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

FIELD INSPECTION BY:
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Idaho Geological Survey

FINAL REPORT EDITED BY:
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Prepared for the U.S. Forest Service, Region 1,
Under Participating Agreement No. FS-01-96-14-2800
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Field Inspection conducted by Earl Bennett, 
John Kauffman, Falma Moye, and William Rember
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1.0 PROJECT OVERVIEW

1.1 INTRODUCTION

In order to fulfill its obligations under the Clean Water Act and related legislation, the Northern Region of the United States Forest Service (USFS) needs to identify and characterize the abandoned and inactive mines with environmental, health, and/or safety problems that are on or could impact National Forest Service-administered lands. The Northern Region of the USFS administers National Forest lands in the northern part of Idaho, Montana, and parts of North and South Dakota. The Idaho Geological Survey (IGS) is the lead state agency for the collection, interpretation, and distribution of information about the geology and mineral resources of Idaho. The USFS and the IGS, having determined that an inventory and preliminary characterization of abandoned and inactive mines in Idaho would be beneficial to both agencies, have entered into a series of participating agreements to accomplish this work. The first forest inventoried was the Panhandle National Forest. This report, Volume I, presents the results of the work done in the Summit mining district (Prichard-Eagle Creek drainage). For continuity, the general design of this report follows that used by the Montana Bureau of Mines and Geology for similar studies in Montana.

1.2 PROJECT OBJECTIVES

In 1992, the USFS and IGS entered into an agreement to inventory abandoned and inactive mines on or affecting Forest Service lands in Idaho. Work on the initial phase of the project included developing a computerized database of all such mines and prospects and plotting the locations of these properties on National Forest base maps. Phase 2 work conducted the following year provided the Forest Service with screening forms containing site information from the database and map overlays at 7.5-minute scale for areas of dense mining activity. Phase 3 started in the summer of 1996 and included field examination of properties in the Prichard Creek and Eagle Creek basins (Summit mining district) in Shoshone County and preparation of reports discussing the ownership and operational history of selected mines.

The overall objectives of this inventory and preliminary characterization process, as defined by the USFS, were to:

1. Systematically identify all mine sites with possible human health, environmental, and/or safety related problems that either are on or affecting National Forest Service lands.

2. Identify the human health and environmental risks at each location based on site characterization factors (see Section 1.5), including screening-level soil and water samples taken and analyzed in accordance with Environmental Protection Agency (EPA) protocols and quality control procedures.

3. Based on site characterization factors, identify those sites that are not affecting National Forest Service lands and that can therefore be eliminated from further consideration.
4. Cooperate with other state and federal agencies, and integrate the Northern Region program with their programs.

5. Develop and maintain a data file of site information that will allow the Region to pro-actively respond to governmental and public interest group concerns.

In addition to the USFS objectives outlined above, the IGS objectives included gathering new information associated with these abandoned and inactive mines. The Survey's enabling legislation (Sections 47-201–47-204 of the Idaho Code) designates IGS as the lead state agency for the collection, interpretation, and distribution of all geologic and minerals data for Idaho.

1.3 ABANDONED AND INACTIVE MINES DEFINED

For the purposes of this study, mines, mills, or other processing facilities related to mineral extraction and/or processing are defined as abandoned or inactive as follows:

A mine is considered abandoned if there are no identifiable owners or operators for the facilities, or if the facilities have reverted to federal ownership.

A mine is considered to be inactive if there is an identifiable owner or operator of the facility, but the facility is not currently operating and there are no approved authorizations or permits to operate.

1.4 HEALTH AND ENVIRONMENTAL PROBLEMS AT MINES

A variety of safety, health, and environmental problems may occur at abandoned and inactive mines. These include metals that contaminate ground water, surface water, and soils; airborne dust from abandoned tailings impoundments; eroding mine and mill waste materials that contribute excessive amounts of sediment to surface waters; unstable waste piles with the potential for catastrophic failure; and physical hazards associated with mine openings and dilapidated structures. The most important environmental hazard is the contamination of both surface and subsurface water by metals, acid mine drainage, or sediment loading.

Metals are often transported from a mine by water (ground water discharge or surface runoff) and may be dissolved, suspended, or carried as part of the bedload. When sulfides are present, acid water can form; this, in turn, increases the solubility of metals. This condition, known as acid mine drainage (AMD), is a significant source of metal releases at some mine sites in Idaho.

1.4.1 Acid Mine Drainage

Trexler and others (1975) identified six factors that govern the formation of metal-laden acid mine waters. They are:

1) availability of acid-producing minerals, particularly pyrite,
2) presence of oxygen,
3) moisture in the atmosphere,
4) availability of leachable heavy metals,
5) availability of water to transport the dissolved constituents, and
6) mine characteristics, which affect movement of air and water through the mine workings.

These factors occur not only within the mines themselves, but also within mine dumps and mill tailings piles, making these waste materials potential sources of contamination as well. Formation of acid mine drainage can be reduced if minerals such as calcite, which can neutralize acidity, are present (Trexler and others, 1975; Marvin and others, 1995).

Acid mine drainage is formed by the oxidation and dissolution of sulfides, particularly pyrite (FeS₂) and pyrrhotite (Fe₁₋ₓS). Other sulfides play a minor role in acid generation. Oxidation of iron sulfides forms sulfuric acid (H₂SO₄), sulfate ions (SO₄²⁻), and reduced iron (Fe²⁺). When sulfide-bearing rock is mined, the sulfide minerals are exposed to atmospheric oxygen and oxygen-bearing water. Consequently, the sulfide minerals are oxidized, and acid mine waters are produced (Trexler and others, 1975; Marvin and others, 1995).

The oxidation of the reduced iron is the step that limits how much acid will form. The rate of this reaction can be greatly increased by iron-oxidizing bacteria (*Thiobacillus ferroxidans*). The oxidized iron produced by biological activity promotes further oxidation and dissolution of pyrite, pyrrhotite, and marcasite (FeS₂, a dimorph of pyrite) (Trexler and others, 1975; Marvin and others, 1995).

Once formed, the acid can dissolve other sulfide minerals to produce high concentrations of copper, lead, zinc, and other metals. Minerals that can contribute heavy metals to acid mine drainage include arsenopyrite, FeAsS; chalcopyrite, CuFeS₂; galena, PbS; tetrahedrite, (CuFe)₁₂Sb₃S₁₃; and sphalerite, (Zn, Fe)S. Aluminum can be leached by the dissolution of aluminosilicates common in soils and waste material found in Idaho. The dissolution of any given metal is controlled by the solubility of that metal (Trexler and others, 1975; Marvin and others, 1995).

### 1.4.2 Solubility of Selected Metals

The following information is paraphrased from Marvin and others (1995, p. 5-6). This report cites the following references as sources for this material: Lindsay (1979), Stumm and Morgan (1981), Hem (1985), and Maest and Metesh (1993).

At a pH above 2.2, ferric hydroxide [Fe(OH)₃] produces a brownish orange color in surface waters and forms a precipitate with a similar color on rocks in affected streams. If other metals, such as copper, lead, cadmium, zinc, and aluminum, are present in the source rock, they may also precipitate with or adsorb onto the ferric hydroxide (Stumm and Morgan, 1981). Alunite [KAl₃(SO₄)₂(OH)₆] and jarosite
[\text{KFe}_3(\text{SO}_4)_2(\text{OH})_6] \text{ will precipitate at pH of less than 4, depending on SO}_4^{\text{2-}} \text{ and K}^+ \text{ activities (Lindsay, 1979).}

Under acidic conditions, the solubility of the metal controls how much will be released into the environment:

**Manganese** solubility is strongly controlled by the redox state and is limited by the presence of minerals such as pyrolusite and manganite; under reducing conditions, pyrolusite [\text{MnO}_2] dissolves and manganite [\text{MnO(OH)}] precipitates. Manganese is found in mineralized environments as rhodochrosite [\text{MnCO}_3] and its weathering products.

**Aluminum** solubility is most often controlled by alunite [\text{KAl}_3(\text{SO}_4)_2(\text{OH})_6] or by gibbsite [\text{Al(OH)}_3], depending on pH. Aluminum is one of the most common elements in rock-forming minerals such as feldspars, micas, and clays.

**Arsenic** tends to precipitate and adsorb with iron at low pH and de-sorb or dissolve at higher pH. Once oxidized, arsenic will be found in solution in higher pH waters. When the pH is between 3 and 7, the dominant arsenic compound is a monovalent arsenate, \text{H}_3\text{AsO}_4. Arsenic is abundant in metallic mineral deposits as arsenopyrite [\text{FeAsS}], enargite [\text{Cu}_3\text{AsS}_4], tennantite [\text{Cu}_{12}\text{As}_4\text{S}_{13}], and other minerals.

**Cadmium** solubility data are limited. When the pH of soils is above 7.5, the solubility of cadmium is controlled by the carbonate species octavite [\text{CdCO}_3]; when the pH of the soil is below 6, cadmium solubility is controlled by strengite [\text{Cd}_3(\text{PO}_4)_2]. Octavite is the dominant control on the solubility of cadmium in soils. In water, at low partial pressures of \text{H}_2\text{S}, \text{CdCO}_3 \text{ is easily reduced to CdS.}

**Copper** solubility in natural waters is controlled primarily by the amount of carbonate present; malachite [\text{Cu}_2(\text{OH})_2\text{CO}_3] and azurite [\text{Cu}_3(\text{OH})_2(\text{CO}_3)_2] form when CO$_3^{\text{2-}}$ ions are available in sufficient concentrations. In soil, copper combines readily with iron to form cupric ferrite. Other compounds, such as sulfate and phosphates, may also control copper solubility in soils. Copper is present in many ore minerals, including chalcopyrite [\text{CuFeS}_2], bornite [\text{Cu}_3\text{FeS}_4], chalcocite [\text{Cu}_2\text{S}], and tetrahedrite [\text{Cu}_{12}\text{Sb}_4\text{S}_{13}].

**Mercury** readily vaporizes under atmospheric conditions and thus is most often found in concentrations well below the 25 \text{ \mu g/L} equilibrium concentration. The most stable form of mercury in soil is its elemental form. Mercury is found in low temperature hydrothermal ores as cinnabar [\text{HgS}], in
epithermal (hot springs) deposits as native mercury, and as native mercury in man-made deposits where mercury was used to process gold ores.

**Lead** concentrations in natural waters are controlled by the formation of lead carbonate, which has an equilibrium concentration of 50 μg/L when the pH is between 7.5 and 8.5. As with other metals, concentrations in solution increase with decreasing pH. In sulfate soils with a pH of less than 6, the formation of anglesite determines how much lead will remain in solution. The formation of cerussite, a lead carbonate, controls solubility in buffered soils. Lead occurs in the common ore mineral galena [PbS].

**Zinc** solubility is controlled by the formation of zinc hydroxide and zinc carbonate in natural waters. When the pH is above 8, the equilibrium concentration of zinc in water with a high bicarbonate content is less than 100 μg/L. Franklinite may control solubility at pH less than 5 in water and soils, and its formation is strongly affected by sulfate concentrations. Thus, production of sulfate from AMD may ultimately control solubility of zinc in water affected by mining. Sphalerite [ZnS] is common in mineralized systems.

### 1.4.3 The Use of pH and Specific Conductivity to Identify Water Quality Problems

Specific conductance (SC) and pH provide a rapid way to distinguish many "problem" mine sites from those that have no adverse water-related impacts. As a rough screening tool, low pH (<6.0) and high SC (variable) usually occur at sites with problems; neutral or higher pH and low SC indicate sites that are less likely to have serious problems.

