	0.1000	0.767	0.100	0.853	13.993
Upper Ione Mine														
W	(n = 4)	36.500	0.000	19.750	0.895	6.725	7.425	0.000	0.063	0.2000	1.000	0.100	1.125	25.118
Mill Site														
W	(n = 4)	13.750	2.500	4.000	0.598	6.775	7.250	0.000	0.063	0.1500	0.375	0.100	0.438	15.020
T	(n = 3)	70.000	50.000	20.000	1.143	6.633	7.400	0.000	0.300	0.6333	1.433	0.133	2.147	65.496
SE	(n = 2)	0.000	5.500	5.500	1.215	6.750	7.250	0.000	0.050	0.1000	0.050	0.100	0.043	-4.727
N	(n = 3)	7.333	6.000	4.000	0.583	6.500	6.767	1.633	0.050	0.1000	0.250	0.100	0.235	11.365

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/L - Milligrams per liter

Where n = 1, concentration reported for the sample collected

Average values calculated using < pql values as 1/2 pql

mmhos/cm - millimhos per centimeter
s.u. - standard units
EC - Electrical Conductivity
SMP - Shoemacher, McLean and Pratt single buffer method.

HCL - hydrochloric acid
HNO3 - nitric acid.

Total lime requirement calculated according to the following formula: (((HNO3 + Residual) x 31.25) + (HCL x 23.44) + SMP Lime Requirement - Neutralization Potential) x 1.25

TABLE A3

Mean Acid Base Accounting

Bear Gulch Mine Complex

Site Investigation

IPNF

Site	Acid Potential (tons/1000 tons)	Acid/ Base Potential (tons/1000 tons)	Neutral-ization Potential (tons/1000 tons)	EC, Saturated Paste (mmhos/ cm)	pH, Saturated Paste (s.u.)	pH SMP Buffer (s.u.)	SMP Lime Requirement (tons/1000 tons)	Sulphur (%)					Total Lime Requirement (tons/1000 tons)
								HCL	HNO_3	Residual	Water Extractable	Total	
Lower Orofino Mine													
W (n = 4)	16.750	0.000	8.750	0.683	6.850	7.375	0.000	0.075	0.1000	0.425	0.100	0.565	12.500
Upper Orofino Mine													
W (n = 4)	69.250	0.000	14.750	0.830	6.525	7.500	0.000	0.125	0.2500	1.900	0.100	2.153	69.942
Lower Silver Scott Mine													
W (n = 5)	57.400	20.600	37.200	1.280	7.140	7.460	0.000	0.080	0.6200	1.180	0.120	1.800	27.329
Upper Silver Scott Mine													
W (n = 4)	25.500	24.500	1.250	1.500	4.800	6.350	4.225	0.250	0.1000	0.625	0.100	0.800	39.052

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/L - Milligrams per liter

Where n = 1, concentration reported for the sample collected

Average values calculated using < pql values as 1/2 pql

mmhos/cm - millimhos per centimeter
s.u. - standard units
EC - Electrical Conductivity
SMP - Shoemacher, McLean and Pratt single buffer method.

HCL - hydrochloric acid
HNO3 - nitric acid.

Total lime requirement calculated according to the following formula: (((HNO3 + Residual) x 31.25) + (HCL x 23.44) + SMP Lime Requirement - Neutralization Potential) x 1.25

TABLE A4

Summary Statistics - Total Metals Concentrations for Bear Top/Orofino Mill Site

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Arsenic Dry Basis (mg/kg)	Cadmium Dry Basis (mg/kg)	Chromium Dry Basis (mg/kg)	Copper Dry Basis (mg/kg)	Lead Dry Basis (mg/kg)	Mercury Dry Basis (mg/kg)	Zinc Dry Basis (mg/kg)
W							
Minimum	7.00	2.00	7.00	20.00	410.00	0.10	500.00
Maximum	15.00	135.00	11.00	210.00	13,500.00	1.10	35,500.00
Average	9.25	36.75	8.75	92.50	5,567.50	0.40	9,695.00
Standard Deviation	3.86	65.54	1.71	88.08	6,332.78	0.48	17,217.40
n	4	4	4	4	4	4	4
T							
Minimum	9.00	36.00	2.50	370.00	5,760.00	0.80	8,500.00
Maximum	14.00	188.00	9.00	520.00	116,000.00	1.30	46,000.00
Average	12.00	90.67	4.67	463.33	48,253.33	1.13	25,133.33
Standard Deviation	2.65	84.51	3.75	81.45	59,300.19	0.29	19,105.06
n	3	3	3	3	3	3	3
SE							
Minimum	3.00	1.00	11.00	18.00	52.00	0.10	62.00
Maximum	3.00	3.00	12.00	26.00	540.00	0.10	610.00
Average	3.00	2.00	11.50	22.00	296.00	0.10	336.00
Standard Deviation	0.00	1.41	0.71	5.66	345.07	0.00	387.49
n	2	2	2	2	2	2	2
N							
Minimum	4.00	1.00	7.00	10.00	70.00	0.10	110.00
Maximum	15.00	31.00	8.00	160.00	8,280.00	0.50	4,260.00
Average	8.00	12.33	7.67	80.00	3,843.33	0.23	2,173.33
Standard Deviation	6.08	16.29	0.58	75.50	4,145.00	0.23	2,075.10
n	3	3	3	3	3	3	3

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/kg - milligrams per kilogram

Values calculated using < pql values as one-half pql

TABLE A5

Summary Statistics - Leachable Metals Concentrations for Bear Top/Orofino Mill Site

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Arsenic (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Mercury (mg/L)	Zinc (mg/L)
W							
Minimum	0.00	0.01	0.01	0.04	0.15	0.0001	1.70
Maximum	0.00	0.07	0.01	0.04	6.77	0.0001	11.70
Average	0.00	0.04	0.01	0.04	3.46	0.0001	6.70
Standard Deviation	0.00	0.04	0.00	0.00	4.68	0.0000	7.07
n	2	2	2	2	2	2	2
T							
Minimum	0.00	0.02	0.01	0.06	0.39	0.0001	4.01
Maximum	0.00	0.05	0.01	0.06	21.80	0.0001	15.50
Average	0.00	0.03	0.01	0.06	8.18	0.0001	9.61
Standard Deviation	0.00	0.01	0.00	0.00	11.83	0.0000	5.75
n	3	3	3	3	3	3	3
SE							
Minimum	0.00	0.00	0.01	0.01	0.03	0.0001	0.25
Maximum	0.00	0.00	0.01	0.01	0.10	0.0001	0.53
Average	0.00	0.00	0.01	0.01	0.06	0.0001	0.39
Standard Deviation	0.00	0.00	0.00	0.00	0.05	0.0000	0.20
n	2	2	2	2	2	2	2

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/L - milligrams per liter

Values calculated using < pql values as one-half pql

TABLE A6

Summary Statistics - Acid Base Accounting for the Bear Top/Orofino Mill Site

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Acid Potential (tons/1000 tons)	Acid/ Base Potential (tons/1000 tons)	Neutral-ization Potential (tons/1000 tons)	EC, Saturated Paste (mmhos/ cm)	pH, Saturated Paste (s.u.)	pH SMP Buffer (s.u.)	SMP Lime Requirement (tons/1000 tons)	Sulphur (%)					Total Lime Requirement (tons/1000 tons)
								HCL	HNO_3	Residual	Water Extractable	Total	
W													
Minimum	0.00	0.00	3.00	0.29	6.30	7.20	0.00	0.05	0.10	0.05	0.10	0.03	-3.05
Maximum	49.00	4.00	6.00	0.90	7.10	7.40	0.00	0.10	0.30	1.20	0.10	1.57	57.77
Average	13.75	2.50	4.00	0.60	6.78	7.25	0.00	0.06	0.15	0.38	0.10	0.44	15.02
Standard Deviation	23.67	1.73	1.41	0.25	0.34	0.10	0.00	0.03	0.10	0.55	0.00	0.76	28.86
n	4	4	4	4	4	4	4	4	4	4	4	4	4
T													
Minimum	38.00	27.00	11.00	0.59	6.30	7.20	0.00	0.05	0.10	0.80	0.10	1.39	36.06
Maximum	100.00	64.00	36.00	1.52	6.90	7.50	0.00	0.80	1.40	1.80	0.20	2.80	82.93
Average	70.00	50.00	20.00	1.14	6.63	7.40	0.00	0.30	0.63	1.43	0.13	2.15	65.50
Standard Deviation	31.05	20.07	13.89	0.49	0.31	0.17	0.00	0.43	0.68	0.55	0.06	0.71	25.64
n	3	3	3	3	3	3	3	3	3	3	3	3	3
SE													
Minimum	0.00	5.00	5.00	0.74	6.30	7.20	0.00	0.05	0.10	0.05	0.10	0.03	-5.16
Maximum	0.00	6.00	6.00	1.69	7.20	7.30	0.00	0.05	0.10	0.05	0.10	0.06	-4.30
Average	0.00	5.50	5.50	1.22	6.75	7.25	0.00	0.05	0.10	0.05	0.10	0.04	-4.73
Standard Deviation	0.00	0.71	0.71	0.67	0.64	0.07	0.00	0.00	0.00	0.00	0.00	0.02	0.61
n	2	2	2	2	2	2	2	2	2	2	2	2	2
N													

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/L - milligrams per liter

Values calculated using < pql values as one-half pql

TABLE A6

Summary Statistics - Acid Base Accounting for the Bear Top/Orofino Mill Site

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Acid Potential (tons/1000 tons)	Acid/ Base Potential (tons/1000 tons)	Neutral-ization Potential (tons/1000 tons)	EC, Saturated Paste (mmhos/ cm)	pH, Saturated Paste (s.u.)	pH SMP Buffer (s.u.)	SMP Lime Requirement (tons/1000 tons)	Sulphur (%)					Total Lime Requirement (tons/1000 tons)
								HCL	HNO_3	Residual	Water Extractable	Total	
Minimum	0.00	1.00	3.00	0.23	6.20	6.40	0.00	0.05	0.10	0.05	0.10	0.03	-0.55
Maximum	19.00	14.00	5.00	0.78	6.90	7.10	3.90	0.05	0.10	0.60	0.10	0.56	28.90
Average	7.33	6.00	4.00	0.58	6.50	6.77	1.63	0.05	0.10	0.25	0.10	0.24	11.36
Standard Deviation	10.21	7.00	1.00	0.31	0.36	0.35	2.03	0.00	0.00	0.30	0.00	0.29	15.51
n	3	3	3	3	3	3	3	3	3	3	3	3	3

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/L - milligrams per liter

Values calculated using < pql values as one-half pql

TABLE A7

Summary Statistics - Total Metals Concentrations for Silver Scott Mine

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Arsenic Dry Basis (mg/kg)	Cadmium Dry Basis (mg/kg)	Chromium Dry Basis (mg/kg)	Copper Dry Basis (mg/kg)	Lead Dry Basis (mg/kg)	Mercury Dry Basis (mg/kg)	Zinc Dry Basis (mg/kg)
W							
Minimum	6.00	1.00	2.50	30.00	510.00	0.10	340.00
Maximum	20.00	77.00	6.00	130.00	33,000.00	0.40	7,230.00
Average	13.44	25.00	2.89	67.67	6,485.56	0.19	2,608.89
Standard Deviation	4.33	28.01	1.17	37.16	10,127.09	0.14	2,552.25
n	9	9	9	9	9	8	9

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/kg - milligrams per kilogram

Values calculated using < pql values as one-half pql

TABLE A8

Summary Statistics - Leachable Metals Concentrations for Silver Scott Mine

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Arsenic (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Mercury (mg/L)	Zinc (mg/L)
W							
Minimum	0.00	0.00	0.01	0.01	0.03	0.0001	0.32
Maximum	0.00	0.01	0.01	0.03	9.91	0.0001	12.00
Average	0.00	0.01	0.01	0.01	2.46	0.0001	2.77
Standard Deviation	0.00	0.00	0.00	0.01	4.26	0.0000	5.16
n	5	5	5	5	5	5	5

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/L - milligrams per liter

Values calculated using < pql values as one-half pql

TABLE A9

Summary Statistics - Acid Base Accounting for Silver Scott Mine

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Acid Potential (tons/1000 tons)	Acid/ Base Potential (tons/1000 tons)	Neutral-ization Potential (tons/1000 tons)	EC, Saturated Paste (mmhos/ cm)	pH, Saturated Paste (s.u.)	pH SMP Buffer (s.u.)	SMP Lime Requirement (tons/1000 tons)	Sulphur (%)					Total Lime Requirement (tons/1000 tons)
								HCL	HNO_3	Residual	Water Extractable	Total	
W													
Minimum	15.00	1.00	0.50	0.69	4.40	6.10	0.00	0.05	0.10	0.30	0.10	0.52	1.37
Maximum	100.00	54.00	68.00	3.31	7.50	7.50	6.10	0.70	1.00	2.20	0.20	3.22	77.67
Average	43.22	22.33	21.22	1.38	6.10	6.97	1.88	0.16	0.39	0.93	0.11	1.36	32.54
Standard Deviation	31.65	17.44	24.14	0.81	1.26	0.60	2.47	0.21	0.35	0.66	0.03	1.01	22.95
n	9	9	9	9	9	9	9	9	9	9	9	9	9

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/L - milligrams per liter

Values calculated using < pql values as one-half pql

TABLE A10

Summary Statistics - Total Metals Concentrations for Bear Top Mine

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Arsenic Dry Basis (mg/kg)	Cadmium Dry Basis (mg/kg)	Chromium Dry Basis (mg/kg)	Copper Dry Basis (mg/kg)	Lead Dry Basis (mg/kg)	Mercury Dry Basis (mg/kg)	Zinc Dry Basis (mg/kg)
W							
Minimum	6.00	1.00	2.50	24.00	360.00	0.10	304.00
Maximum	17.00	132.00	15.00	296.00	89,400.00	2.20	52,400.00
Average	10.75	27.42	7.29	91.08	21,905.25	0.43	9,668.50
Standard Deviation	3.28	43.01	3.68	78.84	29,751.14	0.62	16,101.05
n	12	12	12	12	12	12	12

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/kg - milligrams per kilogram

Values calculated using < pql values as one-half pql

TABLE A11

Summary Statistics - Leachable Metals Concentrations for Bear Top Mine

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Arsenic (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Mercury (mg/L)	Zinc (mg/L)
W							
Minimum	0.00	0.00	0.01	0.01	0.03	0.0001	1.50
Maximum	0.00	0.06	0.01	0.33	20.10	0.0003	23.40
Average	0.00	0.01	0.01	0.05	3.49	0.0002	4.74
Standard Deviation	0.00	0.02	0.00	0.11	7.11	0.0000	7.21
n	9	9	9	9	9	9	9

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/L - milligrams per liter

Values calculated using < pql values as one-half pql

TABLE A12

Summary Statistics - Acid Base Accounting for the Bear Top Mine

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Acid Potential (tons/1000 tons)	Acid/ Base Potential (tons/1000 tons)	Neutral-ization Potential (tons/1000 tons)	EC, Saturated Paste (mmhos/ cm)	pH, Saturated Paste (s.u.)	pH SMP Buffer (s.u.)	SMP Lime Requirement (tons/1000 tons)	Sulphur (%)					Total Lime Requirement (tons/1000 tons)
								HCL	HNO_3	Residual	Water Extractable	Total	
W													
Minimum	0.00	0.00	0.50	0.13	5.40	5.70	0.00	0.05	0.10	0.05	0.10	0.03	-10.35
Maximum	89.00	4.00	20.00	1.72	8.00	7.60	8.90	0.30	0.40	2.50	0.10	2.90	94.10
Average	21.58	0.33	8.79	0.76	6.82	7.19	0.83	0.09	0.13	0.60	0.10	0.70	21.57
Standard Deviation	31.04	1.15	5.32	0.41	0.64	0.52	2.56	0.08	0.09	0.85	0.00	0.99	34.75
n	12	12	12	12	12	12	12	12	12	12	12	12	12

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/L - milligrams per liter

Values calculated using < pql values as one-half pql

TABLE A13

Summary Statistics - Total Metals Concentrations for Ione Mine

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Arsenic Dry Basis (mg/kg)	Cadmium Dry Basis (mg/kg)	Chromium Dry Basis (mg/kg)	Copper Dry Basis (mg/kg)	Lead Dry Basis (mg/kg)	Mercury Dry Basis (mg/kg)	Zinc Dry Basis (mg/kg)
W							
Minimum	10.00	1.00	2.50	18.00	59.00	0.10	82.00
Maximum	180.00	78.00	14.00	169.00	104000.00	1.10	36400.00
Average	30.27	27.18	6.55	51.73	15853.55	0.37	8898.55
Standard Deviation	50.04	29.78	5.19	40.94	30080.22	0.36	12171.53
n	11	11	11	11	11	11	11

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/kg - milligrams per kilogram

Values calculated using < pql values as one-half pql

TABLE A14

Summary Statistics - Leachable Metals Concentrations for Ione Mine

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Arsenic (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Mercury (mg/L)	Zinc (mg/L)
W							
Minimum	0.00	0.00	0.01	0.01	0.03	0.0001	0.15
Maximum	0.00	0.03	0.01	0.01	0.03	0.0003	3.26
Average	0.00	0.02	0.01	0.01	0.03	0.0002	1.73
Standard Deviation	0.00	0.02	0.00	0.00	0.00	0.0001	1.56
n	3	3	3	3	3	3	3

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/L - milligrams per liter

Values calculated using < pql values as one-half pql

TABLE A15

Summary Statistics - Acid Base Accounting for the Ione Mine

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Acid Potential (tons/1000 tons)	Acid/ Base Potential (tons/1000 tons)	Neutral-ization Potential (tons/1000 tons)	EC, Saturated Paste (mmhos/ cm)	pH, Saturated Paste (s.u.)	pH SMP Buffer (s.u.)	SMP Lime Requirement (tons/1000 tons)	Sulphur (%)					Total Lime Requirement (tons/1000 tons)
								HCL	HNO_3	Residual	Water Extractable	Total	
W													
Minimum	6.00	0.00	7.00	0.23	6.10	6.20	0.00	0.05	0.10	0.20	0.10	0.20	-0.20
Maximum	59.00	4.00	33.00	1.78	7.10	7.70	5.30	0.10	0.30	1.60	0.10	1.90	55.90
Average	23.67	1.25	16.83	1.27	6.63	7.32	0.44	0.07	0.13	0.65	0.10	0.73	13.04
Standard Deviation	16.90	1.60	8.59	0.48	0.41	0.40	1.53	0.03	0.08	0.46	0.00	0.53	15.36
n	12	12	12	12	12	12	12	12	12	12	12	12	12

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/L - milligrams per liter

Values calculated using < pql values as one-half pql

TABLE A16

Summary Statistics - Total Metals Concentrations for Orofino Mine

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Arsenic Dry Basis (mg/kg)	Cadmium Dry Basis (mg/kg)	Chromium Dry Basis (mg/kg)	Copper Dry Basis (mg/kg)	Lead Dry Basis (mg/kg)	Mercury Dry Basis (mg/kg)	Zinc Dry Basis (mg/kg)
W							
Minimum	11.00	1.00	2.50	91.00	3300.00	0.10	1200.00
Maximum	27.00	103.00	2.50	1530.00	74700.00	2.40	61500.00
Average	18.00	30.50	2.50	550.00	39762.50	0.73	19740.00
Standard Deviation	6.46	33.22	0.00	453.34	26866.55	0.82	19872.48
n	8	8	8	8	8	8	8

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/kg - milligrams per kilogram

Values calculated using < pql values as one-half pql

TABLE A17

Summary Statistics - Leachable Metals Concentrations for Orofino Mine

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Arsenic (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Mercury (mg/L)	Zinc (mg/L)
W							
Minimum	0.00	0.00	0.01	0.01	0.03	0.0003	0.99
Maximum	0.00	0.03	0.01	0.43	21.60	0.0003	9.01
Average	0.00	0.01	0.01	0.09	7.23	0.0003	4.99
Standard Deviation	0.00	0.01	0.00	0.19	9.79	0.0000	3.59
n	5	5	5	5	5	5	5

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/L - milligrams per liter

Values calculated using < pql values as one-half pql

TABLE A18

Summary Statistics - Acid Base Accounting for the Orofino Mine

Bear Gulch Mine Complex

Site Investigation

IPNF

Sample Type	Acid Potential (tons/1000 tons)	Acid/ Base Potential (tons/1000 tons)	Neutral-ization Potential (tons/1000 tons)	EC, Saturated Paste (mmhos/ cm)	pH, Saturated Paste (s.u.)	pH SMP Buffer (s.u.)	SMP Lime Requirement (tons/1000 tons)	Sulphur (%)					Total Lime Requirement (tons/1000 tons)
								HCL	HNO_3	Residual	Water Extractable	Total	
W													
Minimum	6.00	0.00	5.00	0.42	6.10	7.20	0.00	0.05	0.10	0.20	0.10	0.21	6.21
Maximum	103.00	0.00	23.00	1.32	7.10	7.70	0.00	0.20	0.60	2.70	0.10	3.17	105.59
Average	42.22	0.00	12.56	0.77	6.67	7.43	0.00	0.11	0.17	1.13	0.10	1.35	38.99
Standard Deviation	30.44	0.00	6.75	0.28	0.34	0.16	0.00	0.07	0.17	0.83	0.00	0.92	33.52
n	9	9	9	9	9	9	9	9	9	9	9	9	9

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

mg/L - milligrams per liter

Values calculated using < pql values as one-half pql

Appendix B

Project Database

Table B1
Total Metals
Bear Gulch Mine Complex
Site Investigation
IPNF

Sample Site	Sample Date	Arsenic Total (mg/kg)	Cadmium Total (mg/kg)	Chromium Total (mg/kg)	Copper Total (mg/kg)	Lead Total (mg/kg)	Mercury Total (mg/kg)	Zinc Total (mg/kg)
Lower Bear Top Mine								
FS-BT(L)-01-0-10(W)	11/14/2001	6	3	9	24	360	U 0.20	1,060
FS-(L)-BT-01-0-0.165(W)	7/10/2002	7	U 2	15	29	387	U 0.20	367
FS-(L)-BT-02-0-0.165(W)	7/10/2002	14	U 2	7	40	896	U 0.20	304
FS-(L)-BT-03-0-0.165(W)	7/10/2002	17	4	J 6	J 67	28,100	U 0.20	1,540
Middle Bear Top Mine								
FS-(M)-BT-01-0-0.165(W)	7/10/2002	10	6	10	106	9,090	U 0.20	1,630
FS-(M)-BT-02-0-0.165(W)	7/10/2002	8	U 2	U 5	70	9,110	U 0.20	831
FS-(M)-BT-03-0-0.165(W)	7/10/2002	12	5	U 5	68	4,680	0.20	1,330
FS-(M)-BT-04-0-0.165(W)	7/10/2002	10	132	U 5	198	73,600	2.20	52,400
Upper Bear Top Mine								
FS-(U)-BT-01-0-0.165(W)	7/10/2002	10	25	8	75	8,320	0.50	6,910
FS-(U)-BT-02-0-0.165(W)	7/10/2002	15	6	8	63	7,620	0.30	1,950
FS-(U)-BT-03-0-0.165(W)	7/10/2002	11	91	7	296	89,400	1.00	27,700
FS-(U)-BT-04-0-0.165(W)	7/10/2002	9	54	10	57	31,300	0.40	20,000
Lower Ione Mine								
FS-IM-(L)-01-0-0.165(W)	11/15/2001	J 180	U 2	14	J 63	75	U 0.20	120
FS-IM-(L)-02-0-0.165(W)	11/15/2001	13	U 2	13	18	59	U 0.20	94
FS-IM-(L)-03-0-0.165(W)	11/15/2001	B 20	U 2	13	37	72	U 0.20	82
FS-IM-(L)-04-0-0.165(W) D	11/15/2001	15	U 2	13	27	81	U 0.20	63
FS-IM-(L)-04-0-0.165(W)	11/15/2001	13	U 2	12	36	73	U 0.20	88
Middle Ione Mine								
FS-(M)-IM-01-0-0.165(W)	7/8/2002	14	37	U 5	30	J 18,000	0.50	J 14,100
FS-(M)-IM-02-0-0.165(W)	7/8/2002	11	28	U 5	35	15,900	U 0.20	11,100
FS-(M)-IM-03-0-0.165(W)	7/8/2002	11	5	U 5	29	8,040	U 0.20	1,430
Upper Ione Mine								
FS-(U)-IM-01-0-0.165(W)	7/8/2002	10	52	U 5	49	3,620	0.80	25,200
FS-(U)-IM-02-0-0.165(W)	7/8/2002	11	78	U 5	52	16,800	0.40	36,400
FS-(U)-IM-03-0-0.165(W)	7/8/2002	J 19	20	UJ< 5	51	7,750	0.70	8,200
FS-(U)-IM-04-0-0.165(W)	7/8/2002	31	75	U 5	169	104,000	1.10	1,070
Mill Site								
FS-MS-01-0-3(T)	11/14/2001	13	188	U 5	500	23,000	1.30	J 46,000
FS-MS-01-3-3.5(N)	11/14/2001	4	31	7	160	8,280	0.50	4,260
FS-MS-03-0-2(T)	11/14/2001	9	36	9	J 520	J 116,000	1.30	8,500
FS-MS-05-0-3.5(W)	11/14/2001	7	3	8	20	510	U 0.20	710
FS-MS-05-3.5-4(W)	11/14/2001	7	2	9	30	410	U 0.20	500

Notes:

M - Matrix spike recoveries exceed acceptable limits
J - The associated value is an estimated quantity
F - Field duplicate results exceed acceptable limits - PQL determination
F% - Field duplicate results exceed acceptable limits - relative % difference determination
U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is the practical quantitation limit (PQL)
UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may be inaccurate or imprecise.
B - Present in the SPLP extraction blank or the preparation blank at or above reporting limit. Sample result less than ten times the blank concentration is flagged.

mg/kg - milligrams per kilogram

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

D - Duplicate sample

A blank cell indicates data not collected/analyzed

Table B1
Total Metals
Bear Gulch Mine Complex
Site Investigation
IPNF

Sample Site	Sample Date	Arsenic Total (mg/kg)	Cadmium Total (mg/kg)	Chromium Total (mg/kg)	Copper Total (mg/kg)	Lead Total (mg/kg)	Mercury Total (mg/kg)	Zinc Total (mg/kg)
Mill Site								
FS-MS-06-0-4(N)	11/14/2001	5	U 2	8	10	70	U 0.20	110
FS-MS-09-0-4(W)	11/14/2001	8	7	7	110	7,850	0.30	2,070
FS-MS-12-0-2(T)	11/14/2001	14	48	U 5	370	5,760	0.80	20,900
FS-MS-12-2.5-3(N)	11/14/2001	15	5	8	70	3,180	U 0.20	2,150
FS-MS-13-0-1.5(W)	11/14/2001	15	135	11	210	13,500	1.10	35,500
FS-MS-101(SE)	11/15/2001	3	3	12	26	540	U 0.20	610
FS-MS-102(SE)	11/15/2001	3	U 2	11	18	52	U 0.20	62
Lower Orofino Mine								
FS-(L)-OM-01-0-0.165(W)	7/9/2002	14	10	U 5	293	23,200	U 0.20	8,390
FS-(L)-OM-02-0-0.165(W)	7/9/2002	11	U 2	U 5	91	3,300	U 0.20	1,200
FS-(L)-OM-03-0-0.165(W)	7/9/2002	13	14	U 5	266	20,200	U 0.20	8,510
FS-(L)-OM-04-0-0.165(W)	7/9/2002	12	7	U 5	400	23,900	U 0.20	6,420
Upper Orofino Mine								
FS-(U)-OM-01-0-0.165(W)	7/9/2002	27	39	U 5	838	74,700	0.80	34,900
FS-(U)-OM-02-0-0.165(W)	7/9/2002	25	103	U 5	426	38,300	1.30	61,500
FS-(U)-OM-03-0-0.165(W)	7/9/2002	18	46	U 5	556	73,600	0.90	20,900
FS-(U)-OM-04-0-0.165(W) D	7/9/2002	20	17	7	907	57,800	2.20	12,700
FS-(U)-OM-04-0-0.165(W)	7/9/2002	24	24	U 5	1,530	60,900	2.40	16,100
Lower Silver Scott Mine								
FS-SC-(L)-01-0-0.165(W)	11/13/2001	11	25	U 5	62	2,110	U 0.20	2,780
FS-SC-(L)-02-0-0.165(W)	11/13/2001	6	4	6	47	510	U 0.20	490
FS-SC-(L)-03-0-0.165(W)	11/13/2001	13	55	U 5	120	5,100	U 0.20	5,240
FS-SC-(L)-04-0-0.165(W)	11/13/2001	11	47	U 5	90	3,560	U 0.20	4,830
FS-SC-(L)-05-0-0.165(W)	11/13/2001	14	77	U 5	130	6,550	U 0.20	J 7,230
Upper Silver Scott Mine								
FS-SC-(U)-01-0-0.165(W)	11/13/2001	11	3	U 5	50	33,000	J 0.40	780
FS-SC-(U)-02-0-0.165(W)	11/13/2001	20	8	U 5	30	2,000	UJ 0.20	980
FS-SC-(U)-03-0-0.165(W)	11/13/2001	17	5	U 5	50	4,250	J 0.40	810
FS-SC-(U)-04-0-0.165(W)	11/13/2001	18	U 2	U 5	30	1,290	UJ	340

Notes:

M - Matrix spike recoveries exceed acceptable limits
J - The associated value is an estimated quantity
F - Field duplicate results exceed acceptable limits - PQL determination
F% - Field duplicate results exceed acceptable limits - relative % difference determination
U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is the practical quantitation limit (PQL)
UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may be inaccurate or imprecise.
B - Present in the SPLP extraction blank or the preparation blank at or above reporting limit. Sample result less than ten times the blank concentration is flagged.

mg/kg - milligrams per kilogram

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

D - Duplicate sample

A blank cell indicates data not collected/analyzed

Table B2
Leachable Metals
Bear Gulch Mine Complex
Site Investigation
IPNF

Sample Site	Sample Date	Arsenic (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Mercury (mg/L)	Zinc (mg/L)
Chronic Aquatic Life Standard		**0.19**	**0.00037 [1]**	**0.057 [1,2]**	**0.0035 [1]**	**0.00054 [1]**	**0.000012 [1]**	**0.032 [1]**
Lower Bear Top Mine								
FS-(L)-BT-01-0-0.165(W)	7/10/2002	U 0.005	U 0.005	U 0.02	U 0.02	U 0.05	U 0.0005	B 2.17
FS-BT(L)-01-0-10(W)	11/14/2001	U 0.005	0.009	U 0.02	U 0.02	U 0.05	U 0.0002	1.9
FS-(L)-BT-02-0-0.165(W)	7/10/2002	U 0.005	0.005	U 0.02	0.03	0.08	U 0.0005	B 1.82
FS-(L)-BT-03-0-0.165(W)	7/10/2002	U 0.005	U 0.005	U 0.02	U 0.02	0.6	U 0.0005	B 1.56
Middle Bear Top Mine								
FS-(M)-BT-01-0-0.165(W)	7/10/2002	U 0.005	U 0.005	U 0.02	0.33	U 0.05	U 0.0005	B 1.83
FS-(M)-BT-03-0-0.165(W)	7/10/2002	U 0.005	U 0.005	U 0.02	U 0.02	U 0.05	U 0.0005	B 1.57
FS-(M)-BT-04-0-0.165(W)	7/10/2002	U 0.005	0.057	U 0.02	U 0.02	10.5	U 0.0005	23.4
Upper Bear Top Mine								
FS-(U)-BT-01-0-0.165(W)	7/10/2002	U 0.005	0.005	U 0.02	U 0.02	0.07	U 0.0005	B 1.5
FS-(U)-BT-03-0-0.165(W)	7/10/2002	U 0.005	0.031	U 0.02	U 0.02	20.1	U 0.0005	B 6.94
Lower Ione Mine								
FS-IM-(L)-02-0-0.165(W)	11/15/2001	U 0.005	U 0.005	U 0.02	U 0.02	U 0.05	U 0.0002	B 0.15
FS-IM-(L)-04-0-0.165(W) D	11/15/2001	U 0.005	U 0.005	U 0.02	U 0.02	U 0.05	U 0.0002	B 0.26
Middle Ione Mine								
FS-(M)-IM-02-0-0.165(W)	7/8/2002	U 0.005	0.034	U 0.02	U 0.02	U 0.05	U 0.0005	B 1.78
Upper Ione Mine								
FS-(U)-IM-02-0-0.165(W)	7/8/2002	U 0.005	0.028	U 0.02	U 0.02	U 0.05	U 0.0005	B 3.26
Mill Site								
FS-MS-01-0-3(T)	11/14/2001	U 0.005	J 0.027	U 0.02	0.06	2.36	U 0.0002	J 15.5
FS-MS-03-0-2(T)	11/14/2001	U 0.005	0.046	U 0.02	0.06	21.8	U 0.0002	9.32
FS-MS-05-0-3.5(W)	11/14/2001	U 0.005	0.01	U 0.02	0.04	0.15	U 0.0002	1.7
FS-MS-12-0-2(T)	11/14/2001	U 0.005	0.022	U 0.02	0.06	0.39	U 0.0002	4.01
FS-MS-13-0-1.5(W)	11/14/2001	U 0.005	0.072	U 0.02	0.04	6.77	U 0.0002	11.7
FS-MS-101(SE)	11/15/2001	U 0.005	U 0.005	U 0.02	U 0.02	0.1	U 0.0002	B 0.53
FS-MS-102(SE)	11/15/2001	U 0.005	U 0.005	U 0.02	U 0.02	U 0.05	U 0.0002	B 0.25
Lower Orofino Mine								
FS-(L)-OM-01-0-0.165(W)	7/9/2002	U 0.005	U 0.005	U 0.02	U 0.02	U 0.05	U 0.0005	B 0.99
FS-(L)-OM-03-0-0.165(W)	7/9/2002	U 0.005	U 0.005	U 0.02	U 0.02	U 0.05	U 0.0005	B 1.75

Notes:

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F - Field duplicate results exceed acceptable limits - PQL determination
F% - Field duplicate results exceed acceptable limits - relative % difference determination
U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is the practical quantitation limit (PQL)
B - Present in the SPLP extraction blank or the preparation blank at or above reporting limit. Sample result less than ten times the blank concentration is flagged.

Chronic Aquatic Life Standard from Idaho Administrative Procedures Act (IDAPA) 16.01.02.250 (Surface water quality criteria)

1 - Based on hardness of 25 mg/L $CaCO_3$ - see IDAPA 58.01.02.210.07
2 - Standard posted for Chromium III. Standard for Chromium VI is 0.011.

mg/L - milligrams per liter

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

D - Duplicate sample

A blank cell indicates data not collected/analyzed

Table B2
Leachable Metals
Bear Gulch Mine Complex
Site Investigation
IPNF

Sample Site	Sample Date	Arsenic (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Mercury (mg/L)	Zinc (mg/L)
Chronic Aquatic Life Standard		**0.19**	**0.00037 [1]**	**0.057 [1,2]**	**0.0035 [1]**	**0.00054 [1]**	**0.000012 [1]**	**0.032 [1]**
Upper Orofino Mine								
FS-(U)-OM-01-0-0.165(W)	7/9/2002	U 0.005	0.032	U 0.02	U 0.02	1.22	U 0.0005	9.01
FS-(U)-OM-03-0-0.165(W)	7/9/2002	U 0.005	0.013	U 0.02	U 0.02	13.3	U 0.0005	B 5.22
FS-(U)-OM-04-0-0.165(W)	7/9/2002	U 0.005	0.018	U 0.02	0.43	21.6	U 0.0005	7.96
FS-(U)-OM-04-0-0.165(W) D	7/9/2002	U 0.005	0.034	U 0.02	0.06	3.79	0.0009	12.2
Lower Silver Scott Mine								
FS-SC-(L)-02-0-0.165(W)	11/13/2001	U 0.005	U 0.005	U 0.02	U 0.02	U 0.05	U 0.0002	B 0.32
FS-SC-(L)-04-0-0.165(W)	11/13/2001	U 0.005	0.012	U 0.02	U 0.02	U 0.05	U 0.0002	B 0.37
FS-SC-(L)-05-0-0.165(W)	11/13/2001	U 0.005	0.012	U 0.02	U 0.02	0.23	U 0.0002	B 0.68
Upper Silver Scott Mine								
FS-SC-(U)-02-0-0.165(W)	11/13/2001	U 0.005	0.006	U 0.02	U 0.02	9.91	U 0.0002	B 0.49
FS-SC-(U)-04-0-0.165(W)	11/13/2001	U 0.005	0.006	U 0.02	0.03	2.11	U 0.0002	12

Notes:

M - Matrix spike recoveries exceed acceptable limits
J - The associated value is an estimated quantity
F - Field duplicate results exceed acceptable limits - PQL determination
F% - Field duplicate results exceed acceptable limits - relative % difference determination
U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is the practical quantitation limit (PQL)
B - Present in the SPLP extraction blank or the preparation blank at or above reporting limit. Sample result less than ten times the blank concentration is flagged.

Chronic Aquatic Life Standard from Idaho Administrative Procedures Act (IDAPA) 16.01.02.250 (Surface water quality criteria)

1 - Based on hardness of 25 mg/L $CaCO_3$ - see IDAPA 58.01.02.210.07
2 - Standard posted for Chromium III. Standard for Chromium VI is 0.011.

mg/L - milligrams per liter

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

D - Duplicate sample

A blank cell indicates data not collected/analyzed

Table B3

Acid Base Account, pH, and Electrical Conductivity

Bear Gulch Mine Complex

Site Investigation

IPNF

Site	Depth (feet)	Type	Acid Potential (tons/1000 tons)	Acid/ Base Potential (tons/1000 tons)	Neutral-ization Potential (tons/1000 tons)	EC, Saturated Paste (mmhos/ cm)	pH, Saturated Paste (s.u.)	pH SMP Buffer (s.u.)	SMP Lime Requirement (tons/1000 tons)	Sulphur (%)					Total Lime Requirement (tons/1000 tons)
										HCL	HNO_3	Residual	Water Extractable	Total	
Lower Bear Top Mine															
FS-BT(L)-01-0-10(W)	0-10	W	0	4	4	0.89	6.9	7.3	0	U 0.1	U 0.1	U 0.1	U 0.1	U 0.05	-3.047
FS-(L)-BT-01-0-0.165(W)	0-0.165	W	6	0	20	0.64	8	7.6	0	U 0.1	U 0.1	0.2	U 0.1	0.19	-10.35
FS-(L)-BT-02-0-0.165(W)	0-0.165	W	6	0	7	1.32	7.4	7.3	0	U 0.1	U 0.1	0.2	U 0.1	0.23	5.8988
FS-(L)-BT-03-0-0.165(W)	0-0.165	W	15	0	4	0.75	6.8	7.3	0	0.1	U 0.1	0.4	U 0.1	0.52	17.461
Middle Bear Top Mine															
FS-(M)-BT-01-0-0.165(W)	0-0.165	W	9	0	8	0.67	7.4	7.5	0	U 0.1	0.1	0.2	U 0.1	0.3	4.6488
FS-(M)-BT-02-0-0.165(W)	0-0.165	W	6	0	10	0.62	6.8	7.3	0	U 0.1	0.1	0.1	U 0.1	0.17	-1.758
FS-(M)-BT-03-0-0.165(W)	0-0.165	W	6	0	6	0.62	6.7	6.8	1	U 0.1	U 0.1	0.2	U 0.1	0.19	8.3988
FS-(M)-BT-04-0-0.165(W)	0-0.165	W	89	0	15	1.72	6.6	7.5	0	0.2	0.4	2.3	U 0.1	2.9	92.579
Upper Bear Top Mine															
FS-(U)-BT-01-0-0.165(W)	0-0.165	W	16	0	10	0.51	7	7.3	0	U 0.1	U 0.1	0.5	U 0.1	0.5	13.868
FS-(U)-BT-02-0-0.165(W)	0-0.165	W	3	0	U 1	0.13	5.4	5.7	8.9	U 0.1	U 0.1	0.1	U 0.1	0.14	20.618
FS-(U)-BT-03-0-0.165(W)	0-0.165	W	85	0	13	0.66	6.3	7.6	0	0.3	U 0.1	2.5	U 0.1	2.65	94.103
FS-(U)-BT-04-0-0.165(W)	0-0.165	W	18	0	8	0.58	6.5	7.1	0	0.1	U 0.1	0.5	U 0.1	0.59	16.368

Notes:

mmhos/cm - millimhos per centimeter
s.u. - standard units
EC - Electrical Conductivity
SMP - Shoemacher, McLean and Pratt single buffer method.

W - Waste Rock
T - Tailings
N - Native
M - Mixed

HCL - hydrochloric acid
HNO3 - nitric acid.

M - Matrix spike recoveries exceed acceptable limits
J - The associated value is an estimated quantity
F - Field duplicate results exceed acceptable limits - PQL determination
F% - Field duplicate results exceed acceptable limits - relative % difference determination
U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is the practical quantitation limit (PQL)
B - Present in the SPLP extraction blank or the preparation blank at or above reporting limit. Sample result less than ten times the blank concentration is flagged.
D - Duplicate sample

Total lime requirement calculated according to the following formula: (((HNO3 + Residual) x 31.25) + (HCL x 23.44) + SMP Lime Requirement - Neutralization Potential) x 1.25

Table B3

Acid Base Account, pH, and Electrical Conductivity

Bear Gulch Mine Complex

Site Investigation

IPNF

Site	Depth (feet)	Type	Acid Potential (tons/1000 tons)	Acid/ Base Potential (tons/1000 tons)	Neutral-ization Potential (tons/1000 tons)	EC, Saturated Paste (mmhos/ cm)	pH, Saturated Paste (s.u.)	pH SMP Buffer (s.u.)	SMP Lime Requirement (tons/1000 tons)	Sulphur (%)					Total Lime Requirement (tons/1000 tons)
										HCL	HNO_3	Residual	Water Extractable	Total	
Lower Ione Mine															
FS-IM-(L)-01-0-0.165(W)	0-0.165	W	22	- 2	20	1.5	7.1	7.4	0	U 0.1	0.1	0.5	U 0.1	0.55	1.3675
FS-IM-(L)-02-0-0.165(W)	0-0.165	W	6	3	9	1.78	6.4	7.4	0	U 0.1	U 0.1	0.2	U 0.1	0.2	3.3988
FS-IM-(L)-03-0-0.165(W)	0-0.165	W	6	4	10	1.74	6.2	7.2	0	U 0.1	U 0.1	0.2	U 0.1	0.26	2.1488
FS-IM-(L)-04-0-0.165(W)	0-0.165	W	12	- 3	9	1.77	6.2	7.3	0	0.1	U 0.1	0.3	U 0.1	0.4	7.305
FS-IM-(L)-04-0-0.165(W) D	0-0.165	W	12	3	15	1.43	6.7	7.4	0	0.1	U 0.1	0.3	U 0.1	0.33	-0.195
Middle Ione Mine															
FS-(M)-IM-01-0-0.165(W)	0-0.165	W	40	0	29	1.58	6.8	7.6	0	0.1	U 0.1	1.2	U 0.1	1.24	17.461
FS-(M)-IM-02-0-0.165(W)	0-0.165	W	28	0	24	1.2	7.1	7.6	0	U 0.1	0.1	0.8	U 0.1	0.94	8.0863
FS-(M)-IM-03-0-0.165(W)	0-0.165	W	12	0	7	0.69	6.1	6.2	5.3	0.1	U 0.1	0.3	U 0.1	0.38	16.43
Upper Ione Mine															
FS-(U)-IM-01-0-0.165(W)	0-0.165	W	47	0	33	1.4	7.1	7.5	0	U 0.1	0.3	1.2	U 0.1	1.39	20.274
FS-(U)-IM-02-0-0.165(W)	0-0.165	W	59	0	17	1.03	7.1	7.5	0	U 0.1	0.3	1.6	U 0.1	1.9	55.899
FS-(U)-IM-03-0-0.165(W)	0-0.165	W	21	0	9	0.92	6.5	7	0	0.1	U 0.1	0.6	U 0.1	0.66	19.024
FS-(U)-IM-04-0-0.165(W)	0-0.165	W	19	0	20	0.23	6.2	7.7	0	U 0.1	U 0.1	0.6	U 0.1	0.55	5.2738

Notes:

mmhos/cm - millimhos per centimeter
s.u. - standard units
EC - Electrical Conductivity
SMP - Shoemacher, McLean and Pratt single buffer method.

W - Waste Rock
T - Tailings
N - Native
M - Mixed

HCL - hydrochloric acid
HNO3 - nitric acid.

M - Matrix spike recoveries exceed acceptable limits
J - The associated value is an estimated quantity
F - Field duplicate results exceed acceptable limits - PQL determination
F% - Field duplicate results exceed acceptable limits - relative % difference determination
U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is the practical quantitation limit (PQL)
B - Present in the SPLP extraction blank or the preparation blank at or above reporting limit. Sample result less than ten times the blank concentration is flagged.
D - Duplicate sample

Total lime requirement calculated according to the following formula: (((HNO3 + Residual) x 31.25) + (HCL x 23.44) + SMP Lime Requirement - Neutralization Potential) x 1.25

Table B3

Acid Base Account, pH, and Electrical Conductivity

Bear Gulch Mine Complex

Site Investigation

IPNF

Site	Depth (feet)	Type	Acid Potential (tons/1000 tons)	Acid/ Base Potential (tons/1000 tons)	Neutral-ization Potential (tons/1000 tons)	EC, Saturated Paste (mmhos/ cm)	pH, Saturated Paste (s.u.)	pH SMP Buffer (s.u.)	SMP Lime Requirement (tons/1000 tons)	Sulphur (%)					Total Lime Requirement (tons/1000 tons)
										HCL	HNO_3	Residual	Water Extractable	Total	
Mill Site															
FS-MS-01-0-3(T)	0-3	T	100	- 64	36	1.52	6.9	7.5	0	U 0.1	1.4	1.8	U 0.1	2.8	82.93
FS-MS-01-3-3.5(N)	3-3.5	N	19	- 14	5	0.78	6.2	6.4	3.9	U 0.1	0.1	0.6	U 0.1	0.56	28.899
FS-MS-03-0-2(T)	0-2	T	72	- 59	13	0.59	6.3	7.2	0	0.8	U 0.1	1.7	U 0.1	2.25	77.503
FS-MS-05-0-3.5(W)	0-3.5	W	0	4	4	0.62	6.9	7.2	0	U 0.1	U 0.1	U 0.1	U 0.1	U 0.05	-3.047
FS-MS-05-3.5-4(W)	3.5-4	W	0	3	3	0.29	7.1	7.2	0	U 0.1	U 0.1	U 0.1	U 0.1	U 0.05	-1.797
FS-MS-06-0-4(N)	0-4	N	0	3	3	0.23	6.9	6.8	1	U 0.1	U 0.1	U 0.1	U 0.1	U 0.05	-0.547
FS-MS-09-0-4(W)	0-4	W	6	0	6	0.58	6.8	7.4	0	U 0.1	U 0.1	0.2	U 0.1	0.13	7.1488
FS-MS-12-0-2(T)	0-02	T	38	- 27	11	1.32	6.7	7.5	0	U 0.1	0.4	0.8	0.2	1.39	36.055
FS-MS-12-2.5-3(N)	2.5-3	N	3	1	4	0.74	6.4	7.1	0	U 0.1	U 0.1	0.1	U 0.1	0.12	5.7425
FS-MS-13-0-1.5(W)	0-1.5	W	49	3	3	0.9	6.3	7.2	0	0.1	0.3	1.2	U 0.1	1.57	57.774
FS-MS-101(SE)		SE	0	6	6	0.74	6.3	7.2	0	U 0.1	U 0.1	U 0.1	U 0.1	0.06	-5.156
FS-MS-102(SE)		SE	0	5	5	1.69	7.2	7.3	0	U 0.1	U 0.1	U 0.1	U 0.1	U 0.05	-4.297
Lower Orofino Mine															
FS-(L)-OM-01-0-0.165(W)	0-0.165	W	21	0	9	0.8	7.1	7.5	0	0.1	0.1	0.5	U 0.1	0.68	15.118

Notes:

mmhos/cm - millimhos per centimeter
s.u. - standard units
EC - Electrical Conductivity
SMP - Shoemacher, McLean and Pratt single buffer method.

W - Waste Rock
T - Tailings
N - Native
M - Mixed

HCL - hydrochloric acid
HNO3 - nitric acid.

M - Matrix spike recoveries exceed acceptable limits
J - The associated value is an estimated quantity
F - Field duplicate results exceed acceptable limits - PQL determination
F% - Field duplicate results exceed acceptable limits - relative % difference determination
U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is the practical quantitation limit (PQL)
B - Present in the SPLP extraction blank or the preparation blank at or above reporting limit. Sample result less than ten times the blank concentration is flagged.
D - Duplicate sample

Total lime requirement calculated according to the following formula: (((HNO3 + Residual) x 31.25) + (HCL x 23.44) + SMP Lime Requirement - Neutralization Potential) x 1.25

Table B3

Acid Base Account, pH, and Electrical Conductivity

Bear Gulch Mine Complex

Site Investigation

IPNF

Site	Depth (feet)	Type	Acid Potential (tons/1000 tons)	Acid/ Base Potential (tons/1000 tons)	Neutral-ization Potential (tons/1000 tons)	EC, Saturated Paste (mmhos/ cm)	pH, Saturated Paste (s.u.)	pH SMP Buffer (s.u.)	SMP Lime Requirement (tons/1000 tons)	Sulphur (%)					Total Lime Requirement (tons/1000 tons)
										HCL	HNO_3	Residual	Water Extractable	Total	
Lower Orofino Mine															
FS-(L)-OM-02-0-0.165(W)	0-0.165	W	6	0	5	0.48	6.8	7.2	0	U 0.1	U 0.1	0.2	U 0.1	0.21	8.3988
FS-(L)-OM-03-0-0.165(W)	0-0.165	W	24	0	8	0.86	6.7	7.5	0	0.1	0.1	0.6	U 0.1	0.83	20.274
FS-(L)-OM-04-0-0.165(W)	0-0.165	W	16	0	13	0.59	6.8	7.3	0	U 0.1	0.1	0.4	U 0.1	0.54	6.2113
Upper Orofino Mine															
FS-(U)-OM-01-0-0.165(W)	0-0.165	W	62	0	23	0.96	6.6	7.7	0	U 0.1	0.2	1.8	U 0.1	1.88	52.305
FS-(U)-OM-02-0-0.165(W)	0-0.165	W	103	0	21	1.32	7.1	7.6	0	U 0.1	0.6	2.7	U 0.1	3.17	105.59
FS-(U)-OM-03-0-0.165(W)	0-0.165	W	64	0	8	0.62	6.3	7.4	0	0.2	0.1	1.8	U 0.1	1.94	70.079
FS-(U)-OM-04-0-0.165(W) D	0-0.165	W	36	0	19	0.84	6.5	7.4	0	0.2	0.1	0.9	U 0.1	1.24	21.173
FS-(U)-OM-04-0-0.165(W)	0-0.165	W	48	0	7	0.42	6.1	7.3	0	0.2	0.1	1.3	U 0.1	1.62	51.798
Lower Silver Scott Mine															
FS-SC-(L)-01-0-0.165(W)	0-0.165	W	38	- 23	15	0.95	7.2	7.4	0	U 0.1	0.5	0.7	U 0.1	1.2	31.055
FS-SC-(L)-02-0-0.165(W)	0-0.165	W	19	1	20	0.89	7.5	7.5	0	U 0.1	0.3	0.3	U 0.1	0.52	1.3675
FS-SC-(L)-03-0-0.165(W)	0-0.165	W	86	- 42	44	1.54	7	7.5	0	0.2	0.9	1.7	U 0.1	2.73	52.423
FS-SC-(L)-04-0-0.165(W)	0-0.165	W	44	- 5	39	1.15	7.1	7.4	0	U 0.1	0.4	1	U 0.1	1.33	8.8675

Notes:

mmhos/cm - millimhos per centimeter
s.u. - standard units
EC - Electrical Conductivity
SMP - Shoemacher, McLean and Pratt single buffer method.

W - Waste Rock
T - Tailings
N - Native
M - Mixed

HCL - hydrochloric acid
HNO3 - nitric acid.

M - Matrix spike recoveries exceed acceptable limits
J - The associated value is an estimated quantity
F - Field duplicate results exceed acceptable limits - PQL determination
F% - Field duplicate results exceed acceptable limits - relative % difference determination
U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is the practical quantitation limit (PQL)
B - Present in the SPLP extraction blank or the preparation blank at or above reporting limit. Sample result less than ten times the blank concentration is flagged.
D - Duplicate sample

Total lime requirement calculated according to the following formula: (((HNO3 + Residual) x 31.25) + (HCL x 23.44) + SMP Lime Requirement - Neutralization Potential) x 1.25

Table B3

Acid Base Account, pH, and Electrical Conductivity

Bear Gulch Mine Complex

Site Investigation

IPNF

Site	Depth (feet)	Type	Acid Potential (tons/1000 tons)	Acid/ Base Potential (tons/1000 tons)	Neutral-ization Potential (tons/1000 tons)	EC, Saturated Paste (mmhos/ cm)	pH, Saturated Paste (s.u.)	pH SMP Buffer (s.u.)	SMP Lime Requirement (tons/1000 tons)	Sulphur (%)					Total Lime Requirement (tons/1000 tons)
										HCL	HNO_3	Residual	Water Extractable	Total	
Lower Silver Scott Mine															
FS-SC-(L)-05-0-0.165(W)	0-0.165	W	100	- 32	68	1.87	6.9	7.5	0	U 0.1	1	2.2	0.2	3.22	42.93
Upper Silver Scott Mine															
FS-SC-(U)-01-0-0.165(W)	0-0.165	W	54	- 54	U 1	3.31	4.4	6.1	6.1	0.7	U 0.1	1.2	U 0.1	1.56	77.666
FS-SC-(U)-02-0-0.165(W)	0-0.165	W	18	- 18	U 1	1.2	4.8	6.5	3.1	0.1	U 0.1	0.5	U 0.1	0.57	28.993
FS-SC-(U)-03-0-0.165(W)	0-0.165	W	15	- 13	2	0.69	5	6.2	5.3	0.1	U 0.1	0.4	U 0.1	0.53	26.586
FS-SC-(U)-04-0-0.165(W)	0-0.165	W	15	- 13	2	0.8	5	6.6	2.4	0.1	U 0.1	0.4	U 0.1	0.54	22.961

Notes:

mmhos/cm - millimhos per centimeter
s.u. - standard units
EC - Electrical Conductivity
SMP - Shoemacher, McLean and Pratt single buffer method.

W - Waste Rock
T - Tailings
N - Native
M - Mixed

HCL - hydrochloric acid
HNO3 - nitric acid.