Limiting data collection only to pH and SC largely ignores the various controls on solubility and can lead to overlooking some types of problems. Arsenic, for example, is most mobile in waters with higher pH values (>7), and its concentration is strongly dependent on the presence of dissolved iron. Cadmium and lead may also exceed standards in waters with pH values within acceptable limits.

Reliance on SC as an indicator of site conditions can also be misleading in certain situations. The SC value of a sample represents 55 to 75 percent of the total dissolved solids (TDS), depending on the concentration of sulfate. Also, it is necessary to have a statistically significant amount of SC data for a study area in order to define what constitutes a high or low SC value.

In some cases, a water sample with a near-neutral pH and a moderate SC could have one or more dissolved metal species that may exceed standards. The complete evaluation of a mine site for adverse impacts on water and soil should include the collection of samples for analysis of metals, cations, and anions.
1.5 METHODOLOGY

1.5.1 Data Sources

The IGS began compiling a database of mining properties in Idaho in 1979. This work has continued to date, and the database (now digital) contains information on some 8,700 mines and prospects. All or parts of the following databases and information sources have been integrated into this digital information system:

1. the Mineral Industry Location Subsystem (MILS) database (U.S. Bureau of Mines)
2. the Mineral Resources Data System (MRDS) database (U.S. Geological Survey)
3. published compilations of mines and prospects data
4. state publications on Idaho mineral deposits
6. IGS mineral property files
7. all mines and prospects noted on the appropriate USGS 7.5-minute quadrangle maps
8. data held in private collections or company information.

Most of the data for this project were collated with existing data in the IGS Mines and Prospects digital database. As noted, this is the most complete compilation available for information on Idaho's mining properties. The IGS continues to update the database, which now contains an estimated 85-90 percent of the mining properties in the state. During the field visits, the IGS located some (but not many) mines and prospects for which no previous information existed. Also, a very few mines listed in the database were not found.

1.5.2 Pre-field Screening

Field crews visited almost all the mine sites in the study area, emphasizing the properties with the potential to release hazardous substances and those for which there was not enough information available to make that determination without a field visit. The Survey and the USFS developed screening criteria (Table 1.5-1) which they used to determine if a site had the potential to release hazardous substances or posed other environmental or safety hazards. The first page of the Field Form (Appendix A) contains the screening criteria. If any of the answers were "yes" or unknown, the site was visited. Personal knowledge of a site and published information were used initially to answer the questions. Forest Service mineral specialists used these criteria to "screen out" several sites using their knowledge of an area.

Mine sites which were not visited were retained in the database along with the data source(s) that were consulted. However, if these sites were close to a visited site, the geologist usually looked at them to verify that the screening information was correct.

Placer mines were not studied as part of this project. Although mercury was used in amalgamating free gold in placer mines, the complex nature of placer deposits makes detection of mercury
difficult and is beyond the scope of this inventory. Due to their oxidized nature, placer deposits are not likely to contain other anomalous concentrations of heavy metals.

Table 1.5-1. Screening Criteria (answer Yes or No to each item).

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>Screening Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Mill site or tailings present.</td>
</tr>
<tr>
<td></td>
<td>2. Adits with discharge or evidence of discharge.</td>
</tr>
<tr>
<td></td>
<td>3. Evidence of or strong likelihood for metal leaching or AMD (water stains, stressed or lack of vegetation, waste below water table, etc.)</td>
</tr>
<tr>
<td></td>
<td>4. Mine waste in floodplain or shows signs of water erosion.</td>
</tr>
<tr>
<td></td>
<td>5. Residences, high public use area, or environmentally sensitive area (as listed in HRS) within 200 feet of disturbance.</td>
</tr>
<tr>
<td></td>
<td>6. Hazardous wastes/materials (chemical containers, explosives, etc.)</td>
</tr>
<tr>
<td></td>
<td>7. Open adits/shafts, highwalls, or hazardous structures/debris.</td>
</tr>
</tbody>
</table>

If the answers to criteria 1 through 6 were all "NO" (based on literature, personal knowledge, or a site visit), the site was not investigated further. Few, if any, properties were screened out at this stage.

1.5.3 Field Inspection Procedures

The sites which could not be screened out by using the criteria in Table 1.5-1 were visited by an IGS geologist. At sites for which little geologic or mining data existed, geologists characterized the geology, collected samples for geochemical analysis, evaluated the deposit, and described workings and processing facilities present. All information required to fill in the Field Questionnaire (Appendix A) was gathered.

When it was determined that a site had a possible environmental problem, more sampling and description were required. Information was collected concerning environmental degradation, hazardous mine openings, the presence of structures, and land ownership. After the potential problems were described, appropriate soil and water samples were collected. All site locations were refined using conventional field methods, and each site was located by latitude and longitude and by Township, Range, and Section. If previously determined, these values were checked and corrected, as needed.

On public lands, sites with ground-water discharge, flowing surface water, or contaminated soils (as indicated by impacts on vegetation) were mapped. The sketch maps show locations of the workings, exposed geology, dumps, tailings, and surface water and geologic sample locations.
Oblique aerial photographs were sometimes substituted or used to supplement the field sketches. The entire site was photographically recorded using both still images and videotape. The videotape record proved especially useful for site description and review, and is recommended for future studies.

1.5.3.1 Soil, Rock, and Mine Waste Sampling Procedures

At sites identified as having a potential problem, the geologist collected soil, rock, and waste samples, as appropriate. Sample locations were selected in areas where waste material was obviously impacting natural material. In most cases a composite sample was gathered to get as representative a sample as possible, or multiple samples were collected. All sample sites were located so as to assess conditions on National Forest lands. Three types of samples were collected:

1) select rock, soil, or waste samples—specimens representing a particular material taken for analysis;

2) composite samples—rock and soil taken systematically from a waste dump or tailings pile for analysis, representing the overall composition of material in the source;

3) leach samples—duplicates of selected composite samples (usually waste rock or mill tailings) for testing leachable metals.

The three types of samples were used to examine the value and metal content of dumps and tailings, and to check the availability of metals during leaching when sample sites were exposed to water. Outcrops and waste materials were not sampled extensively enough to provide reliable estimates of tonnages, grades, or economic feasibility.

1.5.3.2 Water Sampling Procedure

As noted, this project focused on the impacts of mining on surface water, ground water, and soils. The reasoning behind this approach was that a mine disturbance may have high total metal concentrations yet may be releasing few metals into the surface water, ground water, or soil. Conversely, another disturbance could have lower total metal content but be releasing metals in concentrations that adversely impact the environment.

The geologist selected and marked water sample sites based on field parameters (SC, pH, temperature) and observations (such as erosion and staining of soils or stream beds). Sample locations were chosen that would provide the best information on the relative impact of the site to surface water and soils. All sites were accurately located on topographic base maps. Surface water samples were collected at all discharge points at the site, as well as samples from upstream and downstream of the site.
At each water sampling site, the temperature, specific conductivity, and pH were measured. A unique sample number was affixed to the sample bottle. A 500-ml sample was collected (split in the lab into a raw sample and a filtered sample). The field sample was acidified with 0.1N nitric acid and stored in a secured ice box. The samples remained under constant refrigeration and security until analyzed approximately 3-5 days later.

Since monitoring wells were not installed as part of this investigation, the evaluation of metal contamination of ground water was limited to strategic sampling of surface water and soils. In most cases, background water-quality data at a particular mine site was restricted to upstream surface water samples. However, in some drainages background samples were collected at sites with no visible contamination. Background soil samples were not collected. Laboratory leach tests were used to determine if metals might be released from mine waste material, which could provide additional insight to possible ground-water contamination.

1.5.4 Analytical Methods

The Analytical Sciences Laboratory at the University of Idaho performed all of the laboratory analyses using the following EPA-approved protocols and quality assurance standards:

Water Samples (acidified and unfiltered)—Total Recoverable Metal Screen (EPA Test 200.7).
Water Samples (acidified and unfiltered)—Arsenic (EPA Test 206.2), Lead (EPA Test 239.2), and Mercury (ICP, Cold Vapor).
Water Samples (raw and filtered 0.45 micron filter)—Dissolved Metal Screen (EPA Test 200.7).
Soil and Waste Material—Element Screen (EPA Test 3050).
Leachable Metals, TCLP—Metal Screen (EPA Test 1311/6010).

1.5.5 Standards

EPA and various state agencies have developed human health and environmental standards for various metals. To try to put the metal concentrations that were measured into some perspective, they were compared to these developed standards. However, it is understood that the background metal concentrations in mineralized areas may exceed these standards.

1.5.5.1 Water-Quality Standards

The Safe Drinking Water Act (SDWA) directs EPA to develop standards for potable water. Some of these standards are mandatory (primary) and some are desired (secondary). The standards established under the SDWA are often referred to as primary and secondary maximum contaminant levels (MCLs). Similarly, the Clean Water Act (CWA) directs EPA to develop water-quality standards (acute and chronic) that will protect aquatic organisms. These standards may vary with water hardness and are often referred to as the Aquatic Life Standards. The primary and secondary MCLs along with the acute and chronic Aquatic Life Standards for selected metals are listed in Table 1.5-2. As these standards can vary with water hardness, a range of values is given for some elements. Hardness was not measured for this study.
Table 1.5-2. Standards for contaminants in water.

<table>
<thead>
<tr>
<th>Element</th>
<th>Primary MCL (mg/L)</th>
<th>Secondary MCL (mg/L)</th>
<th>Aquatic Life, Acute (mg/L)</th>
<th>Aquatic Life, Chronic (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>---</td>
<td>0.05-0.2</td>
<td>0.75</td>
<td>0.087</td>
</tr>
<tr>
<td>Arsenic</td>
<td>0.05</td>
<td>---</td>
<td>0.36</td>
<td>0.19</td>
</tr>
<tr>
<td>Barium</td>
<td>2</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.005</td>
<td>---</td>
<td>0.004/0.009</td>
<td>0.001/0.002</td>
</tr>
<tr>
<td>Chromium</td>
<td>0.1</td>
<td>---</td>
<td>1.7/3.1</td>
<td>0.21/0.37</td>
</tr>
<tr>
<td>Copper</td>
<td>1.3</td>
<td>1</td>
<td>0.018/0.034</td>
<td>0.012/0.021</td>
</tr>
<tr>
<td>Iron</td>
<td>---</td>
<td>0.3</td>
<td>---</td>
<td>1</td>
</tr>
<tr>
<td>Lead</td>
<td>0.015</td>
<td>---</td>
<td>0.082/0.2</td>
<td>0.003/0.008</td>
</tr>
<tr>
<td>Manganese</td>
<td>---</td>
<td>0.05</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.002</td>
<td>---</td>
<td>0.0024</td>
<td>0.000012</td>
</tr>
<tr>
<td>Nickel</td>
<td>0.1</td>
<td>---</td>
<td>1.4/2.5</td>
<td>0.16/0.28</td>
</tr>
<tr>
<td>Zinc</td>
<td>---</td>
<td>5</td>
<td>0.12/0.21</td>
<td>0.11/0.19</td>
</tr>
</tbody>
</table>

1.5.5.2 Soil and Rock Background Standards

It is useful to have some idea about the natural background values of rocks and soils when interpreting geochemical data. Although no whole rock or soil samples were run for this study, an estimate can be made from the analyses presented by Gott and Cathrall (1980). They analyzed 727 rock samples from the Prichard Formation and 1,705 soil samples from above Prichard parent material. The median results from these analyses are presented in Tables 1.5-3 and 1.5-4, along with data for the Burke, Revett, St. Regis, and Wallace Formations. These samples were analyzed by emission spectrophotometry, a much less accurate technique than we use today. However, due to the large number of analyses, the data is still useful, especially for estimating background values. For example, an average sample of soil above the Prichard Formation might contain 54 ppm (mg/Kg) lead, 140 ppm (mg/Kg) zinc, 21 ppm (mg/Kg) copper, 0.13 ppm (mg/Kg) mercury, and 10 ppm (mg/Kg) arsenic. These data were used by the Environmental Protection Agency as background data for their studies of the Bunker Hill Superfund Site (Nick Ceto, 1997, personal communication).
Table 1.5-3. Median values of metals in rock samples from various units of the Belt Supergroup (data from Gott and Cathrall, 1980; ppm = mg/Kg).

<table>
<thead>
<tr>
<th>Element</th>
<th>Prichard Formation</th>
<th>Burke Formation</th>
<th>Revett Formation</th>
<th>St. Regis Formation</th>
<th>Wallace Formation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron (percent)</td>
<td>3</td>
<td>1.8</td>
<td>1.4</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>Magnesium (percent)</td>
<td>0.4</td>
<td>0.1</td>
<td>0.05</td>
<td>0.19</td>
<td>0.48</td>
</tr>
<tr>
<td>Calcium (percent)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.05</td>
</tr>
<tr>
<td>Titanium (percent)</td>
<td>0.3</td>
<td>0.19</td>
<td>0.13</td>
<td>0.19</td>
<td>0.21</td>
</tr>
<tr>
<td>Manganese (ppm)</td>
<td>224</td>
<td>386</td>
<td>381</td>
<td>600</td>
<td>360</td>
</tr>
<tr>
<td>Barium (ppm)</td>
<td>343</td>
<td>360</td>
<td>235</td>
<td>543</td>
<td>378</td>
</tr>
<tr>
<td>Beryllium (ppm)</td>
<td>1.3</td>
<td>---</td>
<td>---</td>
<td>0.9</td>
<td>0.89</td>
</tr>
<tr>
<td>Cobalt (ppm)</td>
<td>5</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>3.9</td>
</tr>
<tr>
<td>Chromium (ppm)</td>
<td>40</td>
<td>13</td>
<td>8.3</td>
<td>20</td>
<td>23.8</td>
</tr>
<tr>
<td>Molybdenum (ppm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Nickel (ppm)</td>
<td>10</td>
<td>5.5</td>
<td>4.2</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Strontium (ppm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Vanadium (ppm)</td>
<td>54</td>
<td>26</td>
<td>20</td>
<td>30</td>
<td>36</td>
</tr>
<tr>
<td>Sulfur (percent)</td>
<td>.01</td>
<td>.007</td>
<td>.006</td>
<td>0.007</td>
<td>0.009</td>
</tr>
<tr>
<td>Mercury (ppm)</td>
<td>.03</td>
<td>---</td>
<td>0.03</td>
<td>0.03</td>
<td>0.04</td>
</tr>
<tr>
<td>Copper (ppm)</td>
<td>22</td>
<td>6.2</td>
<td>8</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Lead (ppm)</td>
<td>34</td>
<td>14</td>
<td>10</td>
<td>11</td>
<td>23</td>
</tr>
<tr>
<td>Zinc (ppm)</td>
<td>60</td>
<td>31</td>
<td>15</td>
<td>20</td>
<td>41</td>
</tr>
<tr>
<td>Silver (ppm)</td>
<td>0.4</td>
<td>0.36</td>
<td>0.2</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Cadmium (ppm)</td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Arsenic (ppm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Antimony (ppm)</td>
<td>109</td>
<td>1.1</td>
<td>1.6</td>
<td>2.2</td>
<td>1.1</td>
</tr>
<tr>
<td>No. of Samples</td>
<td>727</td>
<td>402</td>
<td>455</td>
<td>839</td>
<td>998</td>
</tr>
</tbody>
</table>
Table 1.5-4. Median values of metals in soil samples from various units of the Belt Supergroup (data from Gott and Cathrall, 1980; ppm = mg/Kg).

<table>
<thead>
<tr>
<th>Element</th>
<th>Prichard Formation</th>
<th>Burke Formation</th>
<th>Revett Formation</th>
<th>St. Regis Formation</th>
<th>Wallace Formation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron (percent)</td>
<td>3.1</td>
<td>3.3</td>
<td>3.8</td>
<td>3.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Magnesium (percent)</td>
<td>0.61</td>
<td>0.60</td>
<td>0.5</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Calcium (percent)</td>
<td>0.57</td>
<td>0.59</td>
<td>0.5</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Titanium (percent)</td>
<td>0.56</td>
<td>0.49</td>
<td>0.5</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td>Manganese (ppm)</td>
<td>1,285</td>
<td>1,373</td>
<td>1,730</td>
<td>1,809</td>
<td>1,377</td>
</tr>
<tr>
<td>Barium (ppm)</td>
<td>647</td>
<td>647</td>
<td>616</td>
<td>684</td>
<td>586</td>
</tr>
<tr>
<td>Beryllium (ppm)</td>
<td>1.4</td>
<td>1.1</td>
<td>1</td>
<td>1.1</td>
<td>1.2</td>
</tr>
<tr>
<td>Cobalt (ppm)</td>
<td>14</td>
<td>10</td>
<td>8.8</td>
<td>9.5</td>
<td>9.4</td>
</tr>
<tr>
<td>Chromium (ppm)</td>
<td>43</td>
<td>32</td>
<td>34</td>
<td>34</td>
<td>32</td>
</tr>
<tr>
<td>Molybdenum (ppm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Niobium (ppm)</td>
<td>9</td>
<td>9</td>
<td>---</td>
<td>---</td>
<td>8</td>
</tr>
<tr>
<td>Nickel (ppm)</td>
<td>29</td>
<td>21</td>
<td>20</td>
<td>21</td>
<td>24</td>
</tr>
<tr>
<td>Strontium (ppm)</td>
<td>159</td>
<td>178</td>
<td>157</td>
<td>164</td>
<td>154</td>
</tr>
<tr>
<td>Vanadium (ppm)</td>
<td>98</td>
<td>90</td>
<td>97</td>
<td>90</td>
<td>94</td>
</tr>
<tr>
<td>Mercury (ppm)</td>
<td>0.13</td>
<td>0.09</td>
<td>0.08</td>
<td>0.1</td>
<td>0.13</td>
</tr>
<tr>
<td>Copper (ppm)</td>
<td>21</td>
<td>20</td>
<td>29</td>
<td>30</td>
<td>29</td>
</tr>
<tr>
<td>Lead (ppm)</td>
<td>54</td>
<td>35</td>
<td>41</td>
<td>39</td>
<td>45</td>
</tr>
<tr>
<td>Zinc (ppm)</td>
<td>140</td>
<td>89</td>
<td>77</td>
<td>86</td>
<td>115</td>
</tr>
<tr>
<td>Silver (ppm)</td>
<td>0.5</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Cadmium (ppm)</td>
<td>1.3</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.5</td>
</tr>
<tr>
<td>Arsenic (ppm)</td>
<td>10</td>
<td>8.6</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Antimony (ppm)</td>
<td>1</td>
<td>1</td>
<td>1.8</td>
<td>1.9</td>
<td>1.1</td>
</tr>
<tr>
<td>Sulfur (percent)</td>
<td>0.029</td>
<td>0.035</td>
<td>0.053</td>
<td>0.049</td>
<td>0.046</td>
</tr>
<tr>
<td>No. of Samples</td>
<td>1,705</td>
<td>573</td>
<td>699</td>
<td>1,586</td>
<td>2,298</td>
</tr>
</tbody>
</table>
There are no federal standards for concentrations of metals and other constituents in soils; acceptable limits for such are often based on human and/or environmental risk assessments for an area. Since no assessments of this kind have been done, concentrations of metals in soils were compared to the limits postulated by the U.S. EPA for the Clark Fork Superfund site (Table 1.5-5). The proposed upper limit for lead in soils is 1,000 mg/Kg to 2,000 mg/Kg, and 80 to 100 mg/Kg for arsenic in residential areas.

Table 1.5-5. Clark Fork Superfund background levels for selected elements.

<table>
<thead>
<tr>
<th>Material</th>
<th>As (mg/Kg)</th>
<th>Cd (mg/Kg)</th>
<th>Pb (mg/Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Mean Soil</td>
<td>6.7</td>
<td>0.7</td>
<td>20.0</td>
</tr>
<tr>
<td>Helena Valley Mean Soil</td>
<td>16.5</td>
<td>0.2</td>
<td>11.5</td>
</tr>
<tr>
<td>Missoula Lake Bed Sediments</td>
<td>n.a.</td>
<td>0.2</td>
<td>34.0</td>
</tr>
<tr>
<td>Blackfoot River</td>
<td>4.0</td>
<td>&lt;0.1</td>
<td>n.a.</td>
</tr>
<tr>
<td>Phytotoxic Concentration</td>
<td>100.0</td>
<td>100.0</td>
<td>1,000.0</td>
</tr>
</tbody>
</table>

1.5.6 Analytical Results

The results of the sample analyses were used to estimate the nature and extent of potential impacts to the environment and human health. Selected results for each site are presented in the discussion; a complete listing of water quality, soil chemistry, and leach test results are presented in Appendix C. It should be noted that the sampling for this study was of a reconnaissance nature only, sufficient for outlining possible problem areas for future study. Sampling density was not sufficient to provide a statistically valid description of any specific site.

The data fields in the current database are presented in Appendix B, and the format (dBase IV) is compatible with the widely used ARC/INFO Geographical Information System (GIS). In addition, all of the field observations and analytical data were entered into a Paradox database, which is compatible with other studies under way by the U.S. Forest Service.

1.5.6 Sample and Site Identification Numbers

All water, tailings, and dump samples were assigned unique numbers. These were constructed according to the following system: 1) an initial letter code (usually the first letter of the last name) identifying the person who took the sample; 2) one or two digits for the month (some sample numbers contain a leading zero); 3) two digits for the date on which the sample was taken; 4) the last two digits in the year in which the sample was taken (i.e., “97,” if the samples was taken in 1997); and 5) one to three digits, including leading zeros, identifying the individual sample. Site numbers for properties that did not have a database identification number assigned to them were generated in the same manner.
2.0 SUMMIT MINING DISTRICT (PRICHARD-EAGLE CREEK DRAINAGE)

2.1 INTRODUCTION

The Summit Mining District is one of eleven districts that collectively today are known as the Coeur d'Alene Mining District. The district is located in north Idaho and includes the drainage basins of Prichard Creek and Eagle Creek. The only town in the district is Murray, Idaho. Access to the area is by a paved road which follows the North Fork of the Coeur d'Alene River from the Kingston exit from Interstate 90 to Babins Junction and Prichard. Another route is by paved road (USFS Road 456) from Wallace, Idaho, north up Ninemile Creek and over Dobson Pass into Beaver Creek and hence to Babins Junction. A cutoff from the Beaver Creek Road, called the Kings Pass Road, is a shortcut to Murray. A new road is being constructed along Prichard Creek which will join the paved road in Montana at Thompson Pass. Most of the secondary drainages have dirt roads, especially those with past mining activity.

The study area is in the Wallace District of the Panhandle National Forest, and most of the land is administered by the U.S. Forest Service (USFS). A 5-square-mile area containing the town of Murray is administered by the U.S. Bureau of Land Management (BLM). There are enclaves of private land, mostly on patented mining claims.