M - Matrix spike recoveries exceed acceptable limits
J - The associated value is an estimated quantity
F - Field duplicate results exceed acceptable limits - PQL determination
F% - Field duplicate results exceed acceptable limits - relative % difference determination
U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is the practical quantitation limit (PQL)
B - Present in the SPLP extraction blank or the preparation blank at or above reporting limit. Sample result less than ten times the blank concentration is flagged.
D - Duplicate sample

Total lime requirement calculated according to the following formula: (((HNO3 + Residual) x 31.25) + (HCL x 23.44) + SMP Lime Requirement - Neutralization Potential) x 1.25

Table B4
Cross Reference of Lab and Sample Numbers
Bear Gulch Mine Complex
Site Investigation
IPNF

Site	Sample Date	Laboratory Report Sample Number
Lower Bear Top Mine		
FS-(L)-BT-01-0-0.165(W)	7/10/2002	2002070204-24
FS-BT(L)-01-0-10(W)	11/14/2001	2001110188-1
FS-(L)-BT-02-0-0.165(W)	7/10/2002	2002070204-25
FS-(L)-BT-03-0-0.165(W)	7/10/2002	2002070204-26
Middle Bear Top Mine		
FS-(M)-BT-01-0-0.165(W)	7/10/2002	2002070204-20
FS-(M)-BT-02-0-0.165(W)	7/10/2002	2002070204-21
FS-(M)-BT-03-0-0.165(W)	7/10/2002	2002070204-22
FS-(M)-BT-04-0-0.165(W)	7/10/2002	2002070204-23
FS-(M)-BT-102-(SW)	7/11/2002	2002070160-2
Upper Bear Top Mine		
FS-(U)-BT-01-0-0.165(W)	7/10/2002	2002070204-16
FS-(U)-BT-02-0-0.165(W)	7/10/2002	2002070204-17
FS-(U)-BT-03-0-0.165(W)	7/10/2002	2002070204-18
FS-(U)-BT-04-0-0.165(W)	7/10/2002	2002070204-19
FS-(U)-BT-101-(SW)	7/11/2002	2002070160-1
Lower Ione Mine		
FS-IM-(L)-01-0-0.165(W)	11/15/2001	2001110189-1
FS-IM-(L)-02-0-0.165(W)	11/15/2001	2001110189-2
FS-IM-(L)-03-0-0.165(W)	11/15/2001	2001110189-3
FS-IM-(L)-04-0-0.165(W)	11/15/2001	2001110189-4
FS-IM-(L)-04-0-0.165(W)	11/15/2001	2001110189-5
FS-(L)-IM-101-(SW)	7/12/2002	2002070160-5
Middle Ione Mine		
FS-(M)-IM-01-0-0.165(W)	7/8/2002	2002070204-1
FS-(M)-IM-02-0-0.165(W)	7/8/2002	2002070204-2
FS-(M)-IM-03-0-0.165(W)	7/8/2002	2002070204-3
Upper Ione Mine		
FS-(U)-IM-01-0-0.165(W)	7/8/2002	2002070204-4
FS-(U)-IM-02-0-0.165(W)	7/8/2002	2002070204-5
FS-(U)-IM-03-0-0.165(W)	7/8/2002	2002070204-6
FS-(U)-IM-04-0-0.165(W)	7/8/2002	2002070204-7
Mill Site		
FS-MS-01-0-3(T)	11/14/2001	2001110192-1
FS-MS-01-3-3.5(N)	11/14/2001	2001110192-2
FS-MS-03-0-2(T)	11/14/2001	2001110192-3

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

D - Duplicate sample

Table B4
Cross Reference of Lab and Sample Numbers
Bear Gulch Mine Complex
Site Investigation
IPNF

Site	Sample Date	Laboratory Report Sample Number
Mill Site		
FS-MS-05-0-3.5(W)	11/14/2001	2001110192-4
FS-MS-05-3.5-4(W)	11/14/2001	2001110192-5
FS-MS-06-0-4(N)	11/14/2001	2001110192-6
FS-MS-09-0-4(W)	11/14/2001	2001110192-7
FS-MS-12-0-2(T)	11/14/2001	2001110192-8
FS-MS-12-2.5-3(N)	11/14/2001	2001110192-9
FS-MS-13-0-1.5(W)	11/14/2001	2001110192-10
FS-MS-101(SW)	11/15/2001	2001110187-1
FS-MS-101(SE)	11/15/2001	2001110187-2
FS-MS-102(SW)	11/15/2001	2001110187-3
FS-MS-102(SE)	11/15/2001	2001110187-4
Lower Orofino Mine		
FS-(L)-OM-01-0-0.165(W)	7/9/2002	2002070204-8
FS-(L)-OM-02-0-0.165(W)	7/9/2002	2002070204-9
FS-(L)-OM-03-0-0.165(W)	7/9/2002	2002070204-10
FS-(L)-OM-04-0-0.165(W)	7/9/2002	2002070204-11
FS-(L)-OM-102-(SW)	7/12/2002	2002070160-4
Upper Orofino Mine		
FS-(U)-OM-01-0-0.165(W)	7/9/2002	2002070204-12
FS-(U)-OM-02-0-0.165(W)	7/9/2002	2002070204-13
FS-(U)-OM-03-0-0.165(W)	7/9/2002	2002070204-14
FS-(U)-OM-04-0-0.165(W)	7/9/2002	2002070204-15
FS-(U)-OM-04-0-0.165(W)	7/9/2002	2002070204-27
FS-(U)-OM-101-(SW)	7/12/2002	2002070160-3
Lower Silver Scott Mine		
FS-SC-(L)-01-0-0.165(W)	11/13/2001	2001110190-1
FS-SC-(L)-02-0-0.165(W)	11/13/2001	2001110190-2
FS-SC-(L)-03-0-0.165(W)	11/13/2001	2001110190-3
FS-SC-(L)-04-0-0.165(W)	11/13/2001	2001110190-4
FS-SC-(L)-05-0-0.165(W)	11/13/2001	2001110190-5
Upper Silver Scott Mine		
FS-SC-(U)-01-0-0.165(W)	11/13/2001	2001110191-1
FS-SC-(U)-02-0-0.165(W)	11/13/2001	2001110191-2
FS-SC-(U)-03-0-0.165(W)	11/13/2001	2001110191-3
FS-SC-(U)-04-0-0.165(W)	11/13/2001	2001110191-4

Notes:

W - Waste Rock
T - Tailings
N - Native
SE - Sediment

D - Duplicate sample

Table B5
Summary of Stream Flow Gauging
Bear Gulch Mine Complex
Site Investigation
IPNF

15-Nov-01								
location	d.f.i.p	width	depth	revols.	time	velocity	area	discharge
FS-MS-101 (SW)	0	0.25	0.0	0		0	0.00	0
	0.5	0.50	0.1	0	40	0	0.05	0
	1	0.50	0.3	10	43	0.26	0.15	0.04
	1.5	0.50	0.3	15	43	0.37	0.15	0.06
	2	0.50	0.4	10	50	0.22	0.20	0.04
	2.5	0.50	0.4	10	42	0.26	0.20	0.05
	3	0.50	0.5	30	46	0.67	0.25	0.17
	3.5	0.50	0.5	40	53	0.77	0.25	0.19
	4	0.50	0.5	40	40	1.01	0.25	0.25
	4.5	0.50	0.5	50	40	1.25	0.25	0.31
	5	0.50	0.4	60	43	1.39	0.20	0.28
	5.5	0.50	0.4	50	47	1.07	0.20	0.21
	6	0.50	0.3	60	44	1.36	0.15	0.20
	6.5	0.50	0.3	40	44	0.92	0.15	0.14
	7	0.50	0.2	50	44	1.14	0.10	0.11
	7.5	0.50	0.1	0	40	0	0.05	0
	8	0.25	0.0	0	0	0	0.00	0
		TOTAL				AVERAGE	TOTAL	TOTAL
		8				0.71	2.60	2.06

location	d.f.i.p	width	depth	revols.	time	velocity	area	discharge
FS-MS-102 (SW)	0	0.50	0	0			0.00	0
	1	1.00	0.2	0	40	0	0.20	0
	2	1.00	0.3	3	40	0.10	0.30	0.03
	3	1.00	0.5	15	40	0.39	0.50	0.20
	4	1.00	0.6	40	48	0.84	0.60	0.51
	5	1.00	0.7	20	41	0.50	0.70	0.35
	6	1.00	0.9	15	40	0.39	0.90	0.35
	7	1.00	0.6	7	40	0.20	0.60	0.12
	8	1.00	0	0		0	0.00	0
	9	1.00	0.1	0	0	0	0.10	0
	10	0.50	0	0			0.00	0
		TOTAL				AVERAGE	TOTAL	TOTAL
		10.00				0.27	3.90	1.56

12-Jul-02		
location	method	discharge
FS-(L)IM-101 (SW)	E	0.001-0.002
FS-(L)OM-102 (SW)	E	0.009
FS-(U)OM-101 (SW)	E	0.009
FS-(U)BT-101 (SW)	M	0.0007
FS-(M)BT-102 (SW)	M	0.0004

Notes:
d.f.i.p. Distance from initial point (feet)
revols. Revolutions
time (seconds)
velocity (feet per second)
area (square feet)
discharge (cubic feet per second)
M measured
discharge (cubic feet per second)

Table B6
Surface Water Quality
Bear Gulch Mine Complex
Site Investigation
IPNF

Parameter	Acute Standard [1]	Chronic Standard [1]	Sample Location / Date						
			FS-MS-101(SW) 11/15/01	FS-MS-102(SW) 11/15/01	FS-(U)-BT-101(SW) 7/11/02	FS-(M)-BT-102(SW) 7/11/02	FS-(U)-OM-101(SW) 7/12/02	FS-(L)-OM-102(SW) 7/12/02	FS-(L)-IM-101(SW) 7/12/02
Dissolved Metals									
Aluminum as Al (mg/l)	--	--	U 0.05	U 0.05	U 0.1	U 0.1	U 0.1	U 0.1	U 0.1
Antimony as Sb (mg/l)	--	--	U 0.005	U 0.005	0.023	U 0.005	U 0.005	U 0.005	U 0.005
Arsenic as As (mg/l)	0.36	0.19	U 0.001	U 0.001	0.007	U 0.001	U 0.001	U 0.001	U 0.001
Cadmium as Cd (mg/l)	0.00082*	0.00037*	U 0.0001	U 0.0001	U 0.001	0.0018	0.021	0.035	0.0006
Chromium as Cr (mg/l)	0.0176*+	0.057*+	U 0.001	U 0.001	U 0.001	U 0.001	U 0.001	U 0.001	U 0.001
Copper as Cu (mg/l)	0.0046*	0.0035*	U 0.001	U 0.001	U 0.001	U 0.001	0.001	0.003	0.001
Iron as Fe (mg/l)	--	--	U 0.02	U 0.02	U 0.01	U 0.01	U 0.01	U 0.01	U 0.01
Lead as Pb (mg/l)	0.014*	0.00054*	U 0.003	U 0.003	0.004	0.012	0.17	0.36	0.03
Manganese as Mn (mg/l)	--	--	U 0.005	U 0.005	U 0.005	U 0.005	0.008	0.024	U 0.005
Mercury as Hg (mg/l)	0.002*	0.000012*	U 0.0002	U 0.0002	U 0.0002	U 0.0002	U 0.0002	U 0.0002	U 0.0002
Nickel as Ni (mg/l)	0.438*	0.049*	U 0.02	U 0.02	U 0.02	U 0.02	U 0.02	U 0.02	U 0.02
Silver as Ag (mg/l)	0.00032*		U 0.0005	U 0.0005	U 0.0005	U 0.0005	U 0.0005	U 0.0005	U 0.0005
Zinc as Zn (mg/l)	0.035*	0.032*	0.06	U 0.01	0.03	0.52	3.28	5.68	0.19
Ions and Nutrients									
Acidity as CaCO3 (mg/l)	--	--	U 2	U 2	U 2	U 2	U 2	U 2	U 2
Alkalinity Bicarbonate as HCO3 (mg/l)	--	--	11	11	44	24	61	11	12
Alkalinity Carbonate as CO3 (mg/l)	--	--	0	0	0	0	0	0	0
Alkalinity Total as CaCO3 (mg/l)	--	--	9	9	36	20	50	9	10
Calcium as Ca (mg/l)	--	--	U 1	U 1	22	12	24	5	4
Chloride as Cl (mg/l)	--	--	U 4	U 4	U 2	U 2	U 2	U 4	U 2
Fluoride (mg/l)	--	--	U 0.05	U 0.05	U 0.05	U 0.05	U 0.05	U 0.05	U 0.05
Hardness as CaCO3 (mg/l)	--	--	U 7	U 7	71	42	93	17	10
Magnesium as Mg (mg/l)	--	--	U 1	U 1	4	3	8	1	U 1

Notes:

µmhos/cm - Micromhos per centimeter

s.u. - Standard Units

mg/L - Milligrams per liter

U - Not detected above laboratory Practical Quantitation Limit (PQL)

1 - IDPA 58.01.02.210.07

* - Based on hardness of 25mg/l $CaCO_3$

+ - Chromium III

-- - Not available

Table B6
Surface Water Quality
Bear Gulch Mine Complex
Site Investigation
IPNF

Parameter	Acute Standard [1]	Chronic Standard [1]	Sample Location / Date						
			FS-MS-101(SW) 11/15/01	FS-MS-102(SW) 11/15/01	FS-(U)-BT-101(SW) 7/11/02	FS-(M)-BT-102(SW) 7/11/02	FS-(U)-OM-101(SW) 7/12/02	FS-(L)-OM-102(SW) 7/12/02	FS-(L)-IM-101(SW) 7/12/02
Potassium as K (mg/l)	--	--	U 1	U 1	U 1	U 1	U 1	U 1	U 1
Sodium as Na (mg/l)	--	--	2	2	2	2	2	1	1
Sulfate as SO4 (mg/l)	--	--	U 5	U 5	26	23	45	27	9
Physical Parameters									
Electrical Conductivity (umhos/cm)	--	--	29	25	129	86	190	77	32
pH (s.u.)	6.5-9.5	6.5-9.5	6.8	6.9	7.3	7.4	7.2	6.9	6.8
Total Dissolved Solids (mg/l)	--	--	50	58	95	67	127	55	40
Total Metals									
Aluminum as Al (mg/l)	--	--	U 0.05	U 0.05	U 0.1	U 0.1	U 0.1	U 0.1	U 0.1
Antimony as Sb (mg/l)	--	--	U 0.005	U 0.005	0.028	U 0.005	U 0.005	U 0.005	U 0.005
Arsenic as As (mg/l)	0.36	0.19	U 0.001	U 0.001	0.01	U 0.001	U 0.001	U 0.001	U 0.001
Cadmium as Cd (mg/l)	0.00082*	0.00037*	0.0003	U 0.0001	U 0.001	0.0021	0.024	0.049	0.0005
Chromium as Cr (mg/l)	0.0176*+	0.057*+	U 0.001	U 0.001	U 0.001	U 0.001	U 0.001	U 0.001	U 0.001
Copper as Cu (mg/l)	0.0046*	0.0035*	U 0.001	U 0.001	U 0.001	0.001	0.002	0.005	0.002
Iron as Fe (mg/l)	--	--	2.36	1.11	0.19	U 0.01	U 0.01	U 0.01	U 0.01
Lead as Pb (mg/l)	0.014*	0.00054*	0.006	U 0.003	0.005	0.045	0.33	0.76	0.043
Manganese as Mn (mg/l)	--	--	U 0.005	U 0.005	0.01	U 0.005	0.006	0.021	U 0.005
Mercury as Hg (mg/l)	0.002*	0.000012*	U 0.0002	U 0.0002	U 0.0002	U 0.0002	U 0.0002	U 0.0002	U 0.0002
Nickel as Ni (mg/l)	0.438*	0.049*	U 0.02	U 0.02	U 0.02	U 0.02	U 0.02	U 0.02	U 0.02
Silver as Ag (mg/l)	0.00032*		U 0.0005	U 0.0005	U 0.0005	U 0.0005	U 0.0005	U 0.0005	U 0.0005
Zinc as Zn (mg/l)	0.035*	0.032*	0.21	0.16	0.02	0.71	3.83	8.17	0.2

Notes:

µmhos/cm - Micromhos per centimeter

s.u. - Standard Units

mg/L - Milligrams per liter

U - Not detected above laboratory Practical Quantitation Limit (PQL)

1 - IDPA 58.01.02.210.07

* - Based on hardness of 25mg/l $CaCO_3$

+ - Chromium III

-- - Not available

Appendix C

Stream Survey Data Sheets and Field Notebooks

MAXIM Technologies Inc.

MAXIM
TECHNOLOGIES INC

Surface Water Discharge Measurement/Sample Notes

Sta. No. FS-MS-101 (SW)

Site Name: Bear Gulch

Date 11-15-01 Time _____

Field Crew D May J Armstrong

Discharge Summary

Total Disch. (cfs) 2.06

Width 8'

Area 2.6

Average Velocity .71

Type of Meter Pygmy

Method .6

Spin Test +30 sec

Sample Summary

Samples Collected: ✓

Sample Method: EWI ____ EDI ____ Grab ✓

Sample Time: 0830

Bottle List 1; 1 L Poly Comm'l

1; 500ml Poly T Metals

1; 500ml Poly D Metals

Site Information

Wading NA ft. above/below gage

Measurement Rating: Excellent ____ Good ✓ Fair ____ Poor ____

Flow (describe) slightly rippled

Cross-Section (describe) Cobbles, Boulders minor sand/gravel

Weather clear & cool

Remarks Below Mill site By sockpd FS-MS-101

Field Parameters

pH (s.u.) 7.39

Specific Conductivity (µmhos/cm) 37.6

Temperature (C°) 4

Dissolved Oxygen (mg/l) _____

ORP _____

Turbidity (NTU) _____

Gage Information

Staff Gage Reading _____

Inside Gage Reading _____

Intake Flushed _____

Record Removed/Replaced _____

Notes

Angle Coeff	Dist from initial point (ft)	Width (ft)	Depth (ft)	Observation Depth (ft)	Revolutions	Time in Seconds	Velocity (ft/sec) At point	Velocity (ft/sec) Mean in Vertical	Adjusted for horizontal angle	Area (ft^2)	Discharge (ft^3/sec)	
	REW 0		0									
	.5		.1		0	40	0					.85
	1		.3		10	43	.255			.150	.038	
	1.5		.3		16	43	.368			.150	.055	.90
	2		.4		10	50	.223			.20	.044	
	2.5		.4		10	42	.260			.20	.052	.92
	3		.5		30	46	.665			.25	.166	.94
	3.5		.5		40	53	.765			.25	.191	
	4		.5		40	40	1			.25	.251	.96
	4.5		.5		50	40	1.24			.25	.312	.97
	5		.4		60	43	1.39			.20	.278	.98
	5.5		.4		50	47	1.06			.20	.213	.99
	6		.3		60	44	1.36			.15	.204	
	6.5		.3		40	44	.916			.15	.137	
	7		.2		50	44	1.13			.1	.113	1.00
	7.5		.1		0	40	0			.05	0	
	REW 8		0									

MAXIM
TECHNOLOGIES INC

Surface Water Discharge Measurement/Sample Notes

Sta. No. FS-MS-102 (SW)

Site Name: above Mill site

Date 11-15-01 Time _____

Field Crew D May J Armstrong

Discharge Summary

Total Disch. (cfs) 1.56 Type of Meter Pygmy

Width 10' Method .6

Area 3.9 Spin Test +30 sec

Average Velocity .27

Sample Summary

Samples Collected: yes

Sample Method: EWI ____ EDI ____ Grab ✓

Sample Time: 0930

Bottle List 1; 1L Poly Conmons

1; 500ml Poly Total Metals

1; 500ml Poly Dissolved Metals

Site Information

Wading _____ ft. above/below gage

Measurement Rating: Excellent ____ Good ____ Fair ✓ Poor ____

Flow (describe) slightly riffled

Cross-Section (describe) Cobbles, gravels, minor boulders

Weather clear + cool

Remarks At 4 wheeler crossing upstream of Mill ≈ 600'

Field Parameters

pH (s.u.) 7.17

Specific Conductivity (µmhos/cm) 22.4

Temperature (C°) 4

Dissolved Oxygen (mg/l) _____

ORP _____

Turbidity (NTU) _____

Gage Information

Staff Gage Reading _____

Inside Gage Reading _____

Intake Flushed _____

Record Removed/Replaced _____

Notes

Angle Coeff	Dist from initial point (ft)	Width (ft)	Depth (ft)	Observation Depth (ft)	Revolutions	Time in Seconds	Velocity (ft/sec) At point	Velocity (ft/sec) Mean in Vertical	Adjusted for horizontal angle	Area (ft^2)	Discharge (ft^3/sec)	
LEW	0	0	0									
	1		.2		0	40	0					.85
	2		.3		3	40	.101			.3	.03	
	3		.5		15	40	.394			.5	.197	.90
	4		.6		40	48	.842			.6	.505	
	5		.7		20	41	.504			.7	.353	.92
	6		.9		15	40	.374			.9	.355	.94
	7		.6		7	40	.199			.6	.119	
	8		0 Rock				0			0		.96
	9		.1		0	0	0			.1		.97
RFW	10		0									.98
												.99
												1.00

MAXIM TECHNOLOGIES INC

Surface Water Discharge Measurement/Sample Notes

Sta. No. FS-(4)OM-101(SW)

Site Name: Upper Orofino

Date 7-12-02 Time 0900

Field Crew D May

Discharge Summary

Total Disch. (cfs)_____ Type of Meter _____

Width _____ Method _____

Area _____ Spin Test _____

Average Velocity _____

Sample Summary

Samples Collected: ✓

Sample Method: EWI_____ EDI _____ Grab ✓

Sample Time: 0900

Bottle List	
500 ml Poly	Total Metals
500 ml Poly	Diss Metals
500 ml Poly	Common Ions

Site Information

Wading _____ ft. above/below gage

Measurement Rating: Excellent _____ Good _____ Fair _____ Poor _____

Flow (describe) _____

Cross Section (describe) _____

Weather _____

Remarks Flow estimated at 4 gpm. See pg 2.

Field Parameters

pH (s.u.) 6.45

Specific Conductivity (umhos/cm) 46

Temperature (C°) 8

Dissolved Oxygen (mg/l) ________

ORP ________

Turbidity (NTU) ________

Gage Information

Staff Gage Reading ________

Inside Gage Reading ________

Intake Flushed ________

Record Removed/Replaced ________

Notes

Flow is coming from a 2" pipe! When slugged - not much pressure at all - when released very little increase in flow at start

Angle Coeff	Dist from initial point (ft)	Width (ft)	Depth (ft)	Observation Depth (ft)	Revolutions	Time in Seconds	Velocity (ft/sec) At point	Velocity (ft/sec) Mean in Vertical	Adjusted for horizontal angle	Area (ft²)	Discharge (ft³/sec)	
												.85
												.90
												.92
												.94
												.96
												.97
												.98
												.99
												1.00

MAXIM
TECHNOLOGIES INC

Surface Water Discharge Measurement/Sample Notes

Sta. No. FS-(m)BT-102(SW)

Site Name: Middle Bear Top Adit

Date 7-11-02 Time 1440

Field Crew D May

Discharge Summary

Total Disch. (cfs)_____ Type of Meter _____

Width _____ Method _____

Area _____ Spin Test _____

Average Velocity _____

Sample Summary

Samples Collected: ✓

Sample Method: EWI____ EDI ____ Grab ✓

Sample Time: 1440

Bottle List 1; 500ml Poly Total Metals

1; 500ml Poly Diss Metals

1; 500ml Poly Common Ions

_____ _____

Site Information

Wading _____ ft. above/below gage

Measurement Rating: Excellent____ Good____ Fair ___/ Poor ✓

Flow (describe) Seep

Cross Section (describe) _____

Weather clear + Hot

Remarks ~50 ml in 5 sec

0.15 gpm

Field Parameters

pH (s.u.) 6.27

Specific Conductivity (µmhos/cm) 154

Temperature (C°) 4.0

Dissolved Oxygen (mg/l) NA

ORP NA

Turbidity (NTU) NA

Gage Information

Staff Gage Reading _____

Inside Gage Reading _____

Intake Flushed _____

Record Removed/Replaced _____

NA

Notes

Angle Coeff	Dist from initial point (ft)	Width (ft)	Depth (ft)	Observation Depth (ft)	Revolutions	Time in Seconds	Velocity (ft/sec) At point	Velocity (ft/sec) Mean in Vertical	Adjusted for horizontal angle	Area (ft^2)	Discharge (ft^3/sec)	
												.85
												.90
												.92
												.94
												.96
												.97
												.98
												.99
												1.00

MAXIM
TECHNOLOGIES INC

Surface Water Discharge Measurement/Sample Notes

Sta. No. FS-(L)OM-102-SW

Site Name: Lower Orofino Mine

Date 7-12-02 Time 1000

Field Crew D May

Discharge Summary

Total Disch. (cfs) _____ Type of Meter _____

Width _____ Method _____

Area _____ Spin Test _____

Average Velocity _____

Sample Summary

Samples Collected: ✓

Sample Method: EWI _____ EDI _____ Grab ✓

Sample Time: 1000

Bottle List 500 ml Poly Total Metals

500 ml Poly Diss Metals

500 ml Poly Common Ions

_____ _____

Site Information

Wading _____ ft. above/below gage

Measurement Rating: Excellent _____ Good _____ Fair _____ Poor _____

Flow (describe) _____

Cross Section (describe) _____

Weather Clear + HOT

Remarks Flow = H C PM

Field Parameters

pH (s.u.) 6.05

Specific Conductivity (µmhos/cm) 78

Temperature (C°) 5

Dissolved Oxygen (mg/l) ____

ORP ____

Turbidity (NTU) ____

Gage Information

Staff Gage Reading ____

Inside Gage Reading ____

Intake Flushed ____

Record Removed/Replaced ____

Notes

Flow surfaces ≈ 20' from adit flows into partitioned concrete vault ≈ 4'x6'x2' 2nd chamber is cracked. H_2O flows out here + infiltrates

Angle Coeff	Dist from initial point (ft)	Width (ft)	Depth (ft)	Observation Depth (ft)	Revolutions	Time in Seconds	Velocity (ft/sec) At point	Velocity (ft/sec) Mean in Vertical	Adjusted for horizontal angle	Area (ft^2)	Discharge (ft^3/sec)	
												.85
												.90
												.92
												.94
												.96
												.97
												.98
												.99
												1.00

MAXIM
TECHNOLOGIES INC

Surface Water Discharge Measurement/Sample Notes

Sta. No. FS-(L)IM-101-(SW)

Site Name: Lower Tone Mine

Date 7-12-02 Time 1055

Field Crew D May

Discharge Summary

Total Disch. (cfs) _____ Type of Meter _____

Width _____ Method _____

Area _____ Spin Test _____

Average Velocity _____

Sample Summary

Samples Collected: ✓

Sample Method: EWI ____ EDI ____ Grab ✓

Sample Time: 1055

Bottle List

500 ml Poly	Total Metals
500 ml Poly	Diss Metals
500 ml Poly	Common Ions

Site Information

Wading _____ ft. above/below gage

Measurement Rating: Excellent ____ Good ____ Fair ____ Poor ____

Flow (describe) _____

Cross Section (describe) _____

Weather Clear & HOT

Remarks Flow estimated 5-10 gpm

Field Parameters

pH (s.u.) 6.14

Specific Conductivity (µmhos/cm) 115

Temperature (C°) 6

Dissolved Oxygen (mg/l) _____

ORP _____

Turbidity (NTU) _____

Gage Information

Staff Gage Reading _____

Inside Gage Reading _____

Intake Flushed _____

Record Removed/Replaced _____

Notes

Flow daylights ≈ 15' from adit seeps ≈ 50-60' down road & infiltrates there water is standing on floor of adit collected sample between adit & ore cart

Angle Coeff	Dist from initial point (ft)	Width (ft)	Depth (ft)	Observation Depth (ft)	Revolutions	Time in Seconds	Velocity (ft/sec) At point	Velocity (ft/sec) Mean in Vertical	Adjusted for horizontal angle	Area (ft^2)	Discharge (ft^3/sec)	
												.85
												.90
												.92
												.94
												.96
												.97
												.98
												.99
												1.00

MAXIM TECHNOLOGIES INC

Surface Water Discharge Measurement/Sample Notes

Sta. No. FS-(U)BT-101-(SW)

Site Name: adit above chute

Date 7-11-02 Time 1345

Field Crew D May

Discharge Summary

Total Disch. (cfs) _____ Type of Meter _____

Width _____ Method _____

Area _____ Spin Test _____

Average Velocity _____

Sample Summary

Samples Collected: ✓

Sample Method: EWI ____ EDI ____ Grab ✓

Sample Time: 1345

Bottle List 1; 500ml Poly Total Metals

1; 500ml Poly Diss Metals

1; 500ml Poly Common Ions

_____ _____

Site Information

Wading _____ ft. above/below gage

Measurement Rating: Excellent ____ Good ____ Fair ✓ Poor ____

Flow (describe) seeping

Cross Section (describe) _____

Weather clear + Hot

Remarks filled 100ml container in 5 sec = 0.3

Field Parameters

pH (s.u.) 6.22

Specific Conductivity (µmhos/cm) 66

Temperature (C°) 7.0

Dissolved Oxygen (mg/l) ________

ORP ________

Turbidity (NTU) ________

Gage Information

Staff Gage Reading ________

Inside Gage Reading ________

Intake Flushed ________

Record Removed/Replaced ________

Notes

	Angle Coeff	Dist from initial point (ft)	Width (ft)	Depth (ft)	Observation Depth (ft)	Revolu-tions	Time in Seconds	Velocity (ft/sec) At point	Velocity (ft/sec) Mean in Vertical	Adjusted for horizontal angle	Area (ft ^{2})	Discharge (ft ^{3}/sec)	
													.85
													.90
													.92
													.94
													.96
													.97
													.98
													.99
													1.00

FIELD

All-Weather Notebook
No. 351

1 PNF USFS

Bear Gulch Complex Sept 5, 2001
Beauty Creek, September 6, 2001

"Rite in the Rain"®
ALL-WEATHER WRITING PAPER

Name KW Clark
Maxim
Address P.O. Box 2730
Missoula MT 59806
Phone 406/543-3045

Project

INCHES

Yellow Polyethylene Protective Slipcovers (Item #31) are available for this style of notebook. Helps protect your notebook from wear & tear. Contact your dealer or the J. L. Darling Corporation.

CONTENTS

9/5/2011

Linda Lanham
Paul Mack
Ray Tejoro
K. Bill Clarke
Mike Cormier
Jerry Armstrong

1206 Thompson Pass parking area.

Watershed Analysis
Steve Fox + John Wallis Ustars

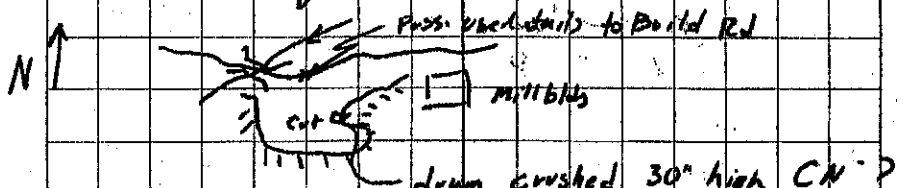
Bear Gulch ~10 miles east of T. Pass. just east of Mile Post 10

Ponds near jct w/ T. Pass road.

At mill site "Bear Top"
Linda asks that Maxim differentiate between material on private vs. F.S.
Jeff Johnson USFS will provide Maxim w/ survey info.

Bear Top Mill Site

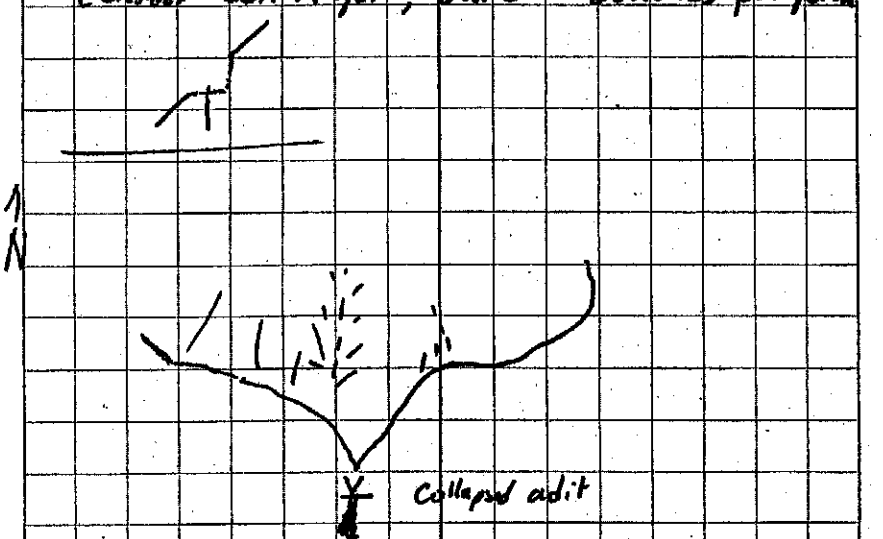
South side of Road, cut in tailings pile



Ray Tejoro
Site defined: downstream to gulley from Grafina mine

Bear Top Main level

Consider Soil Auger, build on benches platform



Consider trench to north, daylight at dump
look for color ⊙

This adit was a crosscut 2,200' to vein, 500'

2:30pm

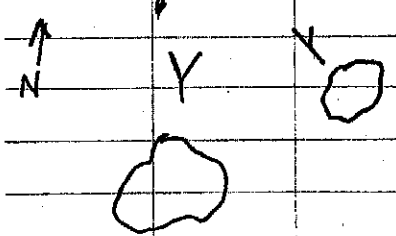
Bear Top Level 2

Ore chute load out, sulfide ore @ base of chute:
adj. to shoot up to level 3

Level 3 - 3 adits, 2 stopes

At top of ore chute - open adit w/ standing water.
East side of ore chute: argillaceous waste rx

Methods: Levels 1:2 Excavator
Ore chute up to level 3 : the 3 adits/dumps:
2 stopes = hand sample

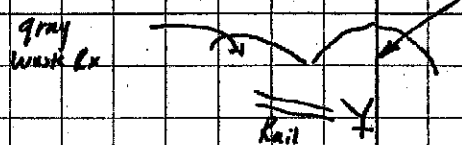


Measure depth of both stopes

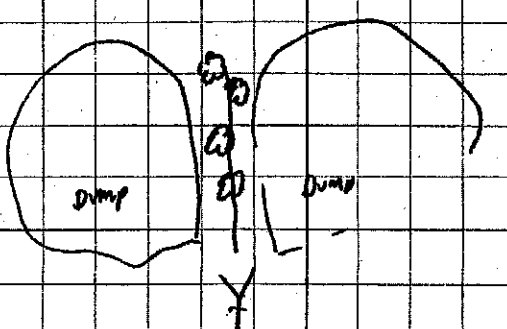
4:07 pm

- Upper lone adit : dump
  Accessed by trail from road to the east
  Dump iron stained.
- Portal 37' deep w/ water to ~ 4' from surface
  dump below

- Lower lone Eastern Adit + dump
  Slight sulfide odor : Fe staining.
  Backhoe access



- Lower lone West adit/dumps
  Seep out of adit, partially collapsed
  No backhoe access
  Hand sample



Check End of Gulch & Bear Gulch for Seeps

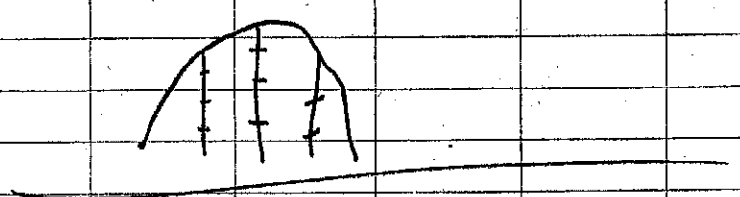
Orofino

Lower East dump w/ loadout [illegible] : remains of old Grizzly

Ray/Mike: no need to survey dumps - use tape inclinometer to measure. Use resource Grade GPS for roads & general location. Augment w/ USFS maps & air photos)

GET Air Photo Blown up or digital

Method longitudinal transects down dumps



Adit flowing ~5gpm to cistern - cold air from adit

did not walk to upper level - no known road access

GET - Scan of Photos from SO office.

Sept 6, 91

Beauty Creek

n Northrup Ervin Brooks Forest Engineer

de Lantram, Paul Mack

3 miles of Road

~ 1 mile may not have the subgrade/basecourse

As, Pb, Zn, Bi 1977 assay

ed due to sulfides in Basecourse/Subgrade ~ 1978

38 existing Road

firm/deny As excl. problem in road

ver - Culvert replacements (4 culverts at a minimum)

ed then, recommendations

urce: vein may only be a part of the basecourse Subgrade

Prim. 02 - Sampling program

Scope Include any seeps from road

follow sign reg. of IPNF - single agency

& or flag it on corners

, White, Dallas Thompson District met at Beauty Creek Campground

llas - east end of campground no mine waste due to existing road.

1993 Jeff Johnson, Geol., As in Beauty Creek Sds.

Basecoarse: from Quang - entire road

Aggregate diff. source

40-100 ppm.

Culvert areas: road failure areas need specific sampling, w/ the rest "random"

Result → recommendations for Road Management

One failure area entire section of road in "wet area" this area also target for Water Sampling of seeps.

Basecourse - actual unpatented mine w/ limited underground workings - no existing shafts.

Mileage from beginning of road - up from campground

0.5 - 0.9 Campground

1.9 - 2.0 Quang cut point out to North outcrop. Mike photographed. Portal gone along w/ all observable workings. No current concern w/ Sampling residual Crushing operation. Remaining is unaltered rock @ surface.

Analysis / incl. Fe, As, Cd, Pb, Zn, Cu, Fe

Sampling - 5 metals, total & leachable, soil paste pH
- Water samples if necessary through base course
- Systematic unbiased approach + 4 culverts

* method of sample preparation
either fine fraction vs. crushed (whole rock)

~ do whole rock analysis
~ include base line 3 samples from first 0.9 miles

Ken White has mile post survey
Ken will give to Jim Northrup

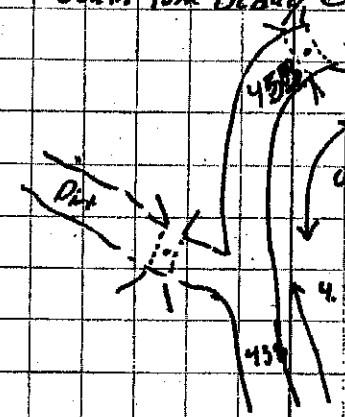
2

7 + Varnum Cr.
Culverts not fish passable can't thrust.
Site for sampling base course

Settling road - will be repaired pend. sampling results.

\+ Beauty Cr. culvert

4.33 + South fork Beauty Creek Culvert



4.43
0.1 + Culvert above road from 4.33

* seeps 4.7 - Area filled up to next drainage
Look for seeps through base course
if found next spring, sample H_2O

4.9 End of seep area
2-3 water samples
$30 - 40,000 awarded.

6.8 Junction w/ 439, end of project

Purpose of asphalt was to isolate the Arsenic

Reporting: Mike suggested combining SI & RI reports. OK with FS if we present the data in Technical Memo - Data Summary Report with meeting.

Then draft final SI/RI report & final meeting.

win wks

Traffic Issues
7-10 days notify FS, they'll post in paper "traffic delays"

Mike suggested 1 flag person & 2 man coring crew.

In Cost Estimate, include options for analyzing subgrade samples

OK to send cost proposals 9/17/01 for Bear Gulch & Beauty Creek.

Traffic Plan - avg. Speed 15-20 mph
MUTCD rule

7-10-01 B. Twardoski
B. Clark

photolog
pics 27-23 upper Bear tap zone
23-13 upper and middle zone

7/10/06

TO Do

1. Elev Altitude upper : Lower Subsurface + GPS

"Rite in the Rain®"

ALL-WEATHER WRITING PAPER

TRANSIT

All-Weather Notebook

No. 301

Bear Gulch - USFS

1570158.

10/22/01 → 11/15/01

4 5/8" x 7" - 48 Numbered Pages

"Rite in the Rain®"
ALL-WEATHER WRITING PAPER

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Address P.O. Box 2730
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Phone (406) 543-3045

Project

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10/22/01 J. Armstrong / Don May
Weather: Rain + Cool.

1045 Arrived @ / near Millsite.
Unloaded ATVs + prepared gear for sampling investigation @ Tone Mine site.

1100 Conducted safety meeting.

1230 Located upper waste rock dump at Tone Mine (w/ open adit)

1251 Located lower waste rock dump @ Tone Mine (w/ open adit + overburned yellow ore cart.).
Waste rock appears as two lobes of material extending below the adit that combine near bottom. Discussed approach to set up transect(s).

1346 (upstream) Set up transect on axis of "main" lobe beneath adit. Trend N 50° W
Length = 211' from road surface at adit (@ railroad tie).
40° slope of waste rock

Slope of native material west of waste rock = 40°

At 50' from toe looking up waste rock

FS-IM-(4)-01

32'	Left	0' thick
15'	Left	4' thick
0'		5' thick
15'	Right	6' thick
30'	Right	2' thick
45'	Right	0' thick
58'	Right	0' thick

Between 45' & 58'; ~ 1.5' thick lobe that extends ~20' down slope

At 100' from toe of slope

FS-IM-01-0-0820

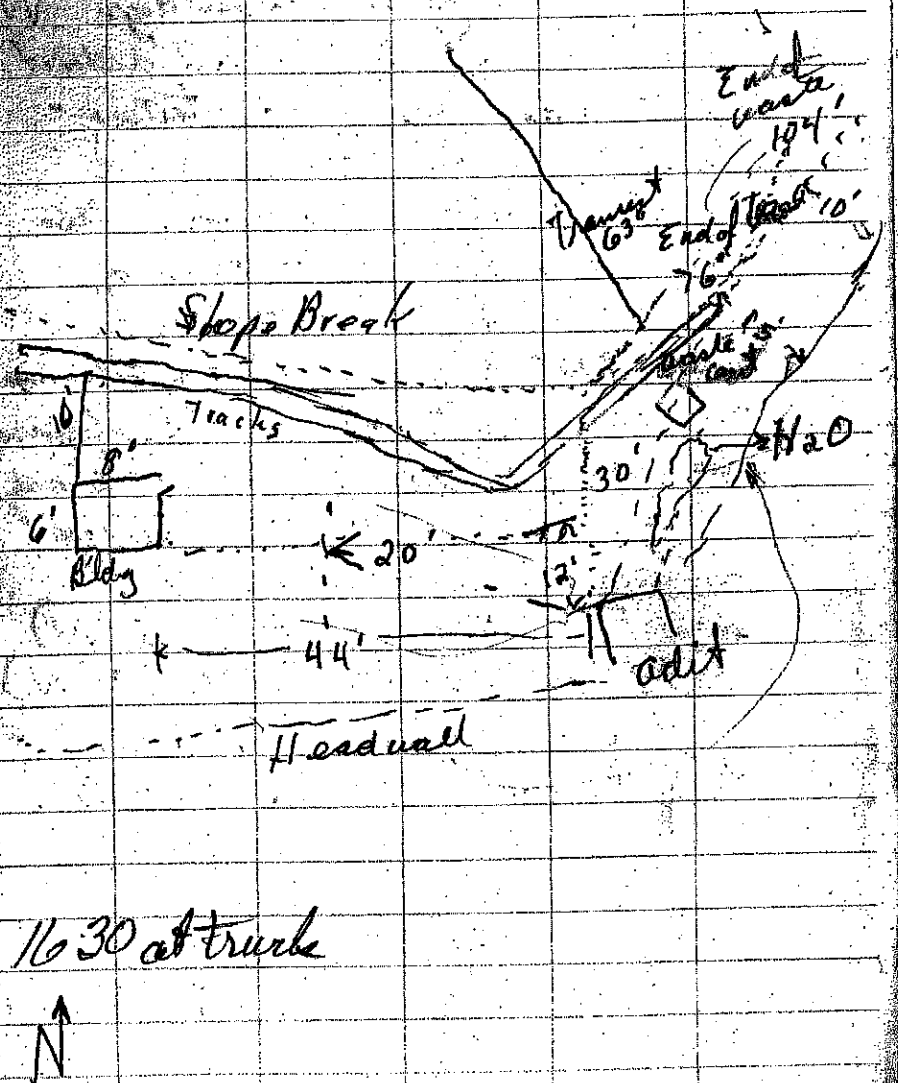
On centerline 0'	Right	8' thick
W 0.165 32'	Right	5' thick
45'	Right	1' thick
~ center of western lobe		5' thick
60'	Right	3' thick
70'	Right	0' thick

20' Left — 5' Thick
36' Left — 0' Thick
@ 150'
0' — 7' Thick
-03 20' Right — 2.5' Thick
40' Right — 0' Thick
on Between Holes (center + Western)
60' Right — 5' Thick
Directly down hill from shack
Center of Western Hole
77' Right — 2' Thick
94' Right edge — 0' Thick
20' Left — 3' Thick
40' Left — 0' Thick
Collected FS-IM-02-0-0.165(W)
@ 150' centerline.
-04 200' center — 7' Thick
21' Right — 3' Thick
32' Right — 5' Thick
60' Right — 6' Thick
75' Right — 7' Thick
center of W Hole Below Shack
99' R Edge of waste — 0' Thick
20' Left — 0' Thick

Collected FS-IM-03-0-0.165(W)
@ 200' on Tape for Transect
Collected FS-IM-03-0.165-1.25
same location but deeper W
Top 2' tan color, 2' distinct
change to grey - same texture -
1516 @ 150' Right edge of
waste digging for Native.
Sample Can not dig
in waste rock to find
Native, slope unstable
edges of waste are predominately
cobble size material. Only place
to collect Native material
is not under waste rock.
FS-IM-04-0-0.165(W)
FS-IM-04-0.165-1.25(W)
If you dig past 1.25' the
Material sloughs into Hole

Lower Zone

All measurements in relation to adit



16:30 at trunk

Summary of days Events

- Investigated Lower Zone Mine
Collected samples from 4 locations.
FS-ZM-01 - 0 - 0.165 (w)
-02 - 0 - 0.165 (w)
-03 - 0 - 0.165 (w)
-03 - 0.165 - 1.25 (w)
-04 - 0 - 0.165 (w)
-04 - 0.165 - 1.25 (w)

Material appears relatively consistent across site: Angular gravel & cobbles w/ fine sand. Dark grey in color. Upper ~1" in areas has a slightly brown hue (organics?).

10/23/01 J. Armstrong / D. May
Weather: Snow + Cold.

0817 At Bear Pa Gold claim "campground" to unload ATVs.
Note: Snow + Slush on Thompson Pass
Winter snow warning for this area.
Slight skiff of snow on ground at this spot, but still able to complete investigatory work.

0925 Flagged road spur to Lower Orphia Mine. Slope ~ 40° + snow covered. Too dangerous to work on. Lots of debris (e.g. wood metal, etc.). Other than lack of vegetation very hard to diff. wide rock perimeter.

0945 Flagged access road to Lower Bear Top Mine. Same conditions as Lower Orphia

1002 At Middle Bear Top (Bottom of Chute)
Approx 1.5" of snow covering ground + dropping. Unable to discern waste rock vs. native ex dept for lack of vegetation

1020 Flagged upper Bear Top access road. Location of large ho

1050 Flagged Road / Trail to Upper

Too cold to write on see next page down

1045 Flagged middle Zone Access Road. Photos

1056 Flagged Road/Trail to Upper Zone Mine adit.

1206 Backhoe travels ≈ 4-5 inches of snow above
More smoke coming down BIG T-lakes.

1230 offsite

11/13/01 J. Armstrong / A. May
Weather: Cloudy & Cold

Note: All times listed are MST.

0915 At Bear Top - Dropping mile.
Objectives for today are to flag waste & stake sampling locations @ millsite and flag Silver Scott mine site.

Start flagging lower portion along creek.
I began flagging east (upper) part of mill site.
Remnant access road identified to upper portion of waste rock / collapsed mill building. Should have this surveyed. Road is heavily treed (some ~ 14"-16" Ø).

1120 Flagged mill site. It is our opinion that area below bridge May consist of waste rock. Will have surveyors survey waste rock edge at the slope break above road + other side of creek. ~~Extent of survey to include~~ Survey to confluence w/ Orofino gulch. Separate survey of loading ramp area.

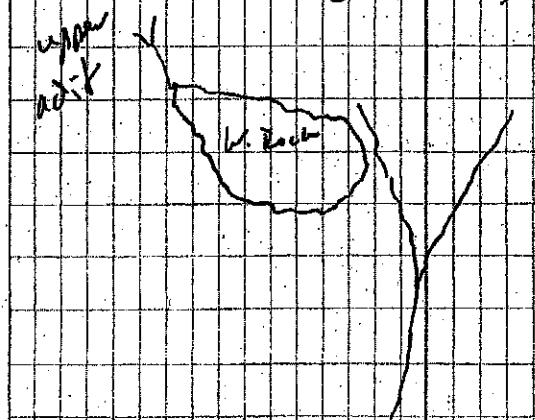
1158 Inspected potential trench spot @ Lower Bear Top. No drains. Looks like backhoe can make it.

1238 At Silver Scott mine. No water from lower adit. Heading uphill to upper waste rock dump/adit.

1328 Located upper adit + waste rock dump (red dump)

Transect Bearing (center lobe of upper dump)
N 89° E.
100' from Top to bottom of waste rock dump.
Open adit 25' from top of waste rock dump. No water flowing.
Dump is void of vegetation.
Ends @ creek (irrigation run creek)

Waste rock is composed of blocky angular cobble/boulder/gravel in red orange sandy silty matrix



Middle of dump has fewer large rock fragments

1345 Collected sample @ top of waste rock dump (100' from bottom) FS-SC(U)-01-

Sample consists of 3 subsamples collected at: ~7' on each side of transect + one on transect. The next samples will also be composed of 3 subsamples at same distances from transect.

1355 Collected FS-SC(U)-02-
@ 75' from bottom of dump
slope = 41°
Note: (U) indicates upper waste rock dump samples

1405 Collected FS-SC(U)-03
@ 50' from bottom of dump

Note: work plan suggested collecting hot spot sample(s). Material appears consistent across dump. No "hot spot" evident. Some darker zones

in material on left (looking downslope) side of dump. Some woody debris in rock may give it that hue.

1410 Collected FS-SC(U)-04-
@ 25' from bottom of dump.

1445 Began flagging edge of waste @ lower dump drive-in cuts

1500 Flagged bottom of dump. Material extends into stream channel. (Channel has large amount of debris including pipes, metal roofing, refrigerator.) Channel is scoured at least 200' downstream from our flags.

1510 190' from bench (at base elev as adj.) to top of slope. Transect located in drainage. (No subsamples will be collected at same transect line location as material is only large cobbles + boulders).

11/13/01 Photo Log

1 Top of Upper dump @ Silver Scott looking down slope
2 Top of Upper dump @ Silver Scott
3 Bottom of upper dump looking up slope / up transect @ Silver Scott
4 Looking down transect @ Lower Silver Scott.
5 Lower Silver Scott adit.
6 Partially collapsed building @ Silver Scott
7 Rail loading facility @ Silver Scott
8 Looking east at partially collapsed blds @ Silver Scott (adit in left ~~left~~ side of photo).

Transect Bearing
S10°E

Samples will be designated with (L) to indicate Lower Silver Scott dump. Sampling beginning @ 40' above toe of dump.

1525 FS-SC(L)-01-0-0.165(L)
Soil sample collected (looking upslope) 10' right, 15' left, + 30' left of transect
Material consists of blocky/angular boulders + cobbles in dark brown silty sand.
40' up from toe

1530 FS-SC(L)-02-0-0.145(L)
80' up from toe
Soil samples: 15' Right, 20' left, + 40' left

1540 Collected FS-SC(L)-03-0-0.165(lb) Subsample at 15' Right, 30' Left + 55' left of transect. Same material as below. Note: Stake is located ~25' west of collapsed loading structure, on bench below adit level.

1550 Collected FS-SC(L)-04-0-0.16(lb) Subsamples @ ~~60'~~ 50' Right (near partially collapsed frame for rail tracks), 25' ~~Right~~ Left, + 60 left of transect. Same material as below

1600 Collected FS-SC(L)-05-0-0.165(lb) sample is of material adjacent to partially collapsed load structure. Approx 20' from transect. Material is similar texture but less coarse fragments + slightly greyer in color.

1621 Heading down from lower Silver Scott.

Summary of Day

- Flagged edge of waste @ Bear Top mine site. Staked pedestrial test pit locations.
- Flagged edge of waste @ 2 dumps @ Silver Scott mine.
- Collected hand samples from each; upper dump samples identified w/ "U" Lower dump identified w/ (L) (4 samples collected from upper) (5 samples collected from lower)
- Photos taken of Silver Scott dumps

11/14/01 J. Armstrong / J. Macy
Weather: Cold + Rain

0650 Met Randy Johnson of Johnson Bros. @ T. Falls. Moved to jct of FS 9 + FS 938. Unloaded Excavator

0838 Arrived @ millsite. Site Safety meeting. Beginning excavation @ big tail piles

0845 FS-MS-01
Tailings 0'-3'
Gray V. angular gravel 65%
Gray F. to coarse sand 25%
silt 10%
Native 3'-74'
Dark brown sand to silty sand w/ organics (wood debris) and occasional gravel.
- Samples 0-? (T)
3-3.5 (W)
3.5-4 (N)

11/14/01 Photologs

1. FS-MS-01 - Tailings over matrix.
2. FS-MS-02 - Tailings
3. Close up of FS-MS-02 material.
4. Excavating test pit FS-MS-03.
5. FS-MS-03 - Tailings
6 FS-MS-04 - South side of test pit
7 FS-MS-04 - North side of test pit.
8 FS-MS-05 - South side of test pit.
9 FS-MS-06 - West end of test pit.
10 FS-MS-07
11 FS-MS-08
12+13 FS-BT(L)-01 Trench
14 FS-MS-09
15 FS-MS-10
16 Damaged Bridge
17 FS-MS-11
18 FS-MS-12
19 Damaged FS-MS-?
20 Damaged bridge

0910 FS-MS-02

Approx 4' of tailings. Water in bottom of test pit. Large boulder also. Suggests original creek channel w/ no soil development. No native samples collected. Texture/% same as FS-MS-01 - Sample 0-4 (T)

0925 FS-MS-03

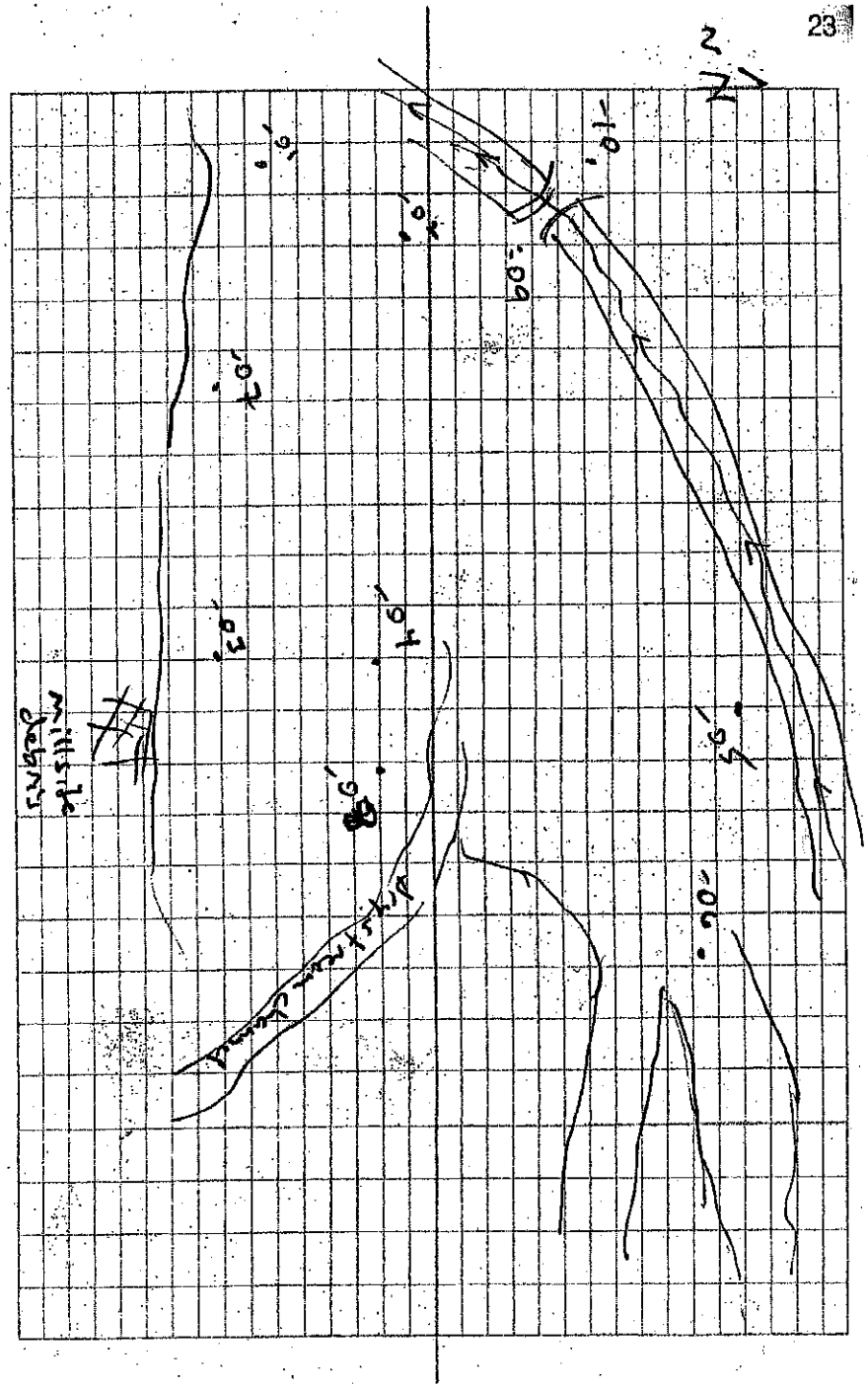
Located in west of millsite debris. Tailings w/ wood debris over native.