The twenty-nine mining properties described in this report (Part 1 of the discussion of the Prichard and Eagle Creek drainages) are located on six 7.5-minute topographic maps (U.S. Geological Survey): the Murray, Prichard, Osburn, Thompson Pass, Burke, and Black Peak quadrangles. The location of these twenty-nine properties is shown in Figure 2.1-1. Elevations range from 2,387 feet at Prichard to over 6,300 feet on the Idaho-Montana border and at Sunset Peak. The area is heavily forested with dense brush and conifers, and the topography is generally very steep.

2.1.1 Summary of the Summit Mining District (Prichard-Eagle Creeks) Study

There were 74 mining properties (Table 2.1-1 and Volume 4 of this report) examined in the Summit district (Prichard and Eagle Creek drainages). At least 4 mines were not located with certainty. The twenty-nine sites discussed below are those with the most significant environmental problems. These properties have either significant environmental problems (usually acid water, high metal loadings in the water, or old mill tailings) or physical hazards (open adits, tunnels, shafts, stopes, or pits). Properties with less serious environmental problems or with only physical hazards are covered in a separate volume of this report.

Of the twenty-nine mines in the Prichard-Eagle Creek drainages discussed in this volume, sixteen have an environmental impact on or near USFS lands. (Several mines that are located on or near U.S. Bureau of Land Management property are on drainages that cross U.S. Forest Service land.) The magnitude of the problem almost always correlates with the amount of production at the property (the larger the production, the larger the problem). Of the sixteen locations, the Jack
Figure 2.1-1. Location of mining properties with the most significant environmental problems in the Summit mining district (U.S. Geological Survey Thompson Falls 1:100,000-scale map).
Table 2.1.1-1. Summary of sites within the Summit Mining District (Prichard-Eagle Creeks drainage). Site name in bold indicates a potential environmental hazard. Under “Environmental Hazards”: W = adit water that exceeds one or more standards, T = a mill tailings problem, D = dump material with high metals content or significant potential for metals leaching, D = dump material in active waterway, D = dump material in active waterway and with high metals content or significant potential for metals leaching, D = dump material present. Under “Physical Hazards” – Features: A = adit, P = prospect pit, S = shaft, St = stope; Condition: O= open, C = Caved. = Unknown (condition or number).

<table>
<thead>
<tr>
<th>Site Number</th>
<th>Mine Name</th>
<th>*Owner</th>
<th>H₂O Sample</th>
<th>Solid Sample</th>
<th>Environment Hazard</th>
<th>Physical Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>WL 4</td>
<td>Crystal Lead</td>
<td>P</td>
<td>1</td>
<td>D₃</td>
<td>1AC</td>
<td>2A?</td>
</tr>
<tr>
<td>WL 21</td>
<td>Consolidated Silver-Lead Mines</td>
<td>FS</td>
<td>1</td>
<td>W</td>
<td>1AO</td>
<td></td>
</tr>
<tr>
<td>WL 28</td>
<td>Jack Waite</td>
<td>P, FS</td>
<td>3</td>
<td>T, W, D₂</td>
<td>2AC</td>
<td></td>
</tr>
<tr>
<td>WL 29</td>
<td>Currency Mine</td>
<td>FS</td>
<td></td>
<td>D₂</td>
<td>1AC</td>
<td></td>
</tr>
<tr>
<td>WL 46</td>
<td>Terrible Edith (Pontiac) Mine</td>
<td>FS</td>
<td>1</td>
<td>W, D₂</td>
<td>1AO</td>
<td>1AC</td>
</tr>
<tr>
<td>WL 58</td>
<td>Pilot Mine</td>
<td>BLM</td>
<td></td>
<td>D₂</td>
<td>2AO</td>
<td></td>
</tr>
<tr>
<td>WL 64</td>
<td>Gold Back Mine</td>
<td>BLM</td>
<td></td>
<td>D₂</td>
<td>3AO</td>
<td></td>
</tr>
<tr>
<td>WL 65</td>
<td>King Mine</td>
<td>P</td>
<td></td>
<td>D</td>
<td>1S?</td>
<td>?A?</td>
</tr>
<tr>
<td>WL 71</td>
<td>Silver Scott Mine</td>
<td>FS</td>
<td>1</td>
<td>1</td>
<td>W, D₁, D₂</td>
<td>2AO</td>
</tr>
<tr>
<td>WL 72</td>
<td>Four Square Mine</td>
<td>P, FS?</td>
<td></td>
<td></td>
<td>?A?</td>
<td></td>
</tr>
<tr>
<td>WL 75</td>
<td>Golden Chest Mine</td>
<td>P</td>
<td>1</td>
<td>W</td>
<td>?AO</td>
<td></td>
</tr>
<tr>
<td>WL 85</td>
<td>Orosino Mine</td>
<td>P</td>
<td>2</td>
<td>W</td>
<td>2AO</td>
<td></td>
</tr>
<tr>
<td>WL 89</td>
<td>Mother Lode Mine</td>
<td>P</td>
<td>1</td>
<td>1</td>
<td>W, D₃</td>
<td>5AO</td>
</tr>
<tr>
<td>WL 93</td>
<td>Bear Top Mine</td>
<td>P</td>
<td></td>
<td>D₂</td>
<td>5AO</td>
<td>2StO</td>
</tr>
<tr>
<td>WL 93</td>
<td>Bear Top Tailings</td>
<td>FS</td>
<td>1</td>
<td>T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WL 100</td>
<td>Ione Mine</td>
<td>P</td>
<td></td>
<td>D</td>
<td>2AO</td>
<td></td>
</tr>
<tr>
<td>WL 108</td>
<td>Upper Paragon Mine</td>
<td>(FS?) P</td>
<td>1</td>
<td>D₂</td>
<td>1SO</td>
<td></td>
</tr>
</tbody>
</table>
Table 2.1.1-1 (continued). Summary of sites within the Summit Mining District (Prichard-Eagle Creeks drainage). Site name in bold indicates a potential environmental hazard. Under “Environmental Hazards”: W = adit water that exceeds one or more standards, T = a mill tailings problem, D₁ = dump material with high metals content or significant potential for metals leaching, D₂ = dump material in active waterway, D₃ = dump material in active waterway and with high metals content or significant potential for metals leaching, D = dump material present at mine site. Under “Physical Hazards” – Features: A = adit, P = prospect pit, S = shaft, St = stope; Condition: O = open, C = Caved. ? = Unknown (condition or number).

<table>
<thead>
<tr>
<th>Site Number</th>
<th>Mine Name</th>
<th>*Owner</th>
<th>H₂O Sample</th>
<th>Solid Sample</th>
<th>Environment Hazard</th>
<th>Physical Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>WL 114</td>
<td>Paragon/Black Horse Tailings</td>
<td>FS</td>
<td>1</td>
<td>2</td>
<td>T, W</td>
<td></td>
</tr>
<tr>
<td>WL 114</td>
<td>Black Horse Mine</td>
<td>P</td>
<td>1</td>
<td>1</td>
<td>W, D₃</td>
<td>3AO</td>
</tr>
<tr>
<td>WL 119</td>
<td>Raven Mine</td>
<td>FS</td>
<td>1</td>
<td>1</td>
<td>D₃</td>
<td>1AC</td>
</tr>
<tr>
<td>WL 120</td>
<td>Lower Paragon Mine</td>
<td>P</td>
<td>D</td>
<td></td>
<td></td>
<td>1AO</td>
</tr>
<tr>
<td>WL 123</td>
<td>Monarch Mine (lower)</td>
<td>P</td>
<td>2</td>
<td>1</td>
<td>W, T, D</td>
<td>1AC, 1AO</td>
</tr>
<tr>
<td>WL 124</td>
<td>Vendetta Mine</td>
<td>FS</td>
<td></td>
<td>D₂</td>
<td></td>
<td>2AO</td>
</tr>
<tr>
<td>WL 126</td>
<td>Giant Ledge Mine</td>
<td>FS</td>
<td>D₂</td>
<td></td>
<td></td>
<td>1SC</td>
</tr>
<tr>
<td>WL 128</td>
<td>Monarch Mine (upper)</td>
<td>P</td>
<td>D</td>
<td></td>
<td></td>
<td>1AC</td>
</tr>
<tr>
<td>WL 137</td>
<td>Silver Strike Mine</td>
<td>P, FS</td>
<td>1</td>
<td>3</td>
<td>W, T, D</td>
<td>2AO</td>
</tr>
<tr>
<td>WL 164</td>
<td>Sunrise Mine</td>
<td>P</td>
<td>1</td>
<td></td>
<td>W, D₂</td>
<td>1AC</td>
</tr>
<tr>
<td>WL 167</td>
<td>St. James Mine</td>
<td>BLM</td>
<td>2</td>
<td>W, D₂</td>
<td></td>
<td>2AC</td>
</tr>
<tr>
<td>WL 180</td>
<td>Washington</td>
<td>FS, P?</td>
<td>1</td>
<td>W, D</td>
<td></td>
<td>5AO</td>
</tr>
</tbody>
</table>

*Ownership is based on Figures 2.1-1 and U.S. Forest Service 7.5-minute topographic bases.
Waite, Mother Lode, lower Monarch, and Silver Strike mines, and the Paragon/Black Horse and Bear Top tailings disposal sites could have significant environmental impacts from either metal contamination, erosion of dumps or mill tailings, or both.

The worst problem at the Jack Waite is the tailings dumps—T1, T2, T3, and T4. These were partially reclaimed by the National Guard in 1980 and 1981, but additional work could be done. Also of concern is the metal loading in the drainage from the 1500 level adit. Future remediation efforts at the Jack Waite are currently under study by the U.S. Forest Service. The main dump at the Mother Lode, which probably has associated tailings, is actively eroding into Prichard Creek. The jig tailings at the lower Monarch Mine are within and on both sides of the active drainage of Prichard Creek. The mill tailings at the Silver Strike are visible along the bank of Granite Gulch, and any flooding will redistribute the tails down the stream. The jig tailings at the Paragon/Black Horse and Bear Top/Orofino millsites are in the active waterways of Paragon Gulch and Bear Gulch, respectively.

Many more of these twenty-nine properties have physical hazards than environmental problems. As noted in Table 2.1.1-1, there are seventeen mines with accessible openings. All of these are of concern, but several stand out. The collapsing stope that is engulfing the road at the Lower Paragon is extremely dangerous. The open shaft at the Upper Paragon needs to be better secured. At the Bear Top, the stopes that open to the surface are very dangerous.

2.2 GEOL OGY

The principal references to the geology and ore deposits of the Summit Mining District (Prichard-Eagle Creek drainage) are Hosterman (1956; covers base metal mines) and Shenon (1938; gold mines). Additional references include Ransome (1905), Ransome and Calkins (1908), Umpleby and Jones (1923), and Harrison and others (1986). A brief description of the geologic framework of the area follows.

The metal mines in the district are hosted by metasedimentary rocks of the Belt Supergroup of Precambrian age (Figure 2.2-1). The characteristics of the various units comprising the supergroup is shown in Table 2.2-1. Most important for the mines in the Summit district is the Prichard Formation, which is broken into an upper and lower part by Hosterman (1956) and Harrison and others (1986). Key information on the Prichard is found in Cressman (1982, 1989). Most of the lode mines in the area are hosted in Hosterman's lower Prichard unit, which consists of "banded dark-gray argillite, laminated in part; partings usually contain many pyrite crystals. Weathers rusty red" (Hosterman, 1956, plate 57; Figure 2.2-1).