Tailings same as FS-MS-01 + -02, but includes wood debris + some coarse rock fragments (Perhaps slough from collaps of mill structure).

2-2.3 of brown silty sand

2.3-TD

Samples 0-2 (T)
2-2.5 (N)
2.5-3 (N)



0940 FS-MS-04
~Approx. 20' north of -03.
0-2 Tailings
Same as -03
2-2.5 native (Dk. brown silty sand + gravel)
Large angular boulders > 2.5' noted
Sample obtained
- Samples 0-2 (T)
2-2.5 (N)

1000 Survey crew (Matt + Barnett) arrive. They'll start @ Silver Scott.

1020 FS-MS-05
0-3.5 Waste Rock
Gravel 60-70%
Brown Sand + silt 30-40%
>3.5 native
Appears similar to 0-3.5 sample but slightly darker brown + coarse fragments slightly more rounded.
- Samples 0-3.5 (W)
3.5-4 (N)
4-4.5 (N)

1040 FS-MS-06
Cobble / Gravel 60-70%
Dk. brown silty sand 30-40%
Native material
- Sample 0-4 (N)

1055 FS-MS-07
Tailings 0-6.5'
Native > 6.5'
Tailings
Gravel 60-70%
~~Brown Sand~~ Grey Sand 30-40%
Note: Tailings sample 0-4'. Unable to collect 4-6' interval. Native sample collected from bucket.
- Samples 0-4 (T)
6.5-7 (N)
Native sample is dark brown silt to sandy silt

1125 FS-MC-08

0-1' Wood planks + gravel

1-1.8' Brown silty fine grained sand (Natural)

1.8-2 Tan to yellowish tan silty fine grained sand.

2-2.8 Large blocky cobbles + boulders

2.8-~~4'~~ Gravel; rounded gravel w/ brown sand

Obtained sample of silty sand 1-2'

- Sample 1-2 (N)

1150 Before digging on bridge abutments, we'll investigate backhoe access to Lower Bench Top on river.

1214 Jon returns. Backhoe @ Lower Bench Top.

Backhoe walking

1315 Collected trench sample @ ~12' from outlet opening. Appears 0-10' is made ground. Unable to collect sample below 10' due to water entering test pit. >10' is much harder & has slightly different appearance/color. Water entering from ~2.5' BGS.

Backfilling trench.

Trench began @ ~5' from opening & extended ~25'. Sample test pit @ ~12' from opening). Some piping & wood debris to ~5' BGS.

- Sample 20 ~~FS-BT(L)-0-10(N)~~

FS-BT(L)-01-0-10(N)

1345 Back @ mill site. Began
digging on east side of
bridge (FS-MS-09)
10' east of bridge

1350 FS-MS-09-0-4(W)
Cobble/Gravel 60%
Brown sand 40%
Water @ 4'
Large boulders @ 5'
Note: Did not include large boulders
in sample
- Sample 0'-4' (W)

1405 FS-MS-10
West side of bridge

Note: Bridge partially broke
when backhoe returned to west
side of bridge.
Tailings 0-0.2'
Gravel 60-70%
Gray sand 30-40%
Native > 0.2'
Boulders/Cobbles/Gravel 70-80%
Brown silty fine to med. g- 20-30%

No boulders in sample
- Samples 0-0.2 (T)
0.2-0.7 (N)
0.7-1.2 (N)

1435 FS-MS-11 (west of -10)
Upper 0-0.5' appear not
to be tailings. Tailings appear
mixed in sediments 0.5-1'.
Collected sample to from 0-1';
likely would remove all material
attempt to remove/dispose of only
the 0.5-1' interval.
- Sample 0-1 (T)
1-1.5 (N)
1.5-2 (N)

0-1'
Gravel 60-70%
dark grey sand (coarse) 30-40%
1-1.5'
Gravel 40%
Black silty sand 60%
1.5-2'
Sub rounded Gravel 70%

1445 FS-MS-12 (near Drohnio Gulch)
Approx 0.5' of soft non-tailing over 2.0 of tailings. Some coarse zone of tailings exhibit much greater % of coarse fractn + less fines, but still have the characteristic gray color.
- Samples 0-2'(T)
2-2.5'(N) } As in
2.5-3'(N) } FS-MS-11

It appears tailings are dispersed down stream at least to confluence of Drohnio gulch

1505 FS-MS-13
Toe of slope of loading area.
0-1.5(W)
Lt. brown silty sand w/ angular gravel. Were calling it waste rock because of it's contrast to material below it

1.5-2.5'(N)
Dk. brown silty sand w/ angular + subrounded gravel. Distinct contact between two sediment types.

1515 Left Buckhorn Home.
Don + I discussed how best to use the time remaining. We expect to complete the following:
- Beer Gulch / Silver Creek stream sampling
- GPS roads
- Resample Lower Tone
We'll try to locate stream sample locations + I'll attempt hand dug test pit just upstream of Drohnio Gulch.

1600 Attempted to dig test pits above confluence w/ Orofino gulch. Deepest ~ 1' BGS. Many large boulders prevent deeper digging. Identified several near surface deposits of grey tailings. Unconsolidated deposits. Lots of metal debris & wood timbers throughout area. (Note: test pits located between stream & north facing slope). Numerous small trees (< 8" ϕ), One old car body partially buried in sediment.

1626 Met Don back @ truck. Heading out.

1639 Identified tributary below Silver Scott Mine. No water flowing.

1702 At highway

Summary

- Backhoe arrived & excavated 13 test pits FS-MS-01 → -13
- Numerous photos
- Don identified stream gaging locations
- I excavated hand dug test pits west of mill site (across stream). Found dispersed tailings near surface
- Surveyors working @ Silver Scott

11/15/01 J. Armstrong / D. May
Weather: Partly Cloudy & Cold

0758 At Bear Top mill site.
GPS unit does not have datum dictionary loaded. Not able to locate reach.
Calibrating meters for surface water sampling @ Bear Gulch.
pH ser. No. I80115
SC ser. No. I80024
SC meter not calibrating properly.
Will use SC meter ser. No. 910007

0830 Sampled FS-MS-101 (SW)
Located ~38' south of FS-MS-11
SC 37.6 mS/cm
pH 7.39 su
Temp 4°C

Note: Jon left to make phone call from Murray.

0900 Collected two glass jars of sediment @ FS-MS-101 (SE) (same location as FS-MS-101 (SW))
* Note: SAP indicates polyethylene jars were using glass.
Sample consists of coarse sand and gravel w/ some silt & minor organics.
Sample collection site also included cobble & boulders which were not collected w/ sample.

0949

0930 Collected upstream sample FS-MS-102 (SW)
SC 22.4 mS/cm
pH 7.17 su
Temp. 4°C

0940 Collected sediment sample FS-MS-102(SE); same location as FS-MS-102(SW). Sample consists of coarse sand + rounded to subrounded gravel w/ some silt. Location also includes cobbles + boulders which were not included in sample. Ran back at site.

~1010 Survey crew arrives. They finished Silver Scott + will start on BearTop mine site. They will likely finish it tomorrow. Ran finished grains FS-MS-101 Heading to FS-MS-102

1204 At Lower Ione to resample

1215 FS-~~IM~~IM(L)-01-0-0.165(W) "L" indicates Lower Ione Mine Collected sed samples 25' left, 45' right + 45' right of transect. Minimal fines. Sample is grey angular rock fragments.

11/15/01 Trip to Log

1. FS-SC(W)-04 - Silver Scott upper level. Closeup of waste rock.
2. Silver Scott upper adit.
3, 4, 5 Silver Scott (lower) material below loading structure + nearby.
6 FS-IM(L)-01 (On transect).

Summary

- Obtained sediment samples + water samples @ FS-MS-101 + -102
- Unable to GPS mines.

Jane

1235 FS-IL(L) -02 (~~TT~~) -0-0.165(W)
Subsamples 30' right, 60' right, + 15' left.

1250 FS-IL(L) -03 (~~TT~~) -0-0.165(W)
Subsamples 15' left, on transect 25' right, + 70' right.

1300 FS-IL(L) -04 (~~TT~~) -0-0.165(W)
Subsamples 5' left, 30' left, + 80' left.

1400 Spoke w/ surveyors. Asked them to also try to survey slope. They will try to get it tomorrow leaving site.

Summary

- Obtained stream sediment samples + water samples @ Bear Gulch
- Unable to GPS reads
- Surveyors completed 5 tree-reads + working on Bear Tree. May also be able to survey slope.
- Resampled Lower Zone.

"Rite in the Rain"®

ALL-WEATHER WRITING PAPER

FIELD

All-Weather Notebook

No. 351

Bear Gulch

Surface Water

4 5/8" x 7" - 48 Numbered Pages

7-11-02 D May weather clear + hot
1300 at upper Bear Top - NO surface water
1315 @ chute adit just below upper Bear Top
calibrating meters - pH, Temp, SC

FS-(U)BT-101(SW)

1345 Sample time
Floor of adit is covered with H_2O ≈ .5 - 1' deep
Flow seeps out ≈ 25' + out onto Top of chute
Flow is in small pond - 2' dia just out adit then infiltrates, then 5' down above ground
Flow ≈ 100 ml in 5 sec
photo outside adit - I back in
Temp 7°C pH 6.22 SC 66 µS/cm

1400 To Lower Zone
1410 Some water seeping cannot see water flowing - cannot

see any water on floor of adit - although entrance has collapsed road in front of adit wet for about 60' below it

1425 @ Middle Bear Top
water is seeping - slight flow discernable from adit to edge of bench ≈ 30'
There is water on floor of adit

FS-(M)BT-102(SW)

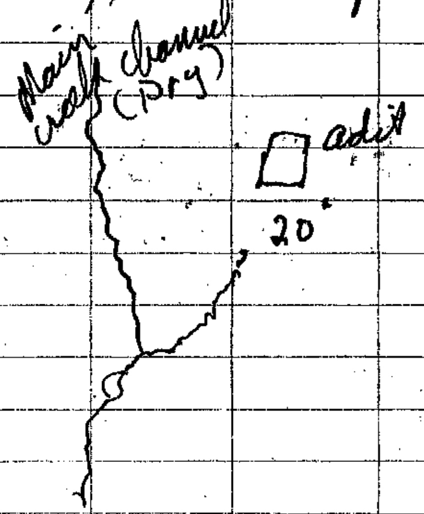
1440 Sample time
photo inside adit (pH/cond) meter
Temp 4.0 pH 6.27 SC 154 µS/cm
1500 To Lower Bear Top
1505 No H_2O at Lower Bear
1515 Stopped at road (steep) just around corner from Big Washout (Below Silver Scott) seep on road - check for overland flow = None
Can't tell if it's from Silver Scott or not - can't sample

1620 Samples filtered & preserved

-12-02 D May weather clear + warm

811 at Lower Orofino will
head up to Upper Orofino to
sample loading up pack

840 @ upper Orofino



Water flows above ground

about 20' N of adit
adit floor is dry
Flow estimated at
4 gpm

0900 sample time FS-(U)OM-101(SW)
Flow is actually coming
out of a 2" pipe (from
adit? I presume) Marked
site with blue ribbon
took photos looking N,
flow + adit + 2" pipe
Temp 8°c pH 7.12 6.45 SC 46 µS/cm

0910 Will go to western
dumps to ✓ maps

0930 To lower Orofino
Flow from adit surfaces
≈ 20' from adit + flows
into a concrete vault
≈ 4' x 6' partitioned 2nd
compartment of vault is cracked
water empties out + infiltrates
there

1000 Sample time FS-(L)OM-102-(SW)
took flow measurement
from Bore 4 GPM
took photo well loaded up
+ head to Lower Dome
Temp 5 pH 6.05 SC 78
1040 @ Lower Dome -

1055 sample time FS-(L)IM-101-(SW)
H_2O daylights ≈ 15' from adit
opening ~~flows~~ seeps ≈ 50-60'
down road + infiltrates there
Water is standing on floor
of adit Collected sample
between adit + ore cart
took photo
Temp 6°C pH 6.14 SC 115

1145 @ truck to filter, preserve
etc calibrating instruments
1250 Done

"Rite in the Rain"®

ALL-WEATHER WRITING PAPER

FIELD

All-Weather Notebook

No. 351

USFS Bear Gulch

1570158

7/8/02 →

4 5/8" x 7" - 48 Numbered Pages

"Rite in the Rain"®
ALL-WEATHER WRITING PAPER

Name Maxim Technologies, Inc

Address P.O. Box 2739
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Project

INCHES

Clear Vinyl Protective Slipcovers (Item No. 30) are available for this style of notebook.
Helps protect your notebook from wear & tear. Contact your dealer or the J. L. Darling Corporation.

CONTENTS

PAGE	REFERENCE	DATE

7/8/02 J. Armstrong / D. May
All times listed in MST

~0600 At MSO office Load equip.

0910 At jct of FS-9 + FS-38
Weather: Rain

0950 At road crossing of ephemeral drainage from Silver Tooth Mine; No water flowing.

1010 Below bridge to TreeTop Mill site.
Set Altimeter @ 7000'
Safety Meeting

1115 Middle Zone Mine
Raining very hard.

Adit to Toe of waste rock = 185'
Bearing N25°E
Altimeter reads 4320 on bench below adit.
2 Photos of transect.

Transect ~ 45° L of adit

FS-(M)IM-01-0-0.165(W)
@ ~ 50' upslope of toe
Subsamples: on transect
60'L of transect
80'R of transect
EOW = 80'L of transect +
100'R of transect

FS-(M)IM-02-0-0.165(W)
@ ~100' upslope of toe
Subsamples:
On transect
60'L of transect
80R of transect
EOW = 80'L + 100'R of transect

FS-(M)IM-03-0-0.165(W)
Subsamples: on
on transect
70L of transect
80R of transect
@ ~150' upslope of toe

EOL = 90' L of transect +
100' R of transect

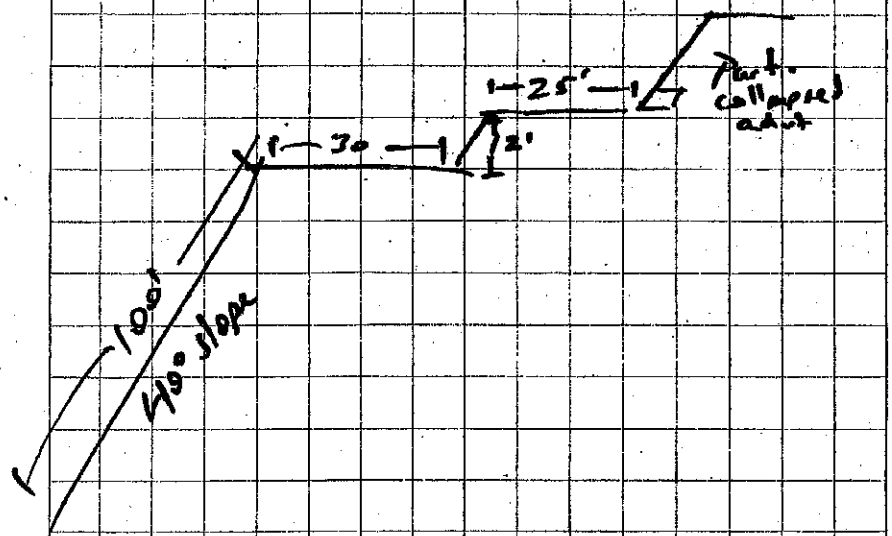
Adit is partially collapsed to ~
3' x 3'. Opens to much larger
~ 10' into adit.

Waste rock is composed of Gray
blocky to very angular cobbles and
boulders to gravels w/ gray med.
gr. sand to brown med. gr. sand.

Wood/woody debris (timbers + trees) in
waste rock. Some pipe + drill rods.
Narrow gage rr trax from adit extending
to W. edge of waste. Trax trending
- E. end abruptly.

MIDDLE ZONE

not to scale



1315 Upper Zone Mine
Altimeter reads 4397'
Adit is ~ 6'Ht X 5'W + open
Transect bearing N40°W
150' from bottom of slope (Toe)
to bench below adit.
Slope = 45°

Several photos of transect + area

FS-(U) Im-01-0-0.165(W)
@ ~50' upslope from toe
Subsamples:
on transect
10'L. of transect
10'R of transect
EOW = 20'L + 15'R of transect

FS-(U) Im-02-0-0.165(W)
@ 100' upslope from toe
Subsamples
on transect
15'L
20'R

EOW = 15'L + 30'R of
transect

FS-(U) Im-03-0-0.165(W)
@ 150' upslope from toe
Subsamples:
on transect
15'L
10'R
EOW = 20'L + 12'R of
transect

Material consists of Block very angular cobbles and boulders + gray to brown fine to coarse grained sand w/ gravels. Subsoil material is typically grayer. ~~Immediately~~ Beneath surface, soil sand is much browner.

1405 Walked up hill from Upper Zone Mine to water filled "adit"? w/ iron gear/pulley assembly

Altimeter reads 4480'

Several photos of wash rock, adit, + water filled area.

Outside opening is ~ 20'H X 15'W.
Opening to water-filled area 6'H X 6'W.

Waste rock 80'L X 35'W
38° slope bearing N21°W.

Collected one sample from near top of waste dump in center
FS(U)IM-04-0-0.165(W)

1450 Back @ Middle Zone Mine to sketch site.
Also obtained additional photos.

1555 Back @ mill site
Altimeter reads 2877'
Also indicates increase in barometric pressure over past 4 hrs.

Summary

- Field notes transcribed from Field book that was damaged by rain/moisture.
- 3 comp samples collected at Middle Zone
- 3 comp samples collected at Upper Zone. (+1 at waste dump above upper mine)
- All samples secured in coolers according to analytical requirements

7/9/02 J. Armstrong / D. May
Weather: Clear + Cool.

0742 At Bear Creek crossing of FS-938 (washed out bridge) loading bikes. Safety meeting (set altimeter @ Thompson Pass 4825 ft).
Jeff Johnson UNFS is supposed to arrive today w/ XRF

0839 set altimeter @ site babies mill to 3000ft Barometer = 29.82 in Hg

0858 several small down ft trees on 100yds from Lower Orphir. Have to walk.

0910 At Lower Orphir Mine
Altimeter reads 3380ft @ 29.40 in Hg.

Transect Bearing = N 68° W
Access Road Bearing = N30° E
Waste Rock Slope dips 41°

Water flowing from adit (~ 2 gpm estimated).

Toe of waste rock 175' from top of slope (~195' from cutslope).
Waste rock comprised predominantly of blocky angular grey argillite: boulders and cobbles and gravels and brown fine to coarse gr: sand.

Altimeter reads 3284 ft @ 29.55 in Hg at toe of slope.

Samples will be biased to not include boulders + large cobbles.

FS-(L)OM-01
@ 50' up slope from toe
Subsamples:
on transect
45' L (EOW = 90' L)
45' R (EOW = 50' R)
also stream channel (at 50' R.
No water flowing on surface)

surface water does daylight right at bottom of transect
Photo

FS-(L)OM-02
100' upslope from Toe
Subsamples:-
- 31' R
- 62' R (on thickest part of lobe (EOW 86' R = stream channel
@ 62' ≈ 8'-10' of waste
@ 31' 4' of waste
- On transect
- 35' L
  waste thickness = 7'
- 65' L
  waste thickness = 3'
  (EOW = 85' L)
Photo

Note: Lots metal debris visible in stream channel (pipes, corrugated roofing bars, etc.)

FS-OM(L)OM-03
@ 100' upslope 150' upslope
Subsamples
- 42' R waste thickness 10'-18'
- 80' R waste thickness 10'
  (EOW = 130' R)
- On transect waste thickness 6'
- 18' L waste thickness 4'
  (EOW = 23' L)
Photo of sample location/stake
Photo of transect

Adit is collapsed but has breeze coming from it.

FS-(L)OM-04
@ 175' upslope at top of slope
- 15' L (waste thickness 1'-2')
- On transect (waste thickness 2'-3')
- 35' R (waste 1' thick)
- 70' R (waste 1'-2' thick)
  EOW = 120' R
- 115' R waste 1'-2' thick
  EOW = 19' L

1115 Found Brass cap survey
E of lower adit heading to Upper Orofino
on cap MS 3245
Brunton 35 28
Barometer 29.26
will head S from here to try +
locate upper Orofino
Bearing tree N 5 W
distance 7 ± T 49N R6E
sect 6

1150 @ Upper Orofino
Brunton reads 3604 at adit
Bar 29.17 inches Hg
Transect bearing N 17° E

= 20° 28' adit
45°
40°
85

partially collapsed adit opening 8'X3'
Back 10' dia 6'X6'

Brunton reads 3547'
29.25 in Hg

FS-(4).OM:01
40' up from Toe
Composites:
5' Thick on transect tape photo
4' thick 12' L EOW 21' (creek bed)
2' Thick 22' R Mostly cobble size material
finish R 45' to edge of waste

FS-(4).OM-02
80' up from toe
Composites:
10' Thick on transect tape photo
5' Thick 15' L EOW 25' (creek bed
~~2' Thick~~ flowing)
2' Thick 18' R (end of smaller size material)
EOW = 44' R

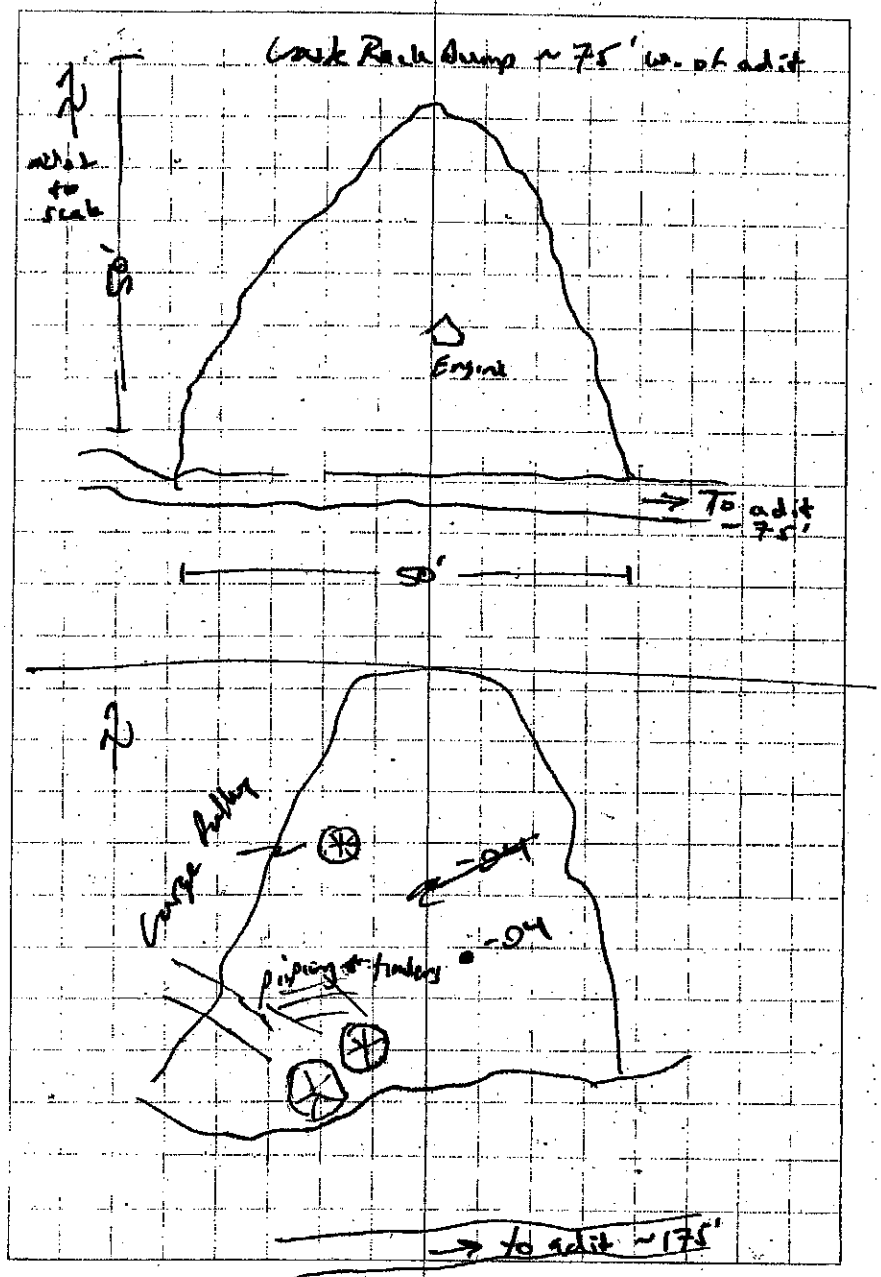
FS-(4).OM-03
120' up from toe
composites:
2' Thick on transect tape photo
1' 8' L EOW 12'
1' 12' R 16' EOW

Took 2 photo's of transect
1 of adit opening

Garden Flowers @ 3-4 gpm - daylights
~ 2f' from mouth of adit

1355 ~ 75' W. = Another waste
rock dump w/ rusty engine
+ driveshaft ~ mid slope
Trends ~N50°E
50'L x 50'W
~2' thick
Appears to be same rock type as
waste rock pile below adit
Photos

1406 ~ 100 W. = Another waste rock
dump (Begins ~25' downslope
previous waste rock dumps) -
~75'L x 45'W 3'-5' thick
Trends N78°E
Lots of pipe 2 Large Ø pulleys metal
pulleys. Burned timbers.
Obtained sample from ~ upper 1/3 of
dump face - FS-(M)DM-04-0-0.16S
(W)



Mafraid appears similar to waste dumps below adit w/ the exception that there appears to be more quartz-rich rocks here.

1430 Jeff Johnson and I were just heading down to Lower Doafins We'll use XRF @ FS-(u) OM-02 @transect Will do 5 readings Started at # 2 through 6 10 seconds apiece

1456 at waste rock dumps = 25' W of upper (with 6 cylinder engine block) Will run 5 tests, 10 sec apiece. Same ballparks as FS-(u) OM-02 except lead vs Potter

1520 at western most dumps (with wheels, pipe + Bernard Tinders) Found some pieces of pure Galena Will run 5: 10 second tests beginning with # 12 18,900 ppb - 25,000 ppb through 16

1600 - scanning XRF at treads FS-(u) OM-04 - western most dump - 5: 10 second Tests starting @ # 17 - 21

FS-(L) OM-02 Tests 22-26

FS-(L) OM-03 Tests 27-31

FS-(u) OM-01 Tests 32-36

Bear Tops Mellotte Loading Ramp, Tests 37-41

FS-(u) IM-02 42-46

Jenny containerizing necessary samples

1730 Jeff offsite.

Waste dumps below adit upper Orofino Mine composed of blocky angular argillite boulders, cobbles, + gravels ranging from gray to orange gray w/ brown f. to coarse gr. sand. Some quartz vein rock + galena waste dumps - 75' W. of adit

dump essentially same material. Dump 175' west of adit appeared to be somewhat sorted as large boulders were not as common. Also appeared to have many more "ore" rocks of galena. All subsamples were biased to not include larger material.

Pass c Brunton,
4852' 4250' 28.55 Hg"

Summary

- Collected surface samples (0 - 0.165') from 4 locations along transect on lower Orofino Mine. ~~Composited~~ Samples are comprised of subsamples collected at ~ same elevation
- Collected 3 composited samples from waste dump below adit of upper Orofino Mine
- ID two waste dumps west of waste dump below adit.
- Jeff Johnson analyzed several in-situ samples at upper Orofino + samples obtained from Orofino + Ione Mines using

a portable XRF. He'll email results to K. Hill.

- Numerous photos taken of each site.
- All samples secured in cooler according to analytical requirements.

7/10/92 J. Armstrong / A. Mary
Weather: Clear & mild

0640 Left motel
0750 At creek crossing at FS-938 (Dan left Quad on highway for Bern & K. Bill).
0825 Left Altimeter @ site below millsite @ 3000 ft.
Barometer = 31.80 in Hg
Using disposable camera today.
0842 At upper Bean Top / Vine

Alt 4060 ft @ adit w/ gate
Baro. 31.56 in Hg
Adit has metal gate but gate is open 4'x6' framing 6'x6' opening in rock.
Caved stope

Upper adit is open (behind tree branches.)
4'x6' opening in rock (no framing).
Alt. = 4092 ft
Baro = 30.53 in. Hg

Adit opening w/ in 3' of waste dump

Waste dump = 208' wide.
West edge defined by gulley next to loading structure

74' Adit to trax on bench
Bench is 10' wide @ transect

Slope @ 50' upslope from toe = 38°

Transect Trend = N32°W

Toe of slope = 3891 ft which also equals elev. of top of ore chute

At toe of waste rock dump
- 2 - 55 gal drums (1 labeled cyanide) crushed empty.
- 1 - 35 gal drum
- Cables & pipes

FS-(U)BT-01-0-0.165 (W) (50' from toe)
Subsamples:
- On transect Waste thickness = 21.3'

~~20~~

- 15' L (EOW = 20' L)
  ↘ ~~50' cyp from Tow~~
  25' R = EOW

Sample biased to not include boulders & cobbles. Material is Lt. grey to grey argillite w/ quartz filled fractures & grey green massive rock (dolomite?) & grey brown f to coarse sandy gravel.

- 16R
  Top ~1' of material is all cobbles & boulders.

Note: grey green rock is much less common in wash above than the argillite.

FS-(U)BT-02 - 0-0.165 (100' cyp from Tow)
(W)
40° slope
Material consistent w/ -01 w/ exception of less cobbles & boulders.
transect ~ 5' below small bench (+ ~ 5' west)
Sample Component
15' L 5' Thick ~~at EOW~~
at 25' 2' Thick
37' 2' Thick 42' EOW

on Transect 5' Thick
20' R 4' Thick
33' to NE corner to loading chute
Photo @ transect.

12'-13' = bench w/ cr-trax.

FS-(U)BT-03 - 0-0.165 (W)
150' upslope 40° slope
9' L = EOW
Compost Samples:
on transect (Sample) 2' Thick
29' R = EOW
22' R 1' Thick (sample)
13' R 2.5-3' Thick (Sample)
Photo

Material consistent w/ 100' interval

FS-(C)BT-04-0-0.165(W)

200' uphill / 8' below adit opening

slope = 30°

Composite Samples

3' L 1'Thick 7.5' EOW

less fines on L side predominately boulders/cobbles

Transect 1'Thick photo

7'R 1'Thick 15' EOW

photo of transect

photo to R over toward stope

photo of adit

photo of stope

Note: All adits dry No flowing water

~1030 (K.B.H, Barri, + Rob K.H.+Assoc)

on site.

Safety meeting.

1130 Rob surveying upper Bear Top stope + other features.

Dan taking K.H.H + Barri to other sites. Jill finish sketch of upper Bear Top, then will begin sketch of Lower Bear Top.

1220 middle Bear Top

Adit open 6'x5'

Water barely flowing = seep.

Alt 3945 ft

Baro. 30.72 in Hg

Water intermittent ~30' W. of adit

150' from bench @ adit to toe of waste rock

Material consists of blocky w. angular boulders, cobbles, and dk grey to green grey argillite w/ quartz filled fractures. Fines material is fine to coarse grained brown sand

Slickenside surfaces visible on many of the larger rock fragments

Toe of slope

3865 ft

Baro

30.80 in Hg

Transect N22°E

FS-(M) BT-01
50' up from Toe 38° slope
Composite sample:
3'L 1'thick 5' to EOW (Gully)
on Transect 2'3" Thick Photo from Uphill
6'R 3'thick 15'R to EOW

FS-(M) BT-02
100' up from Toe 20'L EOW
Composit sample
18'L 1.5'Thick
on Transect Photo
8'R 1.5'Thick 20'R EOW

FS-(M) BT-03
150' up from Toe (at end of adit bench)
composite Samples:
10'L ~20-30 Thick 40' EOW*
transect 15-20 Thick photo
8'R 1-2' Thick 15' EOW
* Lots of tree veg - 0-2' would be organics On East side of stream, lobe of large angular material cobble size + above - didn't sample due to size of material + potentially extension of scree slope above - See Map

Ore chute, 150' Long
adit 6'X5' 30' above top end of ore chute - also about at toe of upper waste rock - lots of metal debris pipe - drill steel etc + air hoses
Material is grey argillite - like upper BT ⇒ E side ⇐
Top of chute "lobe" of material is 20" wide + 4' thick looks like weathered here - 20' down looks like alluvial fan will collect 3 samples of this material 1 @ top, middle + bottom for sample
FS-(M) BT-04

50' from Top 30' wide, 3' thick fairly consistent thickness
Grey argillite cobbles, boulders gravels/sands grey brown

95' from Top waste narrows to ≈ 10' wide ≈ 1' thick

100' from top. 2' wide 1' thick

West side of chute

30' from Top 3'-4' wide 1 foot thick most of the way down fairly consistent

75' from Top waste widens out to ≈12' ≈ 2' thick this way to bottom of

1350 46° at Mouth of adit. 0 YEA! slight breeze

1430 @ Lower Bear Top Hunter 3569' 31.14 Hg" at adit Fuel Tanks 175' below Bench 3'x8' ~~Top~~ 220' to Toe of Slope By UST waste is 15' wide 2' thick 31.15 Hg" 3462' at Toe Just above UST 1-2' Waste is 40' wide + 1-2' thick

Transect ~~N~~ N10°W
Waste Rock toe to adit
= 320'.

Adit is partially collapsed
6'X6'

FS- L(UST) - 01 - 0.- 0.105W
42° slope

Soil samples:
- On transect
waste thickness = 2'

~~-29~~
-29'R waste thickness = 2'
(EOW = 60')
-45'R waste thickness 2'

Material consists of blocky angular rock spillage mostly cobbles + boulders + grey brown fine to medium grained sand w/ gravel
~.40-45 gal. gal/v. ~~drank~~
25' L of transect = EOW

150' upslope 39°-40° slope.

80'R wash = ~~10' thick~~ 7'-10'

@ 130' upslope

80'R wash = 1-2' thick

18'L 10'-12' Thick

40'L 10'-12' Thick

58'L 16'-18' Thick

≈ 70'L Gully Bottom

FS-(L)BT-02 39°

25'R ≈ 30' Thick

Composite/samples:*

*25'R

*on Transect

*79'R 20' thick

110'R-EOW

100'R 8' Thick 8-10'

Composite L*

*44' 25-30' Thick

*60' 12' thick

72' Gully Bottom

*140' 6-8" thick

@ 300' from Toe

≈ 5'R EOW

≈ 30'L EOW

area has been disturbed by trench we dug last year can't sample 0-2"

We'll sample @ 250' from toe

FS-(L)BT-03 slope 0°

composite *

*Transect 12'R EOW

*24'L 40' Thick

35' slope break to Gully 43' to Gully

*85'L

108' to slope break behind bldg

130' to bottom of next gully

*140'L 25' thick

1835 Samples secured. Heading out

Summary:

- Waste samples at upper Bear Top
  4 comp samples
- Waste Rock samples @ Middle Bear Top
  4 comp samples
- Waste Rock samples @ Lower Bear Top
  3 comp samples
- Site maps completed at upper + middle Bear Top
- K. Bills + Barri complete partially completed map @ Lower.
- Rod of K.B. + Assoc surveyed there @ upper Bear Top.
- 2 adits @ upper Bear Top L / E, one chute.
- Also took mid comp-sample of waste rock adjacent the chute

7/11/02 J. Armstrong / D. May
Weather: Clear + Mild (so far)
supposed up to 102°F

0830 At Lower Bear Top to complete map.
Don's eye level 5.4'

1030 Done surveying West Lobe
Started Eastern lobe at small pine sapling assumed elevation = 2' from T-200 set transect B at N 10° W.

1130 Done with survey

1155 At middle Bear Top
Chute bears N. 8° E

1345 Picked up GPS unit @ jct of Bear C. Rd + rd to Silver Scott.
Elev. by GPS = 7317 ft

Opened Rover file 071194

1426 Made it to jct of upper road to Silver Scott. Going very slow. High PDOP/slow point collection

1446 At Lower Silver Scott Mine. Unable to collect sufficient points to delineate road.
PDOP too high to locate other features, as well.
Adit framing open on ~ east side
Gate on south is also missing
partially open. Adit is ~ 7' H x 8' W
Framing is ~ 20' X 15'

Flowing water from upper mine site to location ~ 25' E of lower adit
Intermittent. No surface water flow through lower dump.

~1530 Back @ truck. Don arrived ~ 1535
We collected water samples @ Lower + Middle Bear Top Mines

Summary →

- Surveyed + sketched remainder of Lower Bear Top Mine.
- Don collected samples of water issuing from middle + upper Bear Top Mine adits.
- I attempted to GPS a portion of Road to Silver Scott Mines but was not successful.

7/12/02 J. Armstrong / S. May.
Weather: clear + mild

0715 @ jct w/ hwy + setting up GPS.
Opened Power File R0712 13A
Opened Feature Bear Gulch Rd.
Odometer Reading: Hwy 96:
1.2 mile Creek crossing (old washed out bridge).

1.9 mile to lower Silver Scott Rd

2.8 mile to upper Silver Scott Rd
(2.8+250 ft to wash out)

3.2 mile to bridge @ Millsite.

- GPS'd Hwy 96 bridge below mouth.

- GPS'd FS survey stake labeled 101
= CP 101 ~250 downstream of bridge

GPS'd survey stake labeled 102.
= CP 102
~200' downroad of 101

GPS not tracking any satellites
Closed R0701213A.
Shut it off + turned it back on.
Now tracking satellites. (?)

Opened R0712144A

GPS'd point on road = end of site
= confluence of Orofino drainage + Bear Gulch drainage

GPS'd washout of S. Scott drainage.
= washout.

GPS Silver Scott Rd beginning at jct of Bear Gulch Rd + lower Silver Scott Rd.

End of Road = Adit @ Lower Silver Scott.
Elev. = 41.@ 4,199 ft.

GPS'd Upper S. Scott adit
Elev = 4334 ft

Attempting to GPS upper S. Scott Rd beginning @ jct w/ Lower Rd
Elev = 3907 ft.

0949 At jct w/ Bear Gulch Rd
Elev. = 3579 ft.

0953 GPS road from bridge @ mile 4 up to other mines.
= Bear Gulch UPR

1045 At jct of road to L. Bear Top.
High RDOP. Waiting

1120 GPS'd road to trail to upper Stone mine

GPS trail to upper Stone Mine
~~= Trail UPR~~ Elev. 5044
= Trail UPR
End of trail = adit entrance
Elev. 5069

Frickin' grounds in brush. Got the hell out of there. Didn't GPS upper adit location. Need my pistol!

1139 GPS Road to middle Stone Mine
= M STONE
Endpoint = bench directly below adit.
Elev. = 4937 ft.

1147 L. Stone Mine Rd
= L STONE
End of road elev = 4793 ft.

1152 Attempting to GPS adit entrance
L. Zone mine
= 40' NE of end of road
high RDOP
Abandoned feature

1207 Upper Bear Top Rd
= U BEAR TOP
Elev. = 4682 ft.

1207 Middle Bear Top Rd
= M BEAR TOP
Elev. = 4531 ft.

1217 Lower Bear Top Rd
= L BEAR TOP
Elev = 4107 ft.

1250 Lower Orofino Rd
= L OROFINO
Elev = 3917 ft.
End of line @ 70' E. of adit.

Attempted to GPS upper adit
Insufficient satellites.
Closed 20718/14A.

1345 Done for day

Summary

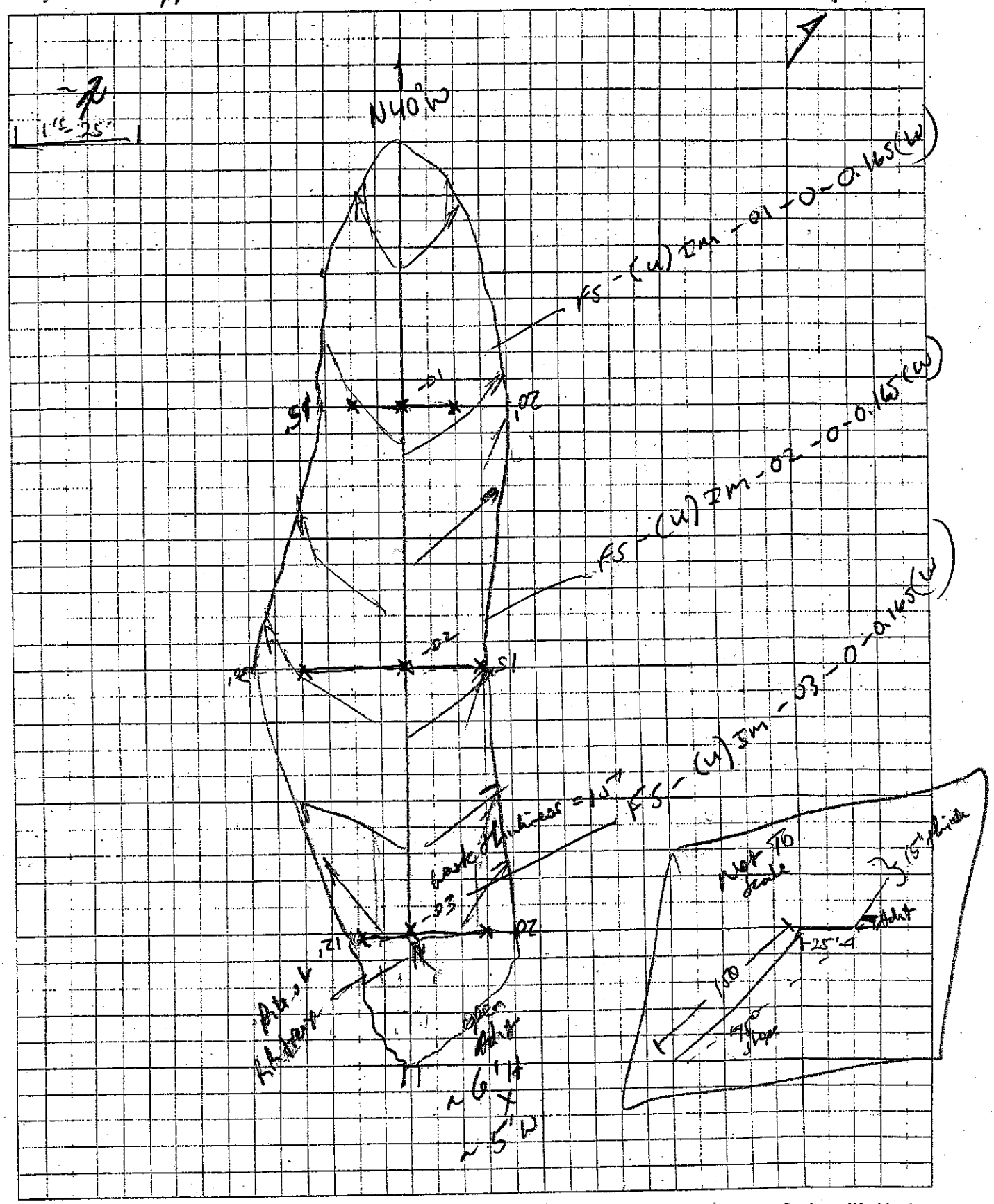
- Dan collected S.W. samples from water issuing from upper + lower Orofino mine adits and the Lower Zone mine (Info. entered into separate field book.
- I GPSd roads/trails & adits and other selected features.

MAXIM TECHNOLOGIES INC

BY _____ DATE _____

JOB TITLE _____ JOB NUMBER _____

SUBJECT Upper Fare Mine SHEET _____

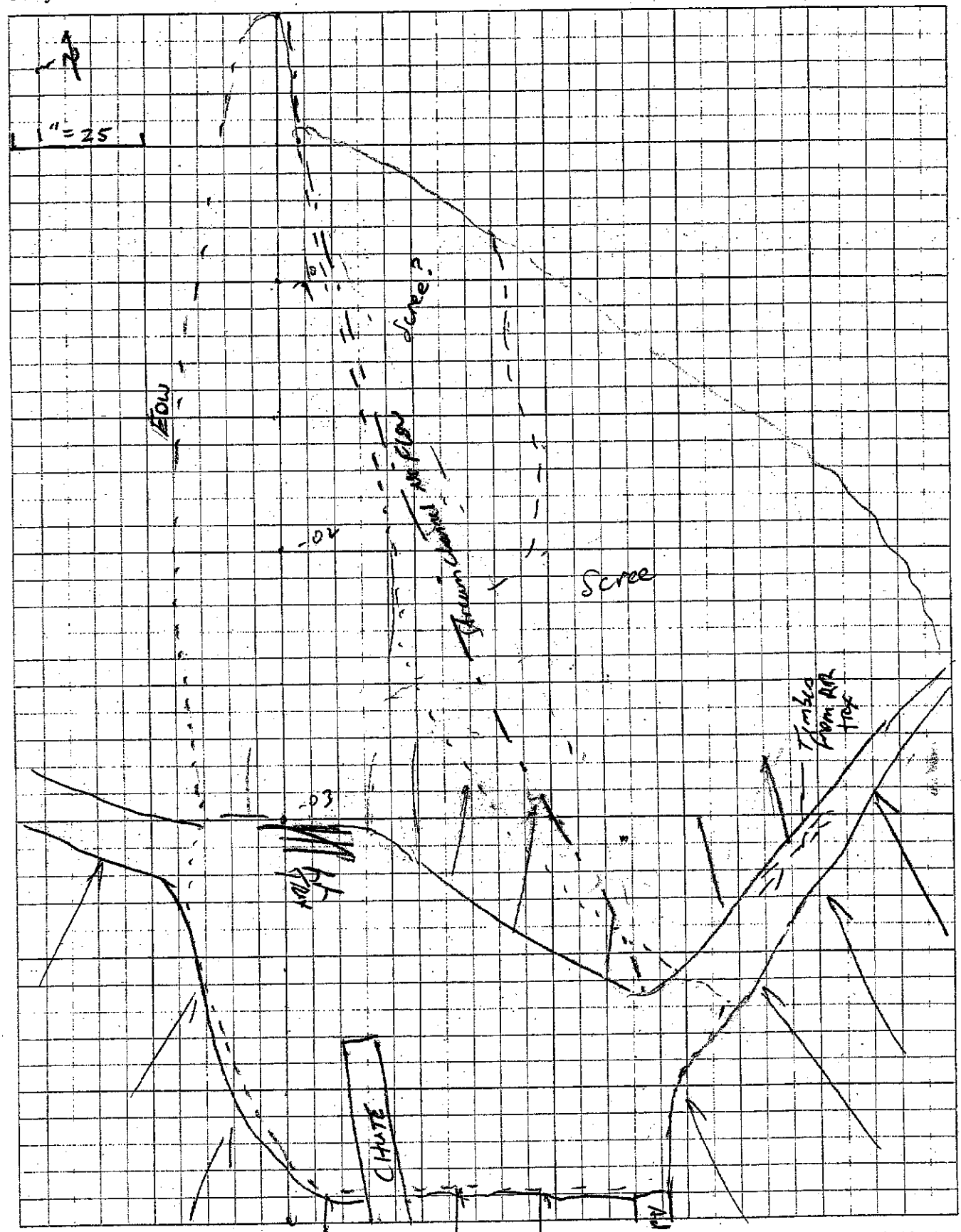


MAXIM TECHNOLOGIES INC

BY Jerry Armstrong DATE 7/10/02

JOB TITLE WFS Deer Gulch Project JOB NUMBER 1570158

SUBJECT Middle Tier Top SHEET 1 OF 1

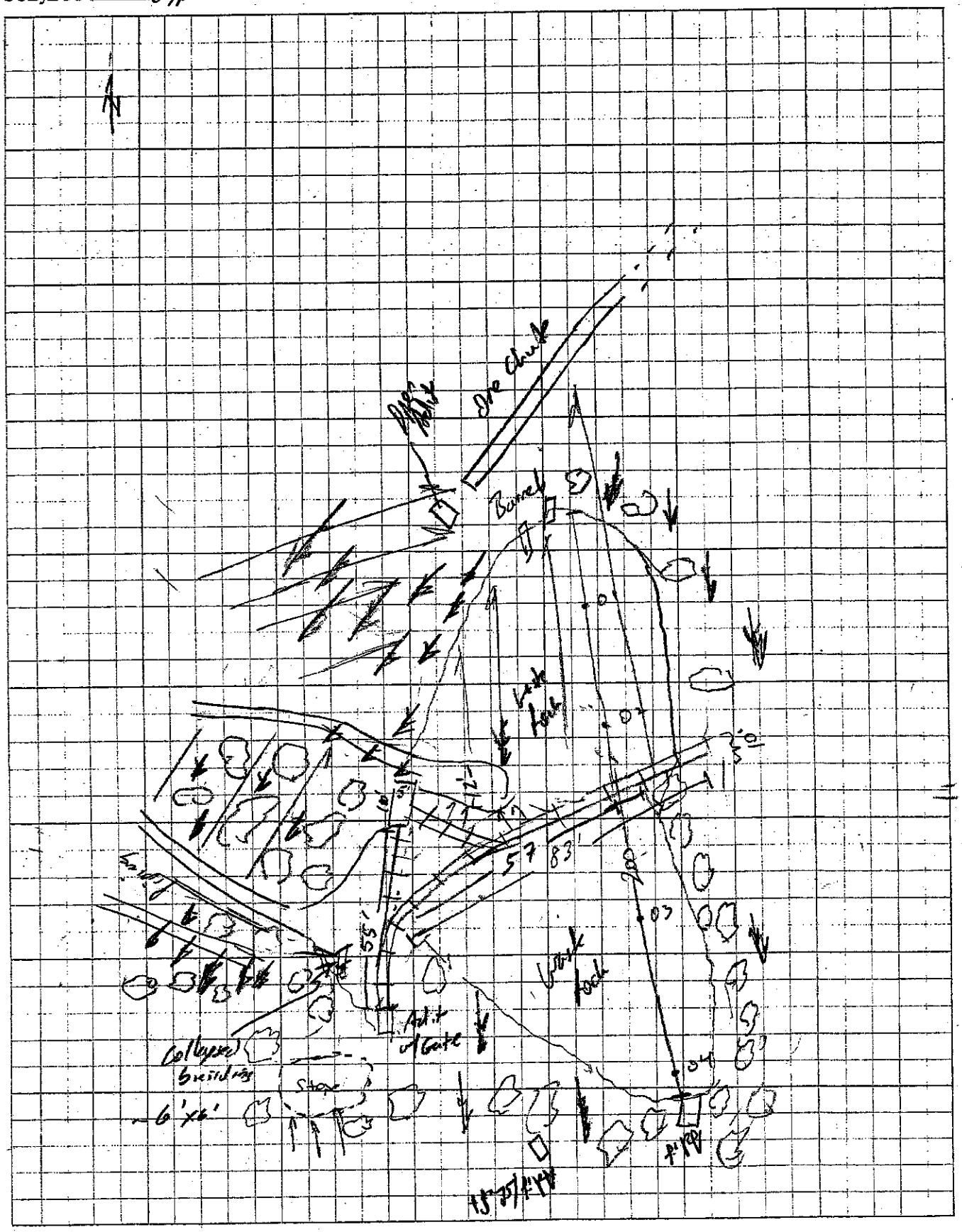


MAXIM TECHNOLOGIES INC

BY Terry Armstrong DATE 7/10/02

JOB TITLE USFS Bear Gulch JOB NUMBER 1570158

SUBJECT Upper Bear Top SHEET 1 of 1

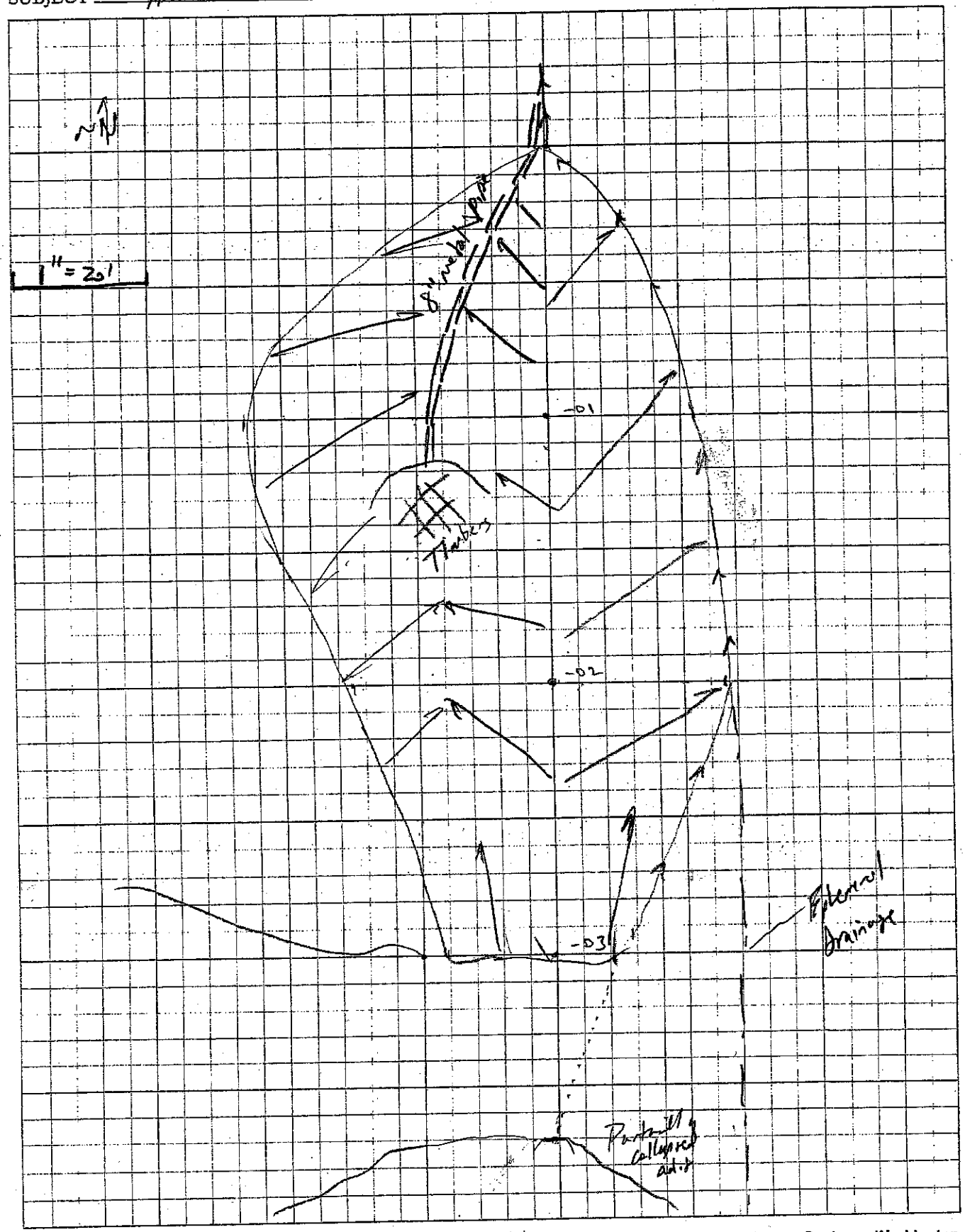


MAXIM TECHNOLOGIES INC

BY Terry Armstrong DATE 7/9/02

JOB TITLE WFS Bear Gulch JOB NUMBER 1570158

SUBJECT Upper Ordovician SHEET 1 of 1

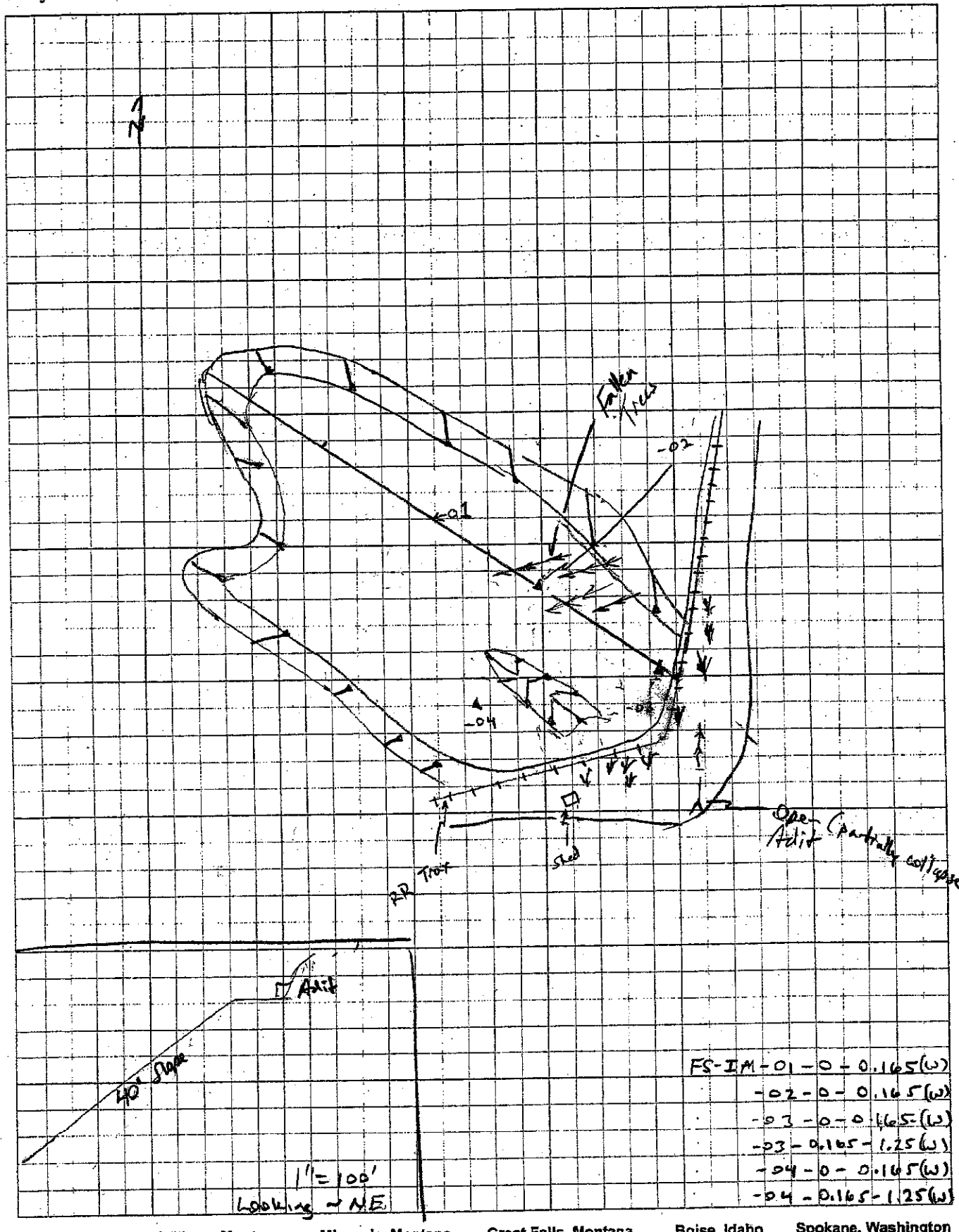


MAXIM TECHNOLOGIES INC

BY JA/DM DATE 10/22/01

JOB TITLE USFS Bear Gulch JOB NUMBER 1570158

SUBJECT Lower Iona Mine SHEET 1" = 50'