Igneous rocks include a series of syenite stocks that trend northeast through Sunset Peak and Granite Gulch. These are a continuation of the Gem Stocks located between Ninemile and Canyon Creeks in the Coeur d'Alene mining district south of the study area. A few lamprophyre dikes have been mapped, especially near Murray.
Figure 2.2-1  Geologic map and sections of the Summit mining district, Shoshone County, Idaho (plate 57 from Hueston, 1956)
Table 2.2-1. Generalized section of the Belt Supergroup (page 14 from Hobbs and others, 1965).

<table>
<thead>
<tr>
<th>Group</th>
<th>Formation</th>
<th>Lithology</th>
<th>Thickness (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missoula</td>
<td>Striped Peak</td>
<td>Interbedded quartzite and argillite with some arenaceous dolomitic beds. Purplish gray and pink to greenish gray. Ripple marks, mud cracks common. Top eroded.</td>
<td>1,500+</td>
</tr>
<tr>
<td></td>
<td>Formation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wallace</td>
<td>Upper part</td>
<td>Mostly medium- to greenish-gray finely laminated argillite. Some arenaceous dolomite and impure quartzite, and minor gray dolomite and limestone in the middle part.</td>
<td>4,500-6,500</td>
</tr>
<tr>
<td></td>
<td>Lower part</td>
<td>Light-gray more or less dolomitic quartzite interbedded with greenish-gray argillite. Ripple marks, mud cracks abundant.</td>
<td></td>
</tr>
<tr>
<td>Ravalli</td>
<td>St. Regis</td>
<td>Upper part Light greenish-yellow to light green-gray argillite; thinly laminated. Some carbonate-bearing beds.</td>
<td>1,400-2,000</td>
</tr>
<tr>
<td></td>
<td>Formation</td>
<td>Lower part Gradational from thick-bedded pure quartzite at base to interbedded argillite and impure quartzite at top. Red-purple color characteristic; some green-gray argillite. Some carbonate-bearing beds. Ripple marks, mud cracks, and mud-chip breccia common.</td>
<td></td>
</tr>
<tr>
<td>Revett</td>
<td>Quartzite</td>
<td>Thick-bedded vitreous light yellowish-gray to nearly white pure quartzite. Grades into nearly pure and impure quartzite at bottom and top. Cross-stratification common.</td>
<td>1,200-3,400</td>
</tr>
<tr>
<td>Burke</td>
<td>Formation</td>
<td>Light greenish-gray impure quartzite. Some pale red and light yellowish-gray pure to nearly pure quartzite. Ripple marks, swash marks, and pseudo-conglomerate.</td>
<td>2,200-3,000</td>
</tr>
<tr>
<td>Prichard</td>
<td>Upper part</td>
<td>Interbedded medium-gray argillite and quartzose argillite and light-gray impure to pure quartzite. Some mud cracks and ripple marks.</td>
<td>12,000+</td>
</tr>
<tr>
<td></td>
<td>Lower part</td>
<td>Thin- to thick-bedded, medium gray argillite and quartzose argillite; laminated in part. Pyrite abundant. some discontinuous quartzite zones. Base buried.</td>
<td></td>
</tr>
</tbody>
</table>
A series of northwest-trending strike-slip faults, including the Thompson Pass fault, are part of the Lewis and Clark line. These faults are similar to better known structures such as the Osburn fault, which separates the Coeur d’Alene district into two halves and follows the South Fork of the Coeur d’Alene River through the district. Folds generally trend north-south, again mimicking better known structures to the south. Among these folds are the Granite Peak syncline and the Trout Creek anticline. A series of north-south faults include the French Gulch, O’Neill, and Murray Peak faults. The Dobson Pass fault is a major structure that separates the Prichard Formation from the Wallace Formation in the west part of the district and is again a continuation of a major fault that extends up Ninemile Creek north of Wallace, Idaho.

The area has been glaciated. Older terrace gravels associated with Prichard Creek contain placer gold, as do the recent gravels in the active waterways. The recent gravels are the source of most of the richer placer mines in the area, with lower grade deposits found in the older terrace gravels.

2.3 ECONOMIC GEOLOGY

The following summary of the district’s mining history is taken from Hosterman (1956) and Shenon (1938), supplemented by other sources as noted.

2.3.1 General Characteristics of the Ore

Shenon (1938) noted four types of deposits in the area:
- Mineralized shear zones that cross bedding at steep angles
- Quartz veins that lie approximately along bedding
- Quartz veins that lie along low-angle thrust faults (the only example is the Wake Up Jim Mine)
- Placer deposits

Hosterman (1956) gives the order of mineralization in the shear zone-hosted deposits as pyrite, magnetite, chlorite, carbonate, quartz, pyrrhotite, sphalerite, galena, and late quartz. Shenon (1938) lists the order of mineralization in the quartz veins along bedding as coarse-grained white quartz, scheelite, fine-grained white quartz, carbonate, specularite, pyrite, arsenopyrite, sphalerite, chalcopyrite, and galena, with gold deposited last.

Most of the mines that are on U.S. Forest Service-administered land are base metal (primarily lead and zinc), shear zone-hosted deposits. The lode gold mines in the Murray area were primarily quartz veins along bedding. These gold mines are mostly on land administered by the U.S. Bureau of Land Management, but some of these are included in this study because effluent from the properties could impact USFS lands and waterways.

2.3.2 Summary of Mill Development

The location and history of ore processing mills in the Summit District is important because a major source of environmental problems in many mining camps is old mill tailings disposal sites.
These problems include high metal loadings, which could be available to waterways, and fine sediment, a possible problem for contaminating streams or as wind-blown material. At one time or another, the following mills were operated (ranked by decreasing quantity of mill tails noted at the site):

Jack Waite mill (flotation tailings)
Monarch mill (jig tailings)
Paragon-Black Horse mill (jig tailings)
Bear Top-Orofino mill (jig tailings)
Silver Strike mill (flotation tailings)
Mother Lode mill (stamp mill tailings)
Golden Chest mill (flotation tailings)
Four Square mill (jig and flotation? tailings)
Giant Ledge mill (flotation tailings?)

The following short descriptions and histories describe the millsites. More complete histories of the development of these plants and mines are in the individual property descriptions.

The first mill at the Jack Waite Mine was built in 1926. Over the years, the mill was enlarged and remodeled, eventually becoming a 500 ton-per-day flotation plant. The remains of the mill burned in 1985. There are four tailings disposal piles (T1-T4) distributed from the mine (T1) to the confluence of Tributary Creek and Eagle Creek (T4). Gaillot and Ralston (1979) estimate the following volumes of material:

- T1 — 42 million cubic feet (155,556 cubic yards),
- T2 — 200,000 cubic feet (7,407 cubic yards),
- T3 — 3.6 million cubic feet (133,333 cubic yards), and
- T4 — 120,000 cubic feet (4,444 cubic yards).

The metal-rich piles are a concern because they are in or adjacent to the active waterway of Tributary Creek, which flows into the East Fork of Eagle Creek. These four piles were stabilized by the Idaho National Guard in 1981. The entire minesite is currently under study by the U.S. Forest Service and the mining companies for remediation.

The mill at the Monarch Mine was constructed around 1905 and was a gravity plant producing jig tailings. Only the footings of the structure are left. These tailings are in or adjacent to Prichard Creek. They are an immediate threat to the stream, both from the metals they contain and from the sediment that can be eroded from the piles. The tails extend at least ¼ mile from the mine down Prichard Creek and contain an estimated 24,600 cubic yards of material.

The Black Horse-Paragon gravity mill at the mouth of Paragon Gulch was built in 1910 and operated until the end of World War I in 1917. The mill is now collapsed. Approximately 11,472 cubic yards of jig tailings are in a pile, which is adjacent to and impinges on Paragon Gulch Creek. The tailings are a potential source of both metal and sediment contamination of Prichard Creek.
(The confluence of Paragon Gulch Creek with Prichard Creek is just a few hundred feet to the south of the tailings.)

The gravity mill for the Bear Top and Orofino mines was built in 1904 on the active waterway of Bear Gulch Creek. The mill has collapsed. The spring flood of 1996 and earlier floods have removed a considerable portion of the old tailings, which are now estimated at 1,500 cubic yards. The remaining tails constitute a threat from metal and sediment contamination to the active waterway in Bear Gulch.

The flotation mill at the Silver Strike (Cedar Creek) mine in Granite Gulch was built in 1928 and is totally collapsed. About 300 feet north of the mill is a small patch of flotation tails from this mill. These are in the active waterway of Granite Gulch and have eroded into the stream. The extent of flotation tailings in this drainage is unknown as the vegetation is very heavy. However, the remaining tails are a source of metal and sediment contamination in the active waterway.

The stamp mill at the Mother Lode Mine was built before 1911 (probably much earlier). Although this was a gold mine, a sample from the dump at this property has the highest values of arsenic found in the study area, along with other high metal values. The mill tailings were apparently deposited in the same area as the waste dump, which impinges on Prichard Creek. This dump is a threat to Prichard Creek from both metal contamination and sediment loading.

About halfway between the Silver Strike Mine and the confluence of Granite Gulch Creek with Prichard Creek is the Giant Ledge Mine. A 75-tpd mill was built at this site in 1925 and 1926. However, the mill only processed a little ore and there is no sign of any tailings in the area, so it does not constitute a hazard.

According to Shenon (1938), a 10-stamp mill in Accident Gulch, which was associated with the King Mine, operated for several years. As most of the mine workings were inaccessible at the time of Shenon’s visit in 1935, the mill presumably had not operated for some time. A 3-stamp mill was operated at the Mountain Lion Mine, and a 2-stamp mill was at the Buckeye Boy. A mill in Duncan Gulch was operated in association with the Gold Coin group (Shenon, 1938). For information on the last three properties, see Part 2 of this volume.

The mills at the Golden Chest and Four Square mines were not evaluated for this study. These mills are on private land and are considered active operations.

### 2.4 HYDROLOGY AND HYDROGEOLOGY

The two major drainages in the Summit District (Figures 2.1-1 and 2.2-1) are Prichard Creek and Eagle Creek. Eagle Creek is divided into two approximately equal forks, the West Fork and the East Fork. Eagle Creek is in turn the major tributary of Prichard Creek. Other sizeable tributaries to Prichard Creek are Granite Gulch, Bear Gulch, and Butte Gulch. Prichard Creek flows into the North Fork of the Coeur d’Alene River at Prichard. A long stretch of Prichard Creek was
dredged for gold between 1917 and 1926 (Shenon, 1938), and the bed of the creek was severely disrupted, as evidenced by the substantial dredge spoils near Murray. In places, the creek disappears and flows under the gravels in the streambed. As noted, the most severe threat to the water quality of these streams is from past mining activity, including the jig tailings deposits at Paragon Gulch, at the Monarch Mine, and the waste/mill dump at the Mother Lode Mine. The East Fork of Eagle Creek is at risk from the four tailings impoundments at the Jack Waite Mine located at the head of Tributary Creek. The west side of the district is marked by Beaver Creek, which is a north-flowing drainage that also joins the North Fork of the Coeur d'Alene River near Babins Junction.

Most of the base metal mines in the district are hosted by rocks of the lower Prichard Formation. In places these rocks contain visible sulfides (primarily pyrite and pyrrhotite). These rocks also contain significantly higher values of base metals than some of the other Belt rocks. Table 1.5-3 (based on 727 samples) shows that rocks in the Prichard Formation contain 60 ppm zinc, 34 ppm lead, 3% iron, 22 ppm copper, and 0.5 ppm cadmium. Soils above the Prichard reflect this metal content (Table 1.5-4). Based on 1,705 samples, these soils contain 140 ppm zinc, 54 ppm lead, 3.1% iron, 21 ppm copper, 1.3 ppm cadmium, and 10 ppm arsenic.

To test whether the high metal content from the Prichard Formation was impacting stream waters, 15 background water samples were collected. The chemical analyses for these samples is shown in Table 2.4-1, along with water quality standards suggested by the Environmental Protection Agency (EPA).

Of the background water quality samples taken, the following meet or are below the suggested thresholds for all metals in the EPA Primary and Secondary MCL and Aquatic Life water standards for all metals in unfiltered samples:

- B7309605 – collected from Bear Gulch Creek
- F7239602 – collected from Columbus Creek, a tributary to the East Fork of Eagle Creek, upstream from adits
- F7239603 – collected from the East Fork of Eagle Creek above the confluence with Tributary Creek
- B8019601 – collected from Cedar Creek, a tributary to Granite Gulch Creek, below the workings of the Silver Strike Mine
- B8019602 – collected from the creek in Granite Gulch just above the confluence with Cedar Creek
- B8019605 – collected from the mouth of Granite Gulch Creek
- B8019612 – collected from the mouth of Cottonwood Creek
- B8309602 – collected from the mouth of Butte Gulch
- F7239605 – collected from a tributary to Tributary Creek, upstream from the Consolidated Silver-Lead Mine
- K8159602 – collected from the head of Cedar Creek
Table 2.4-1. Background water samples for the Prichard-Eagle Creek area.

<table>
<thead>
<tr>
<th>FIELD NO.</th>
<th>REMARKS (Water Samples)</th>
<th>Al (ppm)</th>
<th>As (ppm)</th>
<th>Ba (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Cu (ppm)</th>
<th>Fe (ppm)</th>
<th>Pb (ppm)</th>
<th>Mn (ppm)</th>
<th>Hg (ppm)</th>
<th>Ni (ppm)</th>
<th>Zn (ppm)</th>
</tr>
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<tbody>
<tr>
<td><strong>Dissolved metals screen</strong></td>
<td>B7239602 Tributary Creek, upstream from Jack Waite adit</td>
<td>---</td>
<td>---</td>
<td>0.002</td>
<td>---</td>
<td>0.0120</td>
<td>0.006</td>
<td>0.0020</td>
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<td>---</td>
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<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>F7239605 Upstream from Consolidated Silver-Lead Mine</td>
<td>---</td>
<td>---</td>
<td>0.003</td>
<td>---</td>
<td>0.010</td>
<td>0.009</td>
<td>---</td>
<td>---</td>
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<td>---</td>
</tr>
<tr>
<td><strong>Total metals screen</strong></td>
<td>B7239602 Tributary Creek, upstream from Jack Waite adit</td>
<td>---</td>
<td>---</td>
<td>0.037</td>
<td>---</td>
<td>0.036</td>
<td>0.037</td>
<td>0.013</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.004</td>
<td>0.250</td>
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<tr>
<td></td>
<td>B7309605 Bear Creek</td>
<td>---</td>
<td>0.023</td>
<td>---</td>
<td>---</td>
<td>0.036</td>
<td>0.049</td>
<td>0.003</td>
<td>---</td>
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<td>---</td>
<td>0.005</td>
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<td>B8019606 Tributary to Granite Gulch below Silver Strike Mine</td>
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<td>0.020</td>
<td>---</td>
<td>---</td>
<td>0.037</td>
<td>0.009</td>
<td>0.002</td>
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<td>---</td>
<td>---</td>
<td>0.005</td>
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<tr>
<td></td>
<td>B8019602 Granite Gulch at forks</td>
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<td>0.037</td>
<td>0.002</td>
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<td>---</td>
<td>---</td>
<td>0.051</td>
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<tr>
<td></td>
<td>B8019605 Mouth of Granite Gulch</td>
<td>0.009</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.058</td>
<td>0.002</td>
<td>0.005</td>
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<td>---</td>
<td>0.005</td>
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<tr>
<td></td>
<td>B8019606 Prichard Creek, main stem</td>
<td>0.025</td>
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<td>---</td>
<td>0.075</td>
<td>0.0069</td>
<td>0.004</td>
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<td>---</td>
<td>---</td>
<td>0.031</td>
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<tr>
<td></td>
<td>B8019607 East Fork of Eagle Creek at washout</td>
<td>0.011</td>
<td>0.004</td>
<td>---</td>
<td>0.046</td>
<td>0.003</td>
<td>0.002</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.003</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B8019608 Mouth of Cottonwood Creek</td>
<td>0.011</td>
<td>---</td>
<td>0.037</td>
<td>---</td>
<td>0.002</td>
<td>0.002</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.002</td>
<td>0.002</td>
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<tr>
<td></td>
<td>B8019612 West Fork of Eagle Creek above Cottonwood Creek</td>
<td>0.041</td>
<td>---</td>
<td>---</td>
<td>0.027</td>
<td>0.002</td>
<td>0.002</td>
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<td>---</td>
<td>---</td>
<td>0.003</td>
<td></td>
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<tr>
<td></td>
<td>B8309601 Mouth of Butte Gulch</td>
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<td>0.046</td>
<td>---</td>
<td>0.026</td>
<td>0.007</td>
<td>0.030</td>
<td>0.002</td>
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<td>---</td>
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<tr>
<td></td>
<td>B8309602 Prichard Creek before confluence with Eagle Creek</td>
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<td>---</td>
<td>0.006</td>
<td>---</td>
<td>0.040</td>
<td>0.003</td>
<td>0.003</td>
<td>0.002</td>
<td>---</td>
<td>---</td>
<td>0.002</td>
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<tr>
<td></td>
<td>F7239605 Upstream from Consolidated Silver-Lead Mine</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.023</td>
<td>---</td>
<td>0.086</td>
<td>0.0026</td>
<td>0.007</td>
<td>---</td>
<td>0.001</td>
<td>0.021</td>
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<tr>
<td></td>
<td>K81959602 Sunrise Mine, upstream from Adit No. 1</td>
<td>0.042</td>
<td>---</td>
<td>0.053</td>
<td>---</td>
<td>0.007</td>
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<td>---</td>
<td>0.003</td>
<td>0.008</td>
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<tr>
<td></td>
<td>B8189601 &quot;Blitz Mine&quot; (Blank sample)</td>
<td>---</td>
<td>0.004</td>
<td>---</td>
<td>0.033</td>
<td>0.002</td>
<td>0.040</td>
<td>0.003</td>
<td>---</td>
<td>0.02</td>
<td>---</td>
<td>0.003</td>
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</tr>
</tbody>
</table>

**EXPLANATION**

Blank space equals no analysis
mg/L = ppm
Below Detection Limit is ---

**WATER QUALITY STANDARDS**

<table>
<thead>
<tr>
<th></th>
<th>Al (mg/L)</th>
<th>As (mg/L)</th>
<th>Ba (mg/L)</th>
<th>Cd (mg/L)</th>
<th>Cr (mg/L)</th>
<th>Cu (mg/L)</th>
<th>Fe (mg/L)</th>
<th>Pb (mg/L)</th>
<th>Mn (mg/L)</th>
<th>Hg (mg/L)</th>
<th>Ni (mg/L)</th>
<th>Zn (mg/L)</th>
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</thead>
<tbody>
<tr>
<td>Primary MCL</td>
<td>0.050</td>
<td>2.000</td>
<td>0.005</td>
<td>0.100</td>
<td>0.050</td>
<td>0.002</td>
<td>0.100</td>
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<tr>
<td>Secondary MCL</td>
<td>0.05-0.2</td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
<td>0.300</td>
<td>0.050</td>
<td></td>
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<td></td>
<td></td>
<td>5.000</td>
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<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.360</td>
<td>0.004-0.009</td>
<td>1.7-3.1</td>
<td>0.018-0.034</td>
<td>1.00</td>
<td>0.082-0.2</td>
<td>0.0024</td>
<td>1.4-2.5</td>
<td>0.12-0.21</td>
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<tr>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.190</td>
<td>0.001-0.002</td>
<td>0.21-0.37</td>
<td>0.012-0.021</td>
<td>0.003-0.006</td>
<td>0.000012</td>
<td>0.16-0.28</td>
<td>0.11-0.19</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Estimated Detection Level — Dissolved Metals Screen (33% confidence)</td>
<td>0.1</td>
<td>0.0029</td>
<td>0.001</td>
<td>0.004</td>
<td>0.007</td>
<td>0.007</td>
<td>0.004</td>
<td>0.0015</td>
<td>0.002</td>
<td>0.005</td>
<td>0.017</td>
<td>0.008</td>
</tr>
<tr>
<td>Estimated Detection Level — Total Metals Screen (33% confidence)</td>
<td>---</td>
<td>0.0029</td>
<td>0.004</td>
<td>0.003</td>
<td>0.013</td>
<td>0.035</td>
<td>0.012</td>
<td>0.0015</td>
<td>0.002</td>
<td>0.005</td>
<td>0.02</td>
<td>0.003</td>
</tr>
</tbody>
</table>
A background water sample (B8019606) collected from the main stem of Prichard Creek exceeds the Aquatic Life Chronic standard for lead and both Aquatic Life standards for zinc.

2.5 SUMMARY OF THE SUMMIT MINING DISTRICT

2.5.1 Summary of Environmental Observations

Most samples which significantly exceed EPA water standards are from the larger mines in the area (Tables 2.5-1 and 2.5-2). These include the Jack Waite, Black Horse, Orofino, Monarch, Mother Lode, and Golden Chest mines. Zinc in excess of one or both of the Aquatic Life standards is the most prevalent water quality variance in Prichard-Eagle Creek area; lead values in excess of one or more standards are also found in many of these samples. Most of the elements detected in the water samples are also found in the rock units underlying the drainages.

2.5.2 Mill Waste Samples

Arsenic is considered to be one of the elements of most concern in any environmental study of base or precious metal mines. Commonly, waste material from old mills (called mill tailings) contains high values of arsenic as well as other metals. In the Coeur d'Alene district, tailings from a mill using relatively modern flotation technology generally contain several orders of magnitude more arsenic than tailings from mills using older gravity separation (commonly jigs, hence called jig tails). The higher arsenic values can be attributed to the different separation methods. Jig separation is a gravity-based method where the heavier minerals remain together. For example, tetrahedrite and arsenopyrite (major sources of arsenic) stay with the heavier galena and sphalerite and end up being shipped to the smelter. Selective flotation separates sphalerite and galena from the arsenic-bearing minerals. These minerals end up in the tailings, causing higher arsenic values in the waste pile.

Samples of mill tailings were collected from all known mill sites in the Prichard-Eagle Creek area, including the Silver Strike flotation tailings site and the Paragon Gulch, Orofino Mine, and Monarch Mine jig tailings sites (Tables 2.5-3 and 2.5-4). As expected, all samples contained metal loadings, including arsenic, copper, lead, and zinc which exceed the Clark Fork Superfund Background Levels.
Table 2.5-1. Dissolved Metals Screen for water samples from the Prichard-Eagle Creek area.