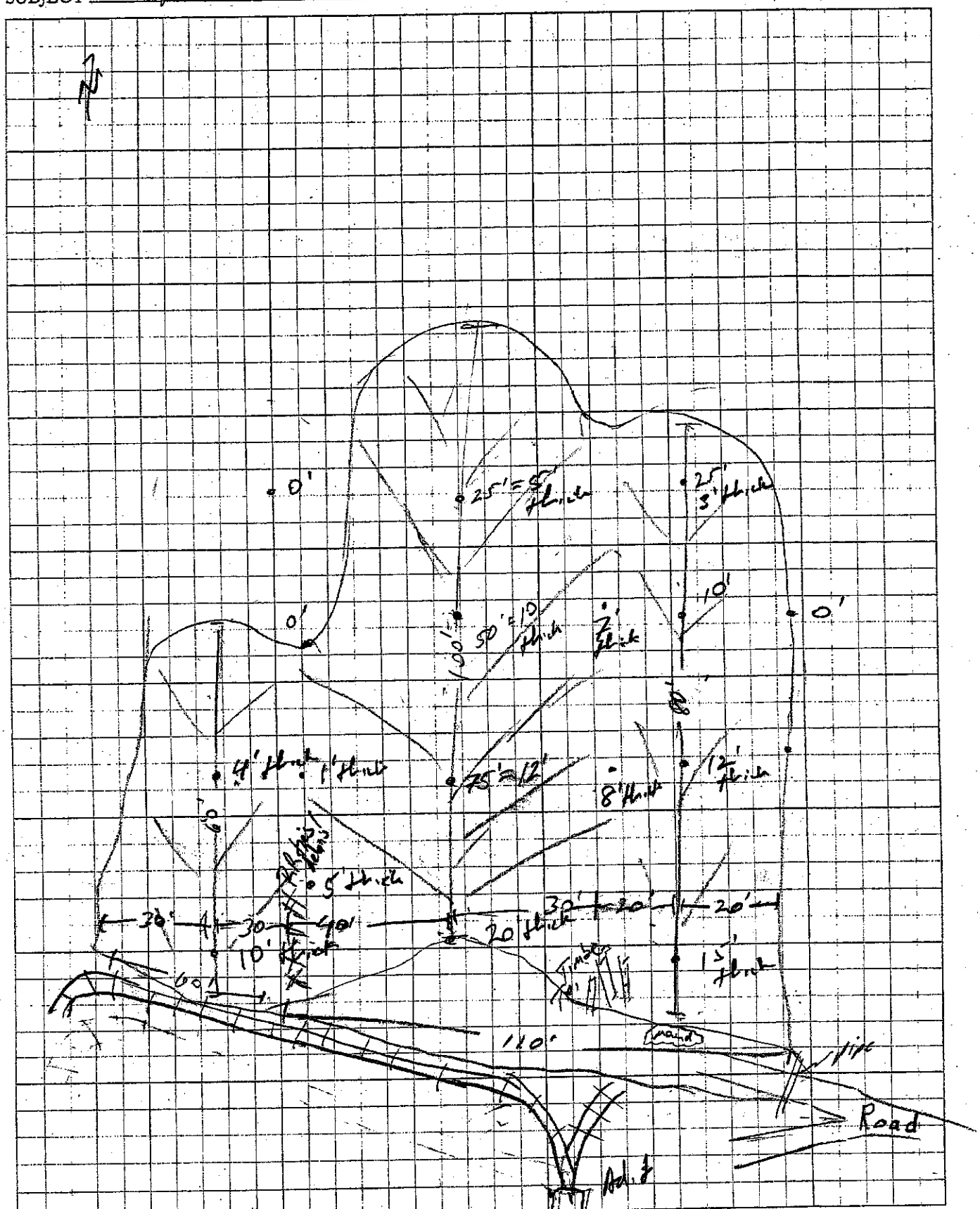
FS-IM-01-0-0.165(W)
-02-0-0.165(W)
-03-0-0.165-1.25(W)
-03-0.165-1.25(W)
-04-0-0.165(W)
-04-0.165-1.25(W)

MAXIM TECHNOLOGIES INC

BY Jerry Armstrong DATE 7/8/02

JOB TITLE USFS Bear Gulch JOB NUMBER 1570158

SUBJECT Middle Stone SHEET 1 of 1

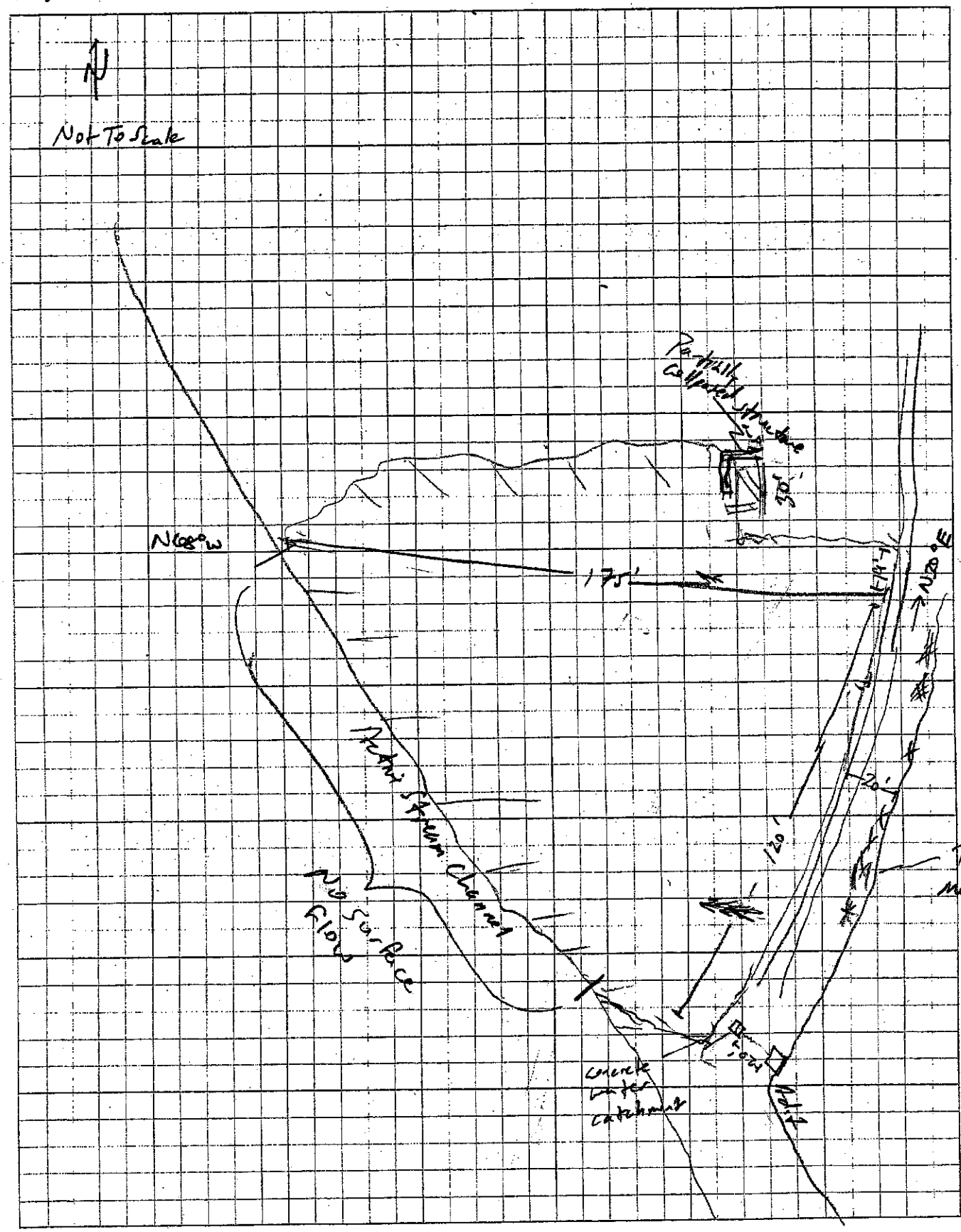


MAXIM TECHNOLOGIES INC

BY Jerry Armstrong DATE 7/9/02

JOB TITLE NFS Deer Gulch JOB NUMBER 157015B

SUBJECT Lower Drainage Map SHEET 1 of 1

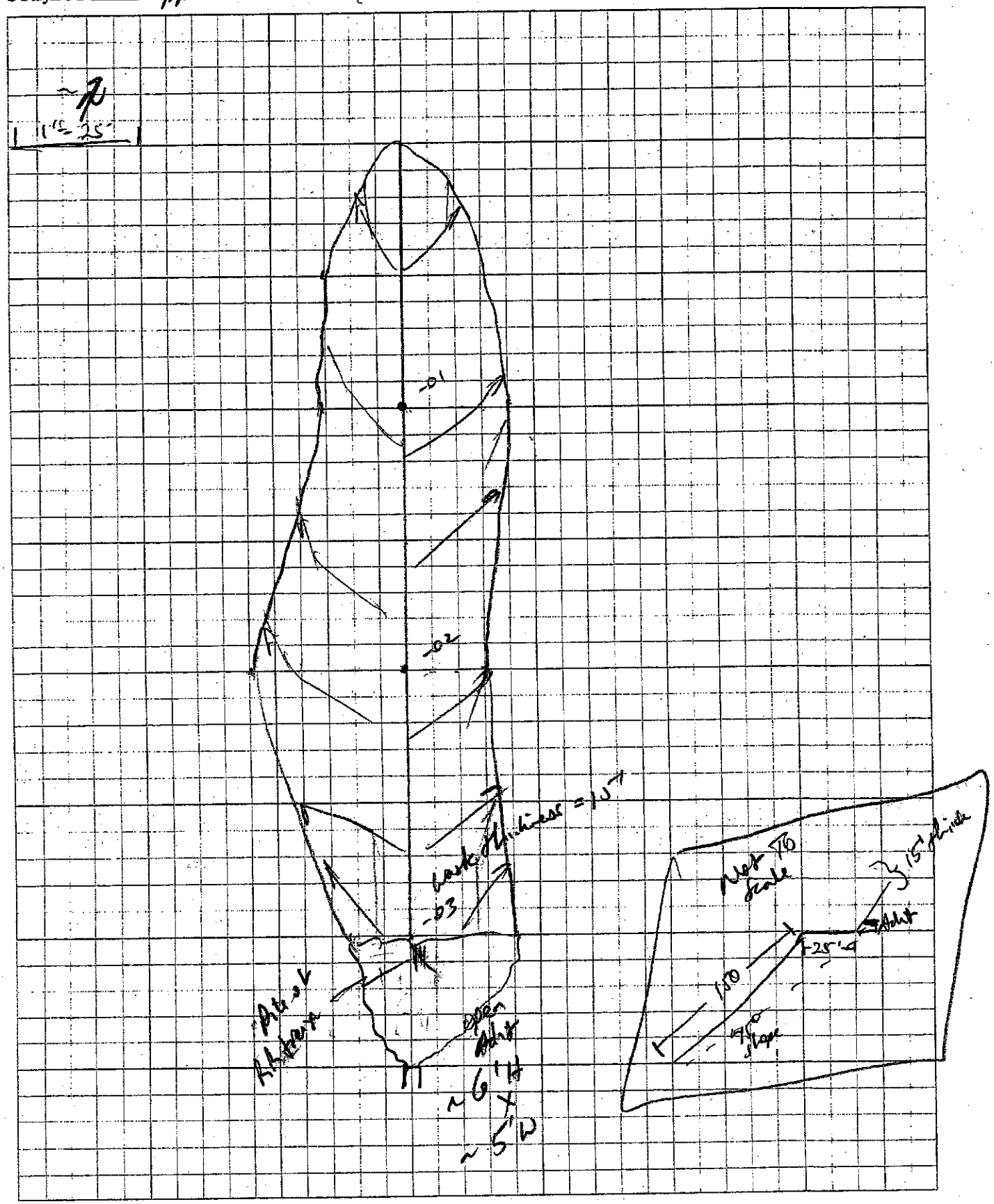


MAXIM TECHNOLOGIES INC

BY Jerry Armstrong DATE 7/8/02

JOB TITLE WFS Bear Gulch Project JOB NUMBER 1570158

SUBJECT Upper Fare Mine SHEET 1 of 1

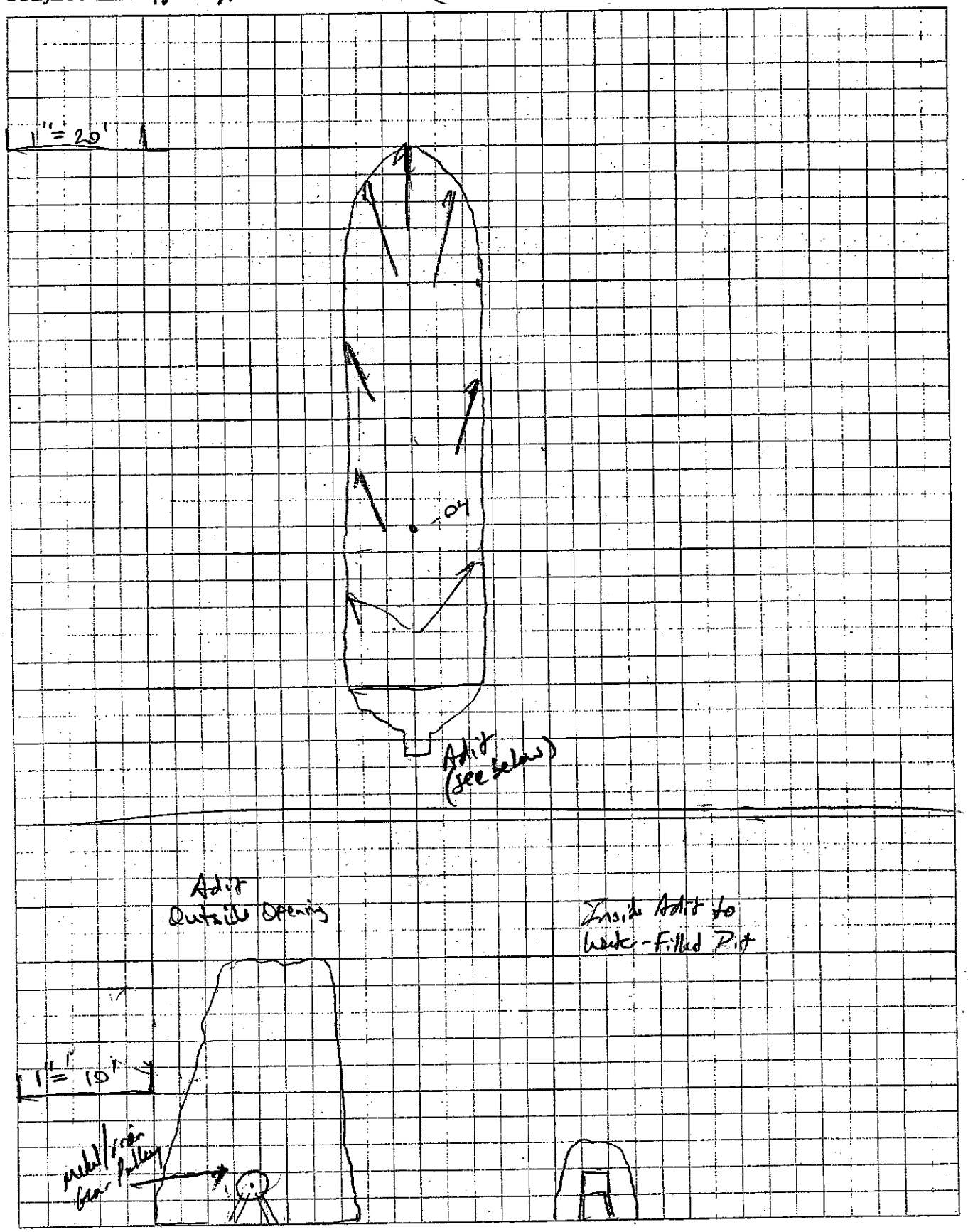


MAXIM TECHNOLOGIES INC

BY Terry Armstrong DATE 7/8/02

JOB TITLE Bear Gulch Project JOB NUMBER

SUBJECT Upper Upper Zone Mine (Additional Info) SHEET 1 of 1

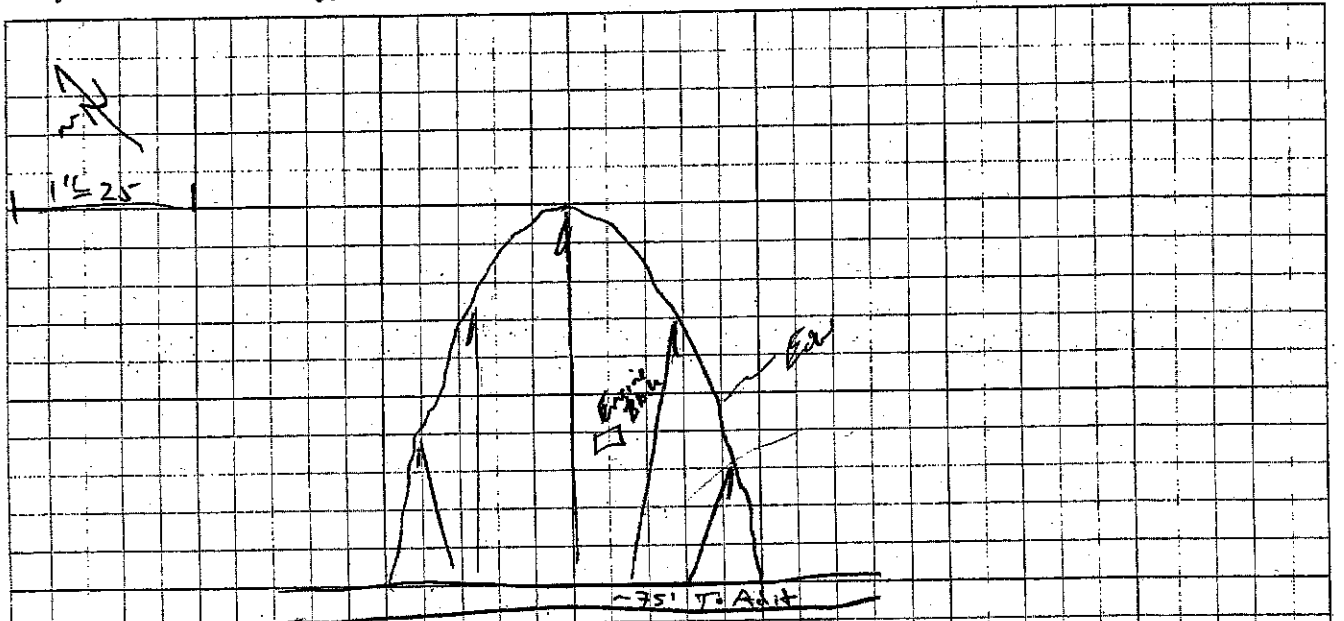


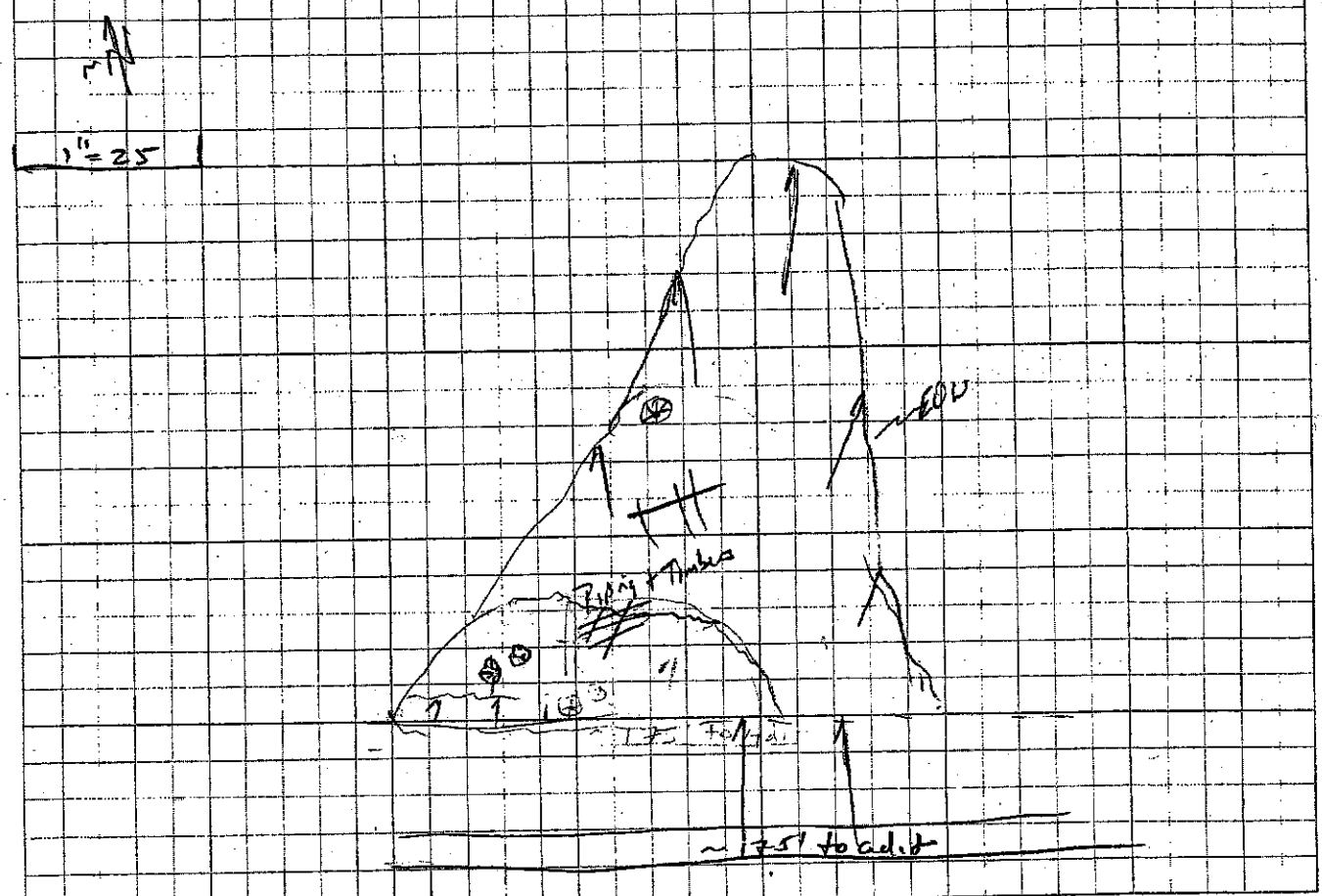
MAXIM TECHNOLOGIES INC

BY Jerry Armstrong DATE 7/9/02

JOB TITLE USFS Bear Guide JOB NUMBER 1570158

SUBJECT Otter Upper Orchard Mini Jumps SHEET 1 of 1



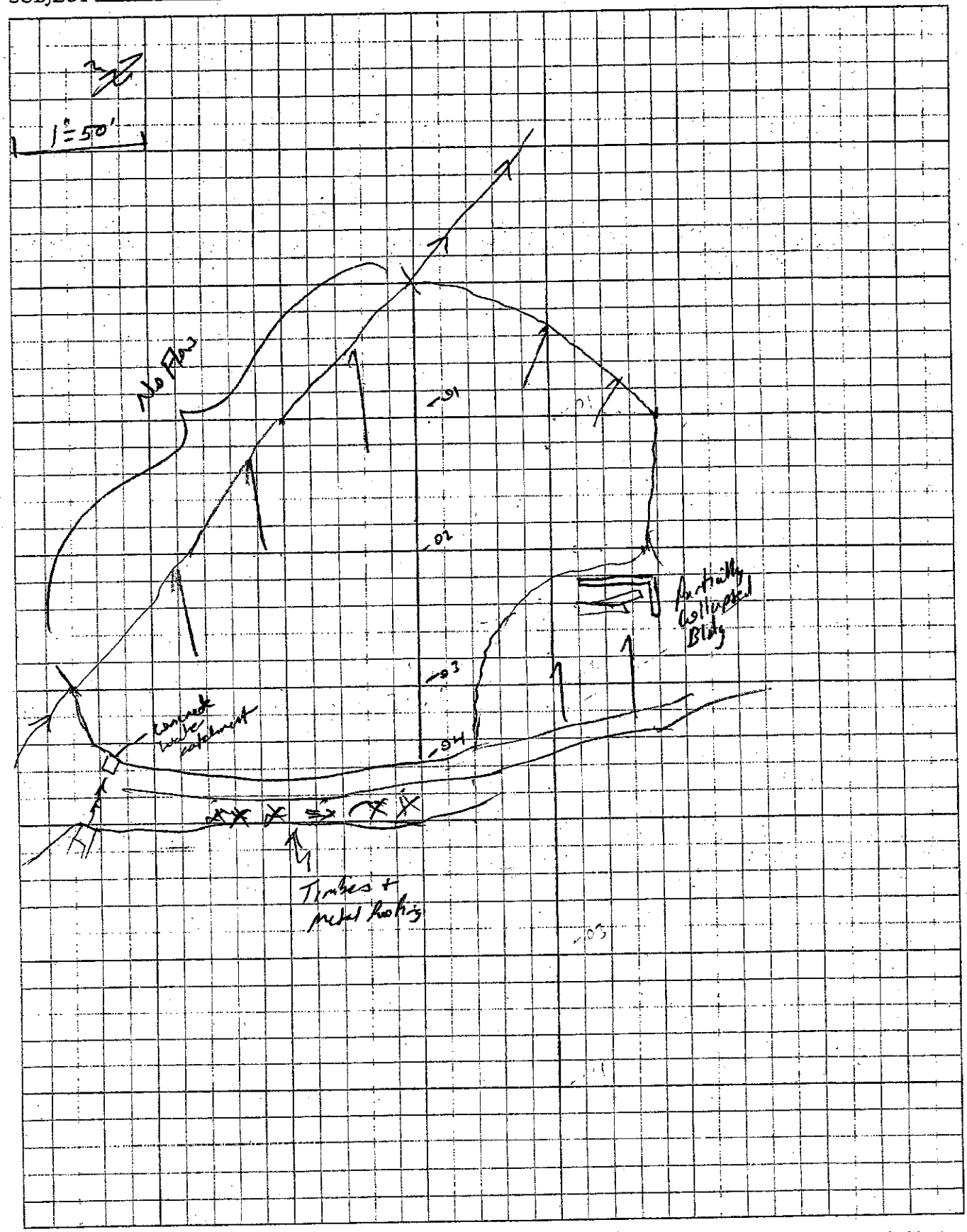


MAXIM TECHNOLOGIES INC

BY Jerry Armstrong DATE 7/9/02

JOB TITLE USFS Bear Gulch JOB NUMBER 1570158

SUBJECT Lower Drotno Mine SHEET 1 of 1

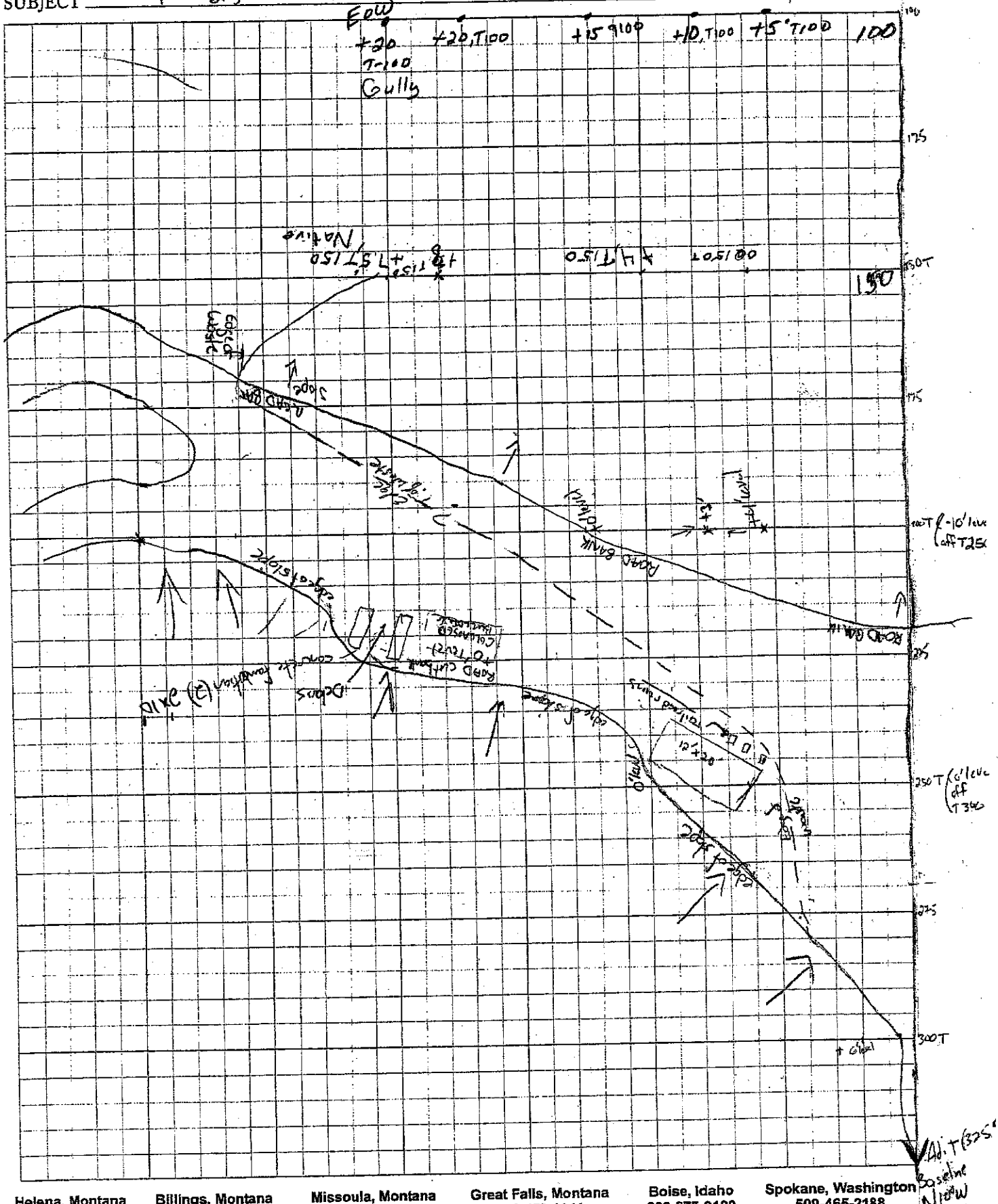


MAXIM TECHNOLOGIES INC

BY Bill Clark/Barry Twardoski DATE 7/10/02

JOB TITLE Beartoothline, Lower Dump JOB NUMBER

SUBJECT 1" = 25' SHEET 1



Helena, Montana 406-443-5210
Billings, Montana 406-248-9161
Missoula, Montana 406-543-3045
Great Falls, Montana 406-453-1641
Boise, Idaho 208-377-2100
Spokane, Washington 509-465-2188

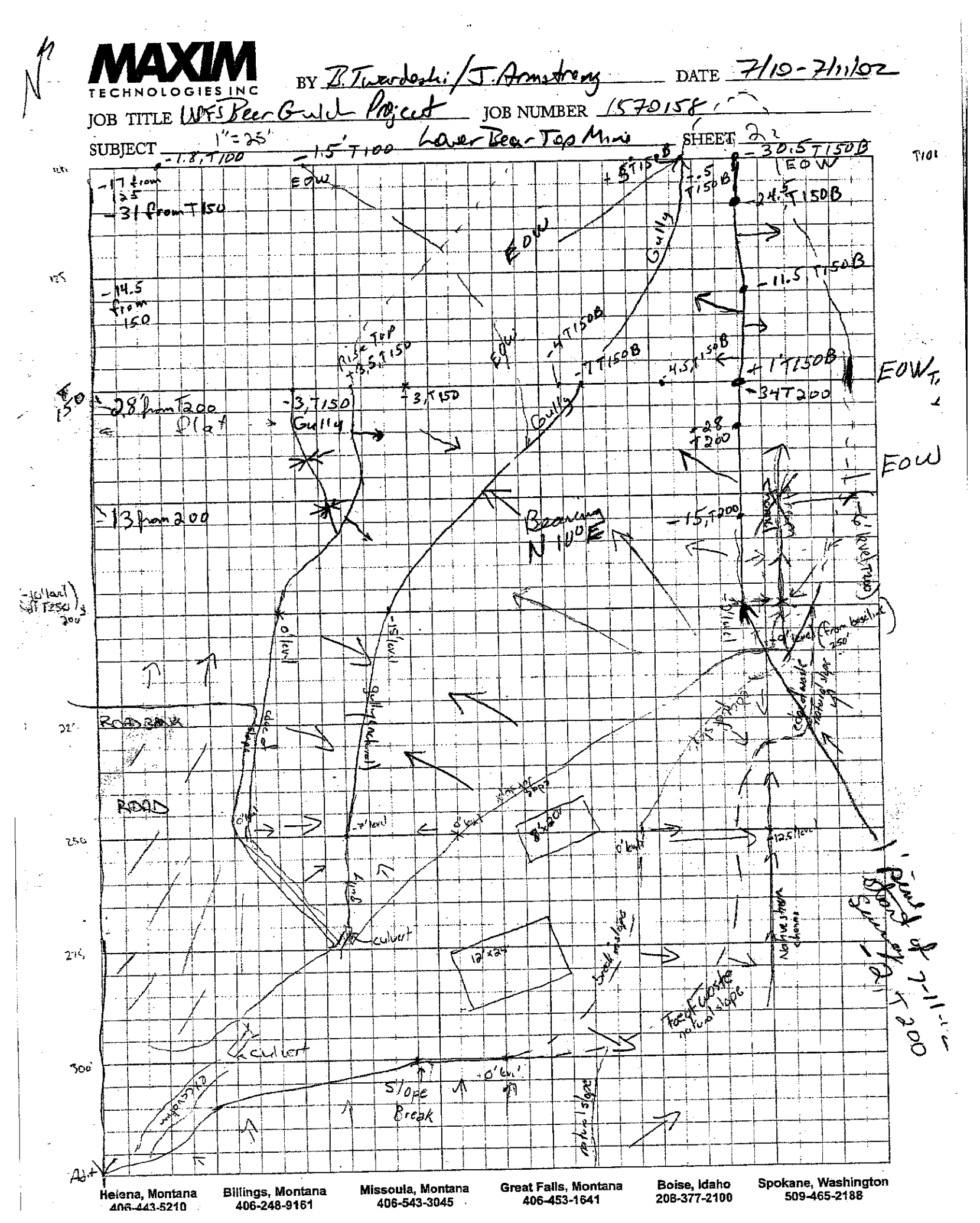
MAXIM TECHNOLOGIES INC

BY B. Tavakoli / J. Armstrong DATE 7/10 - 7/11/02

JOB TITLE WFS Beer Gulch Project JOB NUMBER 1570158

SUBJECT Lower Bear Top Mine SHEET 2 2

1" = 25'

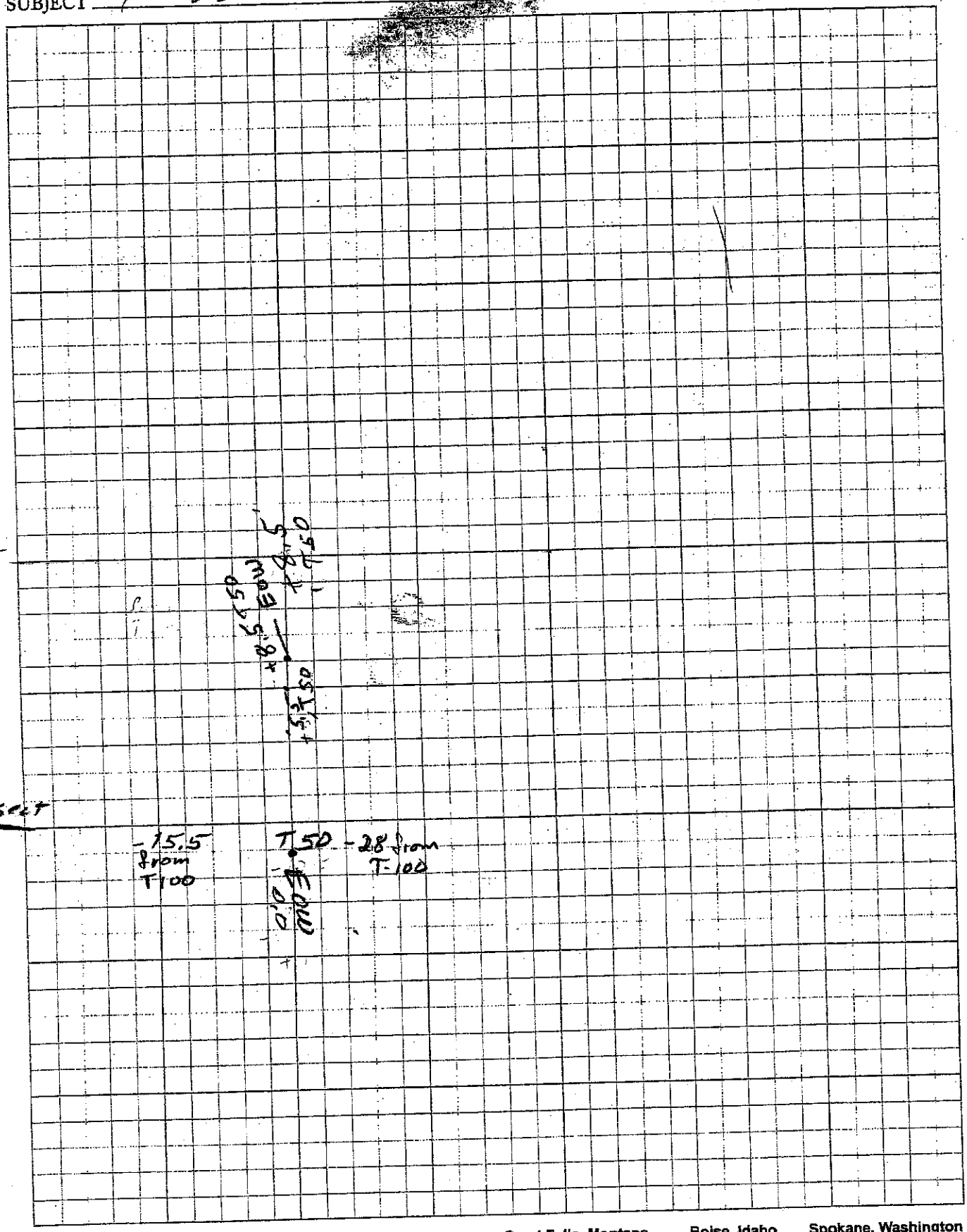


MAXIM TECHNOLOGIES INC

BY Mary J Armstrong DATE 7-11-02

JOB TITLE _____ JOB NUMBER _____

SUBJECT 1" = 25' SHEET 3



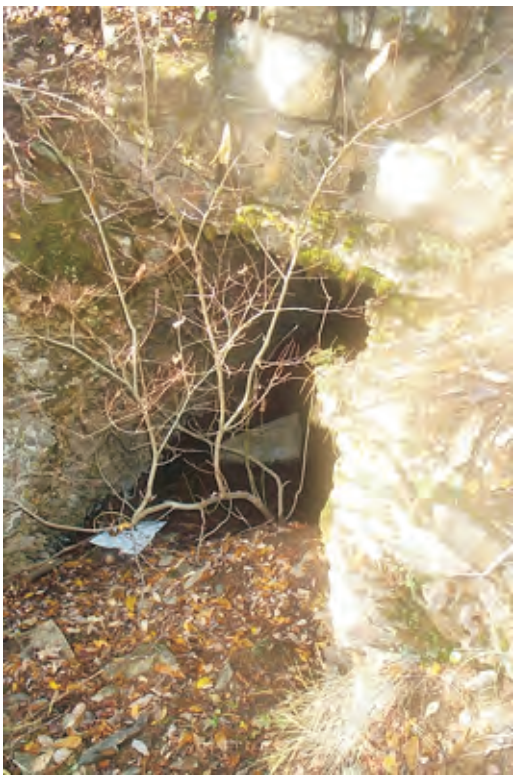
Transect

Appendix D

Selected Photographs

MAXIM Technologies Inc•

Looking down transect



Open adit

FS-SC(U) - 04

Looking up transect

Site Photographs
Upper Workings of Silver Scott Mine
Site Investigation Report
Idaho Panhandle National Forests

Adit

Looking down transect

Collapsed wooden frame, looking east

Partially collapsed loadidng structure

Partially collapsed building

Looking northeast

Site Photographs
Lower Workings of Silver Scott Mine
Site Investigation Report
Idaho Panhandle National Forests

Upper Bear Top Mine, upper adit looking towards stope

Lower Bear Top Mine

Upper Bear Top Mine, looking downslope/transect

Lower Bear Top Mine, top of waste rock dump

Lower Bear Top Mine, waste rock dump

Lower Bear Top Mine, backhoe trench in front of open adit

Site Photographs
Upper and Lower Workings of Bear Top Mine
Site Investigation Report
Idaho Panhandle National Forests

Middle Bear Top Mine, adit

Middle Bear Top Mine, adit at ore chute

Middle Bear Top Mine, waste rock dump looking down transect

Middle Bear Top Mine, top of ore chute

Middle Bear Top Mine, waste rock dump

FS-MS-01

FS-MS-08

FS-MS-12

Looking east, collapsed mill structure in background

FS-MS-13, loading area

Excavating test pits at mill site

Site Photographs
Bear Top / Orofino Mill Site
Site Investigation Report
Idaho Panhandle National Forests

Lower Orofino Mine, adit in background, water-filled concrete vaults in foreground

Lower Orofino Mine, partially collapsed structure

Lower Orofino Mine, looking down transect

Upper Orofino Mine, lookin g down transect, main waste rock dump

Upper Orofino Mine, open adit

Upper Orofino Mine, western waste rock dump

Upper Orofino Mine, middle waste rock dump

Site Photographs
Lower and Upper Workings of Orofino Mine
Site Investigation Report
Idaho Panhandle National Forests

Looking down transect

FS-IM (L) 01

FS-IM (L) 02

FS-IM (L) 03

Overturned ore car and collapsed adit, looking south

Shed, looking southwest

Middle Ione Mine, looking down transect

Middle Ione Mine, top of wate rock dump (adit in bushes)

Upper Ione Mine, open adit

Upper Ione Mine, looking down transect

Upper level of Upper Ione Mine, open adit filled with water

Upper level of Upper Ione Mine, open adit filled with water

Upper level of Upper Ione Mine, waste rock dump

Appendix E

Waste Rock Volume Calculation

MAXIM Technologies Inc.

Appendix E
Volume Calculations for the Orofino Mine

Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

Lower Workings, Orofino Mine Site			
Contour Interval of Waste Thickness (ft)	Surface Area (ft^2)	Average Thickness (ft)	Volume (yd^3)
0-5	14,423	2.5	1,335
5-10	8,523	7.5	2,368
10	1,409	10.0	522
		Total Volume (yd^3)	4,225

Upper Workings, Orofino Mine Site			
Contour Interval of Waste Thickness (ft)	Surface Area (ft^2)	Average Thickness (ft)	Volume (yd^3)
0-2	3,695	1.0	137
2-5	1,593	3.5	206
5-10	846	7.5	235
10	337	10.0	125
		Total Volume (yd^3)	703

Other Upper Workings, Orofino Mine Site			
Dump 1			
Contour Interval of Waste Thickness (ft)	Surface Area (ft^2)	Average Thickness (ft)	Volume (yd^3)
0-2	1,751	1.0	65
2	737	2.0	55
		Dump 1 Volume (yd^3)	119
Dump 2			
0-3	1,179	1.5	66
3-5	1,288	4.0	191
5	624	5.0	116
		Dump 2 Volume (yd^3)	372
		Total Volume of Both Waste Rock Dumps (yd^3)	491

Appendix E
Volume Calculations for the Silver Scott Mine

Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

Upper Workings, Silver Scott Mine Site			
Contour Interval of Waste Thickness (ft)	Surface Area (ft^2)	Average Thickness (ft)	Volume (yd^3)
0-2	1,691	1.0	63
2-4	744	3.0	83
4	386	4.0	57
		Total Volume (yd^3)	202

Lower Workings, Silver Scott Mine Site			
Contour Interval of Waste Thickness (ft)	Surface Area (ft^2)	Average Thickness (ft)	Volume (yd^3)
0-2	11,318	1.0	419
2-4	5,353	3.0	595
4-5	1,447	4.5	241
5-6	839	5.5	171
6	345	6.0	77
		Total Volume (yd^3)	1,503

Appendix E
Volume Calculations for the Ione Mine

Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

Upper Workings, Ione Mine Site			
Contour Interval of Waste Thickness (ft)	Surface Area (ft^2)	Average Thickness (ft)	Volume (yd^3)
0-5	3,438	2.5	318
5-10	1,078	7.5	299
10-15	1,026	12.5	475
15	495	15.0	275
		Total Volume (yd^3)	1,368

(Upper) Upper Workings, Ione Mine Site			
Contour Interval of Waste Thickness (ft)	Surface Area (ft^2)	Average Thickness (ft)	Volume (yd^3)
0-2	670	2.5	62
2-4	464	3.0	52
4-6	329	5.0	61
6	239	6.0	53
		Total Volume (yd^3)	228

Middle Workings, Ione Mine Site			
Contour Interval of Waste Thickness (ft)	Surface Area (ft^2)	Average Thickness (ft)	Volume (yd^3)
0-5	5,688	2.5	527
5-10	3,679	7.5	1,022
10-15	4,340	12.5	2,009
15-20	4,245	17.5	2,751
20	1,845	20.0	1,367
		Total Volume (yd^3)	7,676

Lower Workings, Ione Mine Site			
Contour Interval of Waste Thickness (ft)	Surface Area (ft^2)	Average Thickness (ft)	Volume (yd^3)
0-2	9,092	1.0	337
2-4	6,994	3.0	777
4-6	4,310	5.0	798
6	1,420	6.0	316
		Total Volume (yd^3)	2,228

Appendix E
Volume Calculations for the Bear Top Mine

Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

Upper Workings, Bear Top Mine Site			
Contour Interval of Waste Thickness (ft)	Surface Area (ft^2)	Average Thickness (ft)	Volume (yd^3)
0-1	2,613	0.5	48
1-2	2,698	1.5	150
2-3	2,287	2.5	212
3-4	1,147	3.5	149
4-5	613	4.5	102
5-6	437	5.5	89
6	224	6.0	50
		Total Volume (yd^3)	800

Middle Workings, Bear Top Mine Site			
Main Adit Dump			
Contour Interval of Waste Thickness (ft)	Surface Area (ft^2)	Average Thickness (ft)	Volume (yd^3)
0-1	3,558	0.5	66
1-2	4,254	1.5	236
2-3	727	2.5	67
3-5	617	4.0	91
5-10	1,102	7.5	306
10-15	775	12.5	359
15-20	1,233	17.5	799
20-25	329	22.5	274
25	260	25.0	241
		Main Adit Dump Volume (yd^3)	2,440
Ore Chute Dump			
0-1	287	0.5	5
1-2	269	1.5	15
2-3	222	2.5	21
3-4	875	3.5	113
4	324	4.0	48
		Ore Chute Volume (yd^3)	202
		Total Volume of Both Waste Rock Dumps (yd^3)	2,643

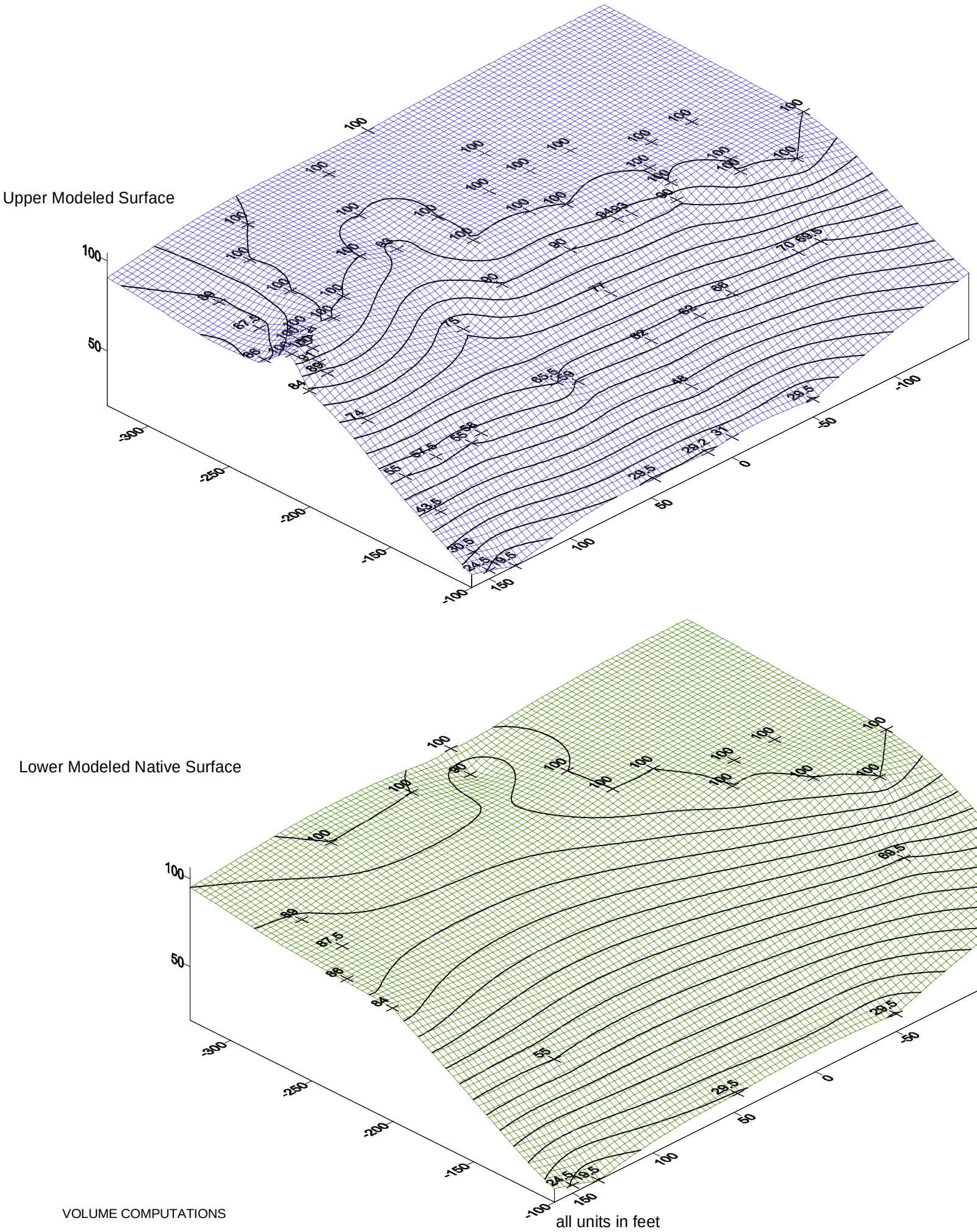
Appendix E
Volume Calculations for the Bear Top Mine

Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

Lower Workings, Bear Top Mine Site			
Contour Interval of Waste Thickness (ft)	Surface Area (ft^2)	Average Thickness (ft)	Volume (yd^3)
0-2	5,077	1.0	188
2-4	5,877	3.0	653
4-6	6,041	5.0	1,119
6-8	8,123	7.0	2,106
8-10	7,051	9.0	2,350
10-12	6,151	11.0	2,506
12-14	5,929	13.0	2,855
14-16	3,322	15.0	1,845
16-18	1,051	17.0	661
18	699	18.0	466
		Total Volume (yd^3)	14,750

NOTE: Volume modeled with surface contouring model (Surfer) is shown on the attached figure. The modeled volume was 9,700 cubic yards.

LOWER BEAR TOP MINE DUMP



VOLUME COMPUTATIONS

all units in feet

UPPER SURFACE
Grid File: N:\PROJECTS\USFS\Bear Gulch\Graphics\Lower Bear Top\Lower Bear Top xyz.grd
Grid size as read: 100 cols by 73 rows
Delta X: 3.10101010101
Delta Y: 3.125
X-Range: -146 to 161
Y-Range: -325 to -100
Z-Range: 19.7572968384 to 104.141093929

LOWER SURFACE
Grid File: N:\PROJECTS\USFS\Bear Gulch\Graphics\Lower Bear Top\Lower Bear Top xyz-base.grd
Grid size as read: 100 cols by 73 rows
Delta X: 3.10101010101
Delta Y: 3.125
X-Range: -146 to 161
Y-Range: -325 to -100
Z-Range: 19.7339884527 to 106.16638497

VOLUMES
Approximated Volume by
Trapezoidal Rule: 245116.354021
Simpson's Rule: 245190.949386
Simpson's 3/8 Rule: 245194.749301

CUT & FILL VOLUMES
Positive Volume [Cut]: 261852.369114
Negative Volume [Fill]: 16739.0475639
Cut minus Fill: 245113.32155

AREAS
Positive Planar Area
(Upper above Lower): 49604.2704574
Negative Planar Area
(Lower above Upper): 19470.7295426
Blanked Planar Area: 0

Modeled Volume of Waste Dump is 261,852 cubic feet or 9,700 cubic yards.

Appendix E
Volume Calculations for the Bear Top-Orofino Mill Site

Bear Gulch Mine Complex
Site Investigation
Idaho Panhandle National Forests

BearTop/Orofino Mill Site			
Waste Area Designation	Surface Area (ft^2)	Average Thickness (ft)	Volume (yd^3)
1 Exposed Tailings	3,512	4.7	611
2 Mill Disturbance/Debris	16,715	2.2	1,362
3 Former Concentrate Area Debris	2,204	1.5	122
4 Reworked/Redistributed Tailing & Alluvium	115,869	2.3	9,870
		Total Volume (yd^3)	11,966