<table>
<thead>
<tr>
<th>FIELD NO.</th>
<th>REMARKS (Water Samples)</th>
<th>AI (ppm)</th>
<th>As (ppm)</th>
<th>Ba (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Cu (ppm)</th>
<th>Fe (ppm)</th>
<th>Pb (ppm)</th>
<th>Mn (ppm)</th>
<th>Hg (ppm)</th>
<th>Ni (ppm)</th>
<th>Zn (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7239601</td>
<td>Jack Waite Mine, adit sample</td>
<td>---</td>
<td>---</td>
<td>0.033</td>
<td>0.015</td>
<td>0.007</td>
<td>0.019</td>
<td>---</td>
<td>0.022</td>
<td>0.008</td>
<td>---</td>
<td>2.600</td>
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<tr>
<td>B7239603</td>
<td>Tributary Creek, downstream from the Jack Waite adit</td>
<td>---</td>
<td>---</td>
<td>0.018</td>
<td>0.007</td>
<td>---</td>
<td>0.015</td>
<td>0.089</td>
<td>---</td>
<td>0.024</td>
<td>0.570</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B7239604</td>
<td>Discharge from west drain, Jack Waite T1 mill tailings pile</td>
<td>---</td>
<td>---</td>
<td>0.019</td>
<td>0.013</td>
<td>0.018</td>
<td>0.020</td>
<td>0.006</td>
<td>0.048</td>
<td>0.013</td>
<td>---</td>
<td>0.031</td>
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<tr>
<td>B7239605</td>
<td>Columbus Creek adit</td>
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<td>---</td>
<td>0.013</td>
<td>0.009</td>
<td>---</td>
<td>0.023</td>
<td>---</td>
<td>---</td>
<td>0.019</td>
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<tr>
<td>B7239607</td>
<td>Golden Dream claims</td>
<td>0.180</td>
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<td>0.024</td>
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<td>0.013</td>
<td>0.014</td>
<td>---</td>
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<td>---</td>
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<td>Golden Chest Mine, main level waste water</td>
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<td>0.011</td>
<td>0.004</td>
<td>0.003</td>
<td>---</td>
<td>0.028</td>
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<tr>
<td>B7309602</td>
<td>Orofino Mine, lower adit</td>
<td>---</td>
<td>---</td>
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<tr>
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<td>Mother Lode, lower adit</td>
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<td>0.044</td>
<td>---</td>
<td>0.041</td>
<td>0.110</td>
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<td>Washington Mining Co. Adit No. 4</td>
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<tr>
<td>B8019603</td>
<td>Silver Strike Mine, main adit</td>
<td>---</td>
<td>---</td>
<td>0.025</td>
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<td>Monarch Mine, lower adit</td>
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<td>0.011</td>
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<td>0.016</td>
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<td>0.058</td>
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<td>0.017</td>
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<td>0.063</td>
<td>---</td>
<td>0.046</td>
<td>1.300</td>
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</tr>
</tbody>
</table>

EXPLANATION

Blank space equals no analysis

mg/L = ppm

Below Detection Limit is ---

WATER QUALITY STANDARDS

<table>
<thead>
<tr>
<th></th>
<th>AI (mg/L)</th>
<th>As (mg/L)</th>
<th>Ba (mg/L)</th>
<th>Cd (mg/L)</th>
<th>Cr (mg/L)</th>
<th>Cu (mg/L)</th>
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<th>Mn (mg/L)</th>
<th>Hg (mg/L)</th>
<th>Ni (mg/L)</th>
<th>Zn (mg/L)</th>
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<td>0.005</td>
<td>0.100</td>
<td>0.050</td>
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<td>Secondary MCL</td>
<td>0.05-0.2</td>
<td>0.360</td>
<td>0.004-0.009</td>
<td>1.7-3.1</td>
<td>0.018-0.034</td>
<td>1.000</td>
<td>0.082-0.2</td>
<td>0.0024</td>
<td>1.4-2.5</td>
<td>0.12-0.21</td>
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<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
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<td>1.7-3.1</td>
<td>0.018-0.034</td>
<td>1.000</td>
<td>0.082-0.2</td>
<td>0.0024</td>
<td>1.4-2.5</td>
<td>0.12-0.21</td>
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<td>Aquatic Life, Chronic</td>
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<td>0.012-0.021</td>
<td>0.003-0.008</td>
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<td>0.16-0.28</td>
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Table 2.5-1 (continued). Dissolved Metals Screen for water samples in the Prichard-Eagle Creek area.

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<th>REMARKS (Water Samples)</th>
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<th>As (ppm)</th>
<th>Ba (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Cu (ppm)</th>
<th>Fe (ppm)</th>
<th>Pb (ppm)</th>
<th>Mn (ppm)</th>
<th>Hg (ppm)</th>
<th>Ni (ppm)</th>
<th>Zn (ppm)</th>
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<td>Tiger Mine, portal</td>
<td>0.100</td>
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<td>0.005</td>
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<tr>
<td>B8239601</td>
<td>Buckeye Mine, adit</td>
<td>0.130</td>
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<td>0.021</td>
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<td>Upstream from the Columbus Creek adit</td>
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<tr>
<td>F7239604</td>
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<td>0.100</td>
<td>0.021</td>
<td>...</td>
<td>0.027</td>
<td>0.010</td>
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<td>...</td>
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<td>C &amp; R Mine, adit No. 1</td>
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<td>0.023</td>
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<td>K8159603</td>
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<td>K8159605</td>
<td>St. James Prospect, adit No. 1</td>
<td>...</td>
<td>0.016</td>
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<td>0.012</td>
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<td>...</td>
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<td>K8159606</td>
<td>St. James Prospect, adit No. 2</td>
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<td>...</td>
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<td>K8209602</td>
<td>Possible adit sample from Bloom Spring</td>
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<td>0.008</td>
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<td>...</td>
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<td>K8219601</td>
<td>Kelly Prospect, adit water sample</td>
<td>...</td>
<td>0.030</td>
<td>...</td>
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<td>...</td>
<td>0.002</td>
<td>...</td>
<td>...</td>
<td>0.015</td>
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<td>...</td>
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EXPLANATION
Blank space equals no analysis
mg/L = ppm
Below Detection Limit is ---

WATER QUALITY STANDARDS

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<th></th>
<th>AI (mg/L)</th>
<th>As (mg/L)</th>
<th>Ba (mg/L)</th>
<th>Cd (mg/L)</th>
<th>Cr (mg/L)</th>
<th>Cu (mg/L)</th>
<th>Fe (mg/L)</th>
<th>Pb (mg/L)</th>
<th>Mn (mg/L)</th>
<th>Hg (mg/L)</th>
<th>Ni (mg/L)</th>
<th>Zn (mg/L)</th>
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<tbody>
<tr>
<td>Primary MCL (mg/l)</td>
<td>0.050</td>
<td>2.000</td>
<td>0.005</td>
<td>0.100</td>
<td>0.050</td>
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<td>5.000</td>
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<tr>
<td>Aquatic Life, Acute (mg/l)</td>
<td>0.750</td>
<td>0.360</td>
<td>0.004-0.009</td>
<td>1.7-3.1</td>
<td>0.018-0.034</td>
<td>1.000</td>
<td>0.082-0.2</td>
<td>0.0024</td>
<td>1.4-2.5</td>
<td>0.012-0.21</td>
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<tr>
<td>Aquatic Life, Chronic (mg/l)</td>
<td>0.087</td>
<td>0.190</td>
<td>0.001-0.002</td>
<td>0.21-0.37</td>
<td>0.012-0.021</td>
<td>0.003-0.008</td>
<td>0.000012</td>
<td>0.16-0.28</td>
<td>0.011-0.19</td>
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<tr>
<td>Estimated Detection Level (33% confidence)</td>
<td>0.1</td>
<td>0.0029</td>
<td>0.001</td>
<td>0.004</td>
<td>0.007</td>
<td>0.004</td>
<td>0.0015</td>
<td>0.002</td>
<td>0.005</td>
<td>0.017</td>
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Table 2.5-2. Total metals screen for water samples from the Prichard-Eagle Creek area.

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<th>FIELD NO.</th>
<th>REMARKS (Water Samples)</th>
<th>Al (ppm)</th>
<th>As (ppm)</th>
<th>Ba (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Cu (ppm)</th>
<th>Fe (ppm)</th>
<th>Pb (ppm)</th>
<th>Mn (ppm)</th>
<th>Hg (ppm)</th>
<th>Ni (ppm)</th>
<th>Zn (ppm)</th>
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<tbody>
<tr>
<td>B7239601</td>
<td>Jack Waite Mine, adit</td>
<td>---</td>
<td>0.036</td>
<td>0.012</td>
<td>---</td>
<td>---</td>
<td>0.022</td>
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<td>0.015</td>
<td>---</td>
<td>0.020</td>
<td>2.8</td>
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<td>B7239603</td>
<td>Tributary Creek, downstream from the Jack Waite adit</td>
<td>---</td>
<td>0.019</td>
<td>---</td>
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<td>Discharge from west drain, T1 mill tailings dump, Jack Waite Mine</td>
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<td>Columbus Creek adit</td>
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<td>Spring (?) from below the Jack Waite adit</td>
<td>---</td>
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<td>Golden Chest Mine, main level waste water</td>
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<td>1.8</td>
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EXPLANATION
- Blank space equals no analysis
- Below Detection Limit is ---

WATER QUALITY STANDARDS

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<th>Primary MCL</th>
<th>Al (mg/L)</th>
<th>As (mg/L)</th>
<th>Ba (mg/L)</th>
<th>Cd (mg/L)</th>
<th>Cr (mg/L)</th>
<th>Cu (mg/L)</th>
<th>Fe (mg/L)</th>
<th>Pb (mg/L)</th>
<th>Mn (mg/L)</th>
<th>Hg (mg/L)</th>
<th>Ni (mg/L)</th>
<th>Zn (mg/L)</th>
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<td>0.005</td>
<td>0.100</td>
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<td>0.002</td>
<td>0.100</td>
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<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.360</td>
<td>0.004-0.009</td>
<td>1.7-3.1</td>
<td>0.018-0.034</td>
<td>1.000</td>
<td>0.082-0.2</td>
<td>0.0024</td>
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<td>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.190</td>
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<tr>
<td>Estimated Detection Level (33% confidence)</td>
<td>0.0029</td>
<td>0.004</td>
<td>0.003</td>
<td>0.013</td>
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Table 2.5-2 (continued). Total Metals Screen for water samples from the Prichard-Eagle Creek area.

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<th>FIELD NO.</th>
<th>REMARKS (Water Samples)</th>
<th>Al (ppm)</th>
<th>As (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Cu (ppm)</th>
<th>Fe (ppm)</th>
<th>Pb (ppm)</th>
<th>Mn (ppm)</th>
<th>Hg (ppm)</th>
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<tr>
<td>B8019610</td>
<td>Cottonwood Creek, second adit (B8019609)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.032</td>
<td>---</td>
<td>---</td>
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</tr>
<tr>
<td>B8019611</td>
<td>Cottonwood Creek below B8019609</td>
<td>---</td>
<td>0.006</td>
<td>0.020</td>
<td>---</td>
<td>0.610</td>
<td>---</td>
<td>0.007</td>
<td>---</td>
<td>0.020</td>
<td>0.024</td>
<td>---</td>
</tr>
<tr>
<td>B8149603</td>
<td>Paragon Creek, south end of the jig tailings</td>
<td>---</td>
<td>0.052</td>
<td>0.007</td>
<td>0.017</td>
<td>0.1</td>
<td>---</td>
<td>0.018</td>
<td>0.005</td>
<td>0.00032</td>
<td>0.060</td>
<td>0.033</td>
</tr>
<tr>
<td>B8149605</td>
<td>Monarch Mine, lower adit</td>
<td>0.0031</td>
<td>0.034</td>
<td>0.011</td>
<td>0.014</td>
<td>---</td>
<td>---</td>
<td>0.018</td>
<td>0.006</td>
<td>0.00035</td>
<td>0.050</td>
<td>0.92</td>
</tr>
<tr>
<td>B8159603</td>
<td>Stream cutting mill tailings west of the Monarch Mine</td>
<td>---</td>
<td>0.048</td>
<td>0.013</td>
<td>0.015</td>
<td>---</td>
<td>0.074</td>
<td>0.004</td>
<td>---</td>
<td>0.040</td>
<td>1.5</td>
<td>---</td>
</tr>
<tr>
<td>B8159607</td>
<td>Tiger Mine, portal</td>
<td>---</td>
<td>---</td>
<td>0.003</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.003</td>
<td>0.00063</td>
<td>0.030</td>
<td>0.008</td>
</tr>
<tr>
<td>B8239601</td>
<td>Buckeye Mine, adit</td>
<td>0.0041</td>
<td>0.015</td>
<td>0.004</td>
<td>0.014</td>
<td>---</td>
<td>1.9</td>
<td>---</td>
<td>0.5</td>
<td>---</td>
<td>0.060</td>
<td>0.014</td>
</tr>
<tr>
<td>B8239604</td>
<td>Terrible Edith Mine, main adit</td>
<td>---</td>
<td>0.025</td>
<td>0.012</td>
<td>0.019</td>
<td>---</td>
<td>---</td>
<td>0.0019</td>
<td>0.014</td>
<td>---</td>
<td>0.050</td>
<td>1.4</td>
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<tr>
<td>B8239606</td>
<td>Liberty Mine, adit</td>
<td>---</td>
<td>0.009</td>
<td>0.005</td>
<td>0.014</td>
<td>---</td>
<td>0.69</td>
<td>0.0047</td>
<td>0.086</td>
<td>---</td>
<td>0.050</td>
<td>0.015</td>
</tr>
<tr>
<td>B8279603</td>
<td>First adit south of the Kings Pass bridge</td>
<td>---</td>
<td>0.003</td>
<td>---</td>
<td>0.027</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>F7239601</td>
<td>Columbus Creek adit (repeat)</td>
<td>---</td>
<td>0.012</td>
<td>---</td>
<td>---</td>
<td>0.052</td>
<td>0.0023</td>
<td>0.007</td>
<td>---</td>
<td>0.020</td>
<td>0.029</td>
<td>---</td>
</tr>
<tr>
<td>F7239602</td>
<td>Upstream from the Columbus Creek adit</td>
<td>---</td>
<td>0.005</td>
<td>---</td>
<td>---</td>
<td>0.089</td>
<td>0.0023</td>
<td>0.004</td>
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<td>0.030</td>
<td>0.015</td>
<td>---</td>
</tr>
<tr>
<td>F7239603</td>
<td>Downstream from the Columbus Creek adit</td>
<td>---</td>
<td>0.004</td>
<td>---</td>
<td>---</td>
<td>0.099</td>
<td>---</td>
<td>0.007</td>
<td>---</td>
<td>---</td>
<td>0.17</td>
<td>---</td>
</tr>
<tr>
<td>F7239604</td>
<td>Consolidated Silver-Lead Mine</td>
<td>---</td>
<td>0.065</td>
<td>0.003</td>
<td>---</td>
<td>3.4</td>
<td>0.004</td>
<td>0.57</td>
<td>0.0005</td>
<td>0.040</td>
<td>0.49</td>
<td>---</td>
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<tr>
<td>F7239606</td>
<td>Downstream from the Consolidated Silver-Lead Mine</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.13</td>
<td>---</td>
<td>0.007</td>
<td>---</td>
<td>0.020</td>
<td>0.02</td>
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<tr>
<td>K8159601</td>
<td>C &amp; R Adit No. 1</td>
<td>---</td>
<td>0.010</td>
<td>---</td>
<td>---</td>
<td>0.043</td>
<td>---</td>
<td>0.003</td>
<td>---</td>
<td>0.040</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K8159603</td>
<td>Sunrise Adit</td>
<td>---</td>
<td>0.039</td>
<td>0.003</td>
<td>---</td>
<td>0.29</td>
<td>0.005</td>
<td>0.022</td>
<td>0.00067</td>
<td>0.030</td>
<td>0.017</td>
<td>---</td>
</tr>
</tbody>
</table>

**EXPLANATION**

Blank space equals no analysis

Below Detection Limit is ---

**WATER QUALITY STANDARDS**

<table>
<thead>
<tr>
<th></th>
<th>Al (mg/L)</th>
<th>As (mg/L)</th>
<th>Ba (mg/L)</th>
<th>Cd (mg/L)</th>
<th>Cr (mg/L)</th>
<th>Cu (mg/L)</th>
<th>Fe (mg/L)</th>
<th>Pb (mg/L)</th>
<th>Mn (mg/L)</th>
<th>Hg (mg/L)</th>
<th>Ni (mg/L)</th>
<th>Zn (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary MCL</td>
<td>0.050</td>
<td>2.000</td>
<td>0.005</td>
<td>0.100</td>
<td>0.030</td>
<td>0.002</td>
<td>0.100</td>
<td>5.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary MCL</td>
<td>0.05-0.2</td>
<td>0.05-0.2</td>
<td>0.004-0.009</td>
<td>1.7-3.1</td>
<td>0.018-0.034</td>
<td>1.000</td>
<td>0.082-0.2</td>
<td>0.024</td>
<td>1.4-2.5</td>
<td>0.12-0.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.360</td>
<td>0.004-0.009</td>
<td>1.7-3.1</td>
<td>0.018-0.034</td>
<td>1.000</td>
<td>0.082-0.2</td>
<td>0.024</td>
<td>1.4-2.5</td>
<td>0.12-0.21</td>
<td></td>
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</tr>
<tr>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.190</td>
<td>0.001-0.002</td>
<td>0.21-0.37</td>
<td>0.012-0.021</td>
<td>0.003-0.008</td>
<td>0.000012</td>
<td>0.16-0.28</td>
<td>0.11-0.19</td>
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<td></td>
</tr>
<tr>
<td>Estimated Detection Level (33% confidence)</td>
<td>0.0029</td>
<td>0.004</td>
<td>0.003</td>
<td>0.013</td>
<td>0.035</td>
<td>0.012</td>
<td>0.0015</td>
<td>0.002</td>
<td>0.0005</td>
<td>0.02</td>
<td>0.003</td>
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</tr>
</tbody>
</table>
Table 2.5-2 (continued). Total Metals Screen for water samples from the Prichard-Eagle Creek area.

<table>
<thead>
<tr>
<th>FIELD NO.</th>
<th>REMARKS (Water Samples)</th>
<th>Al (ppm)</th>
<th>As (ppm)</th>
<th>Ba (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Cu (ppm)</th>
<th>Fe (ppm)</th>
<th>Pb (ppm)</th>
<th>Mn (ppm)</th>
<th>Hg (ppm)</th>
<th>Ni (ppm)</th>
<th>Zn (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K8159605</td>
<td>St. James Adit No. 1</td>
<td>0.0036</td>
<td>0.017</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.04</td>
<td>0.004</td>
<td>0.01</td>
<td>0.00077</td>
<td>0.02</td>
<td>0.006</td>
<td></td>
</tr>
<tr>
<td>K8159606</td>
<td>St. James Adit No. 2</td>
<td>—</td>
<td>0.037</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.77</td>
<td>—</td>
<td>—</td>
<td>0.006</td>
<td>—</td>
<td>0.030</td>
<td></td>
</tr>
<tr>
<td>K8209602</td>
<td>Possible adit sample from Bloom Spring</td>
<td>—</td>
<td>0.008</td>
<td>0.004</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.004</td>
<td>—</td>
<td>0.070</td>
<td>0.008</td>
</tr>
<tr>
<td>K8219601</td>
<td>Kelly prospect, adit</td>
<td>—</td>
<td>0.005</td>
<td>0.007</td>
<td>—</td>
<td>0.77</td>
<td>0.17</td>
<td>0.002</td>
<td>0.01</td>
<td>—</td>
<td>0.050</td>
<td>0.01</td>
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</tr>
<tr>
<td>K8229601</td>
<td>Sampson adit</td>
<td>—</td>
<td>0.047</td>
<td>0.006</td>
<td>0.013</td>
<td>—</td>
<td>0.051</td>
<td>—</td>
<td>0.018</td>
<td>—</td>
<td>0.050</td>
<td>0.014</td>
<td></td>
</tr>
</tbody>
</table>

EXPLANATION

Blank space equals no analysis
Below Detection Limit is —

<table>
<thead>
<tr>
<th>WATER QUALITY STANDARDS</th>
<th>Al (mg/L)</th>
<th>As (mg/L)</th>
<th>Ba (mg/L)</th>
<th>Cd (mg/L)</th>
<th>Cr (mg/L)</th>
<th>Cu (mg/L)</th>
<th>Fe (mg/L)</th>
<th>Pb (mg/L)</th>
<th>Mn (mg/L)</th>
<th>Hg (mg/L)</th>
<th>Ni (mg/L)</th>
<th>Zn (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary MCL</td>
<td>0.050</td>
<td>2.000</td>
<td>0.005</td>
<td>0.100</td>
<td>1.000</td>
<td>0.300</td>
<td>0.050</td>
<td>0.002</td>
<td>0.100</td>
<td>5.000</td>
<td>1.4-2.5</td>
<td>0.12-0.21</td>
</tr>
<tr>
<td>Secondary MCL</td>
<td>0.05-0.2</td>
<td>0.360</td>
<td>0.004-0.009</td>
<td>1.7-3.1</td>
<td>0.018-0.034</td>
<td>1.000</td>
<td>0.082-0.2</td>
<td>0.0024</td>
<td>0.16-0.28</td>
<td>0.11-0.19</td>
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<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.360</td>
<td>0.001-0.002</td>
<td>0.21-0.37</td>
<td>0.012-0.021</td>
<td>0.003-0.008</td>
<td>0.00012</td>
<td>0.16-0.28</td>
<td>0.11-0.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.190</td>
<td>0.001-0.002</td>
<td>0.21-0.37</td>
<td>0.012-0.021</td>
<td>0.003-0.008</td>
<td>0.00012</td>
<td>0.16-0.28</td>
<td>0.11-0.19</td>
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<tr>
<td>Estimated Detection Level (33% confidence level)</td>
<td>0.0029</td>
<td>0.004</td>
<td>0.003</td>
<td>0.013</td>
<td>0.035</td>
<td>0.012</td>
<td>0.0015</td>
<td>0.002</td>
<td>0.0005</td>
<td>0.02</td>
<td>0.003</td>
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</table>
Table 2.5-3. Tailings and dump samples from the Prichard-Eagle Creek area.

<table>
<thead>
<tr>
<th>Field No.</th>
<th>Remarks</th>
<th>Al (ppm)</th>
<th>As (ppm)</th>
<th>Ba (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Cu (ppm)</th>
<th>Fe (ppm)</th>
<th>Pb (ppm)</th>
<th>Mn (ppm)</th>
<th>Hg (ppm)</th>
<th>Ni (ppm)</th>
<th>Zn (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7309607</td>
<td>Mother Lode dump</td>
<td>NA</td>
<td>1300</td>
<td>20</td>
<td>14.0</td>
<td>38.0</td>
<td>760</td>
<td>91,000</td>
<td>4,200</td>
<td>580</td>
<td>NA</td>
<td>36.0</td>
<td>1,700</td>
</tr>
<tr>
<td>B8169602</td>
<td>Silver Scott Mine, upper dump</td>
<td>NA</td>
<td>130</td>
<td>21.00</td>
<td>32.0</td>
<td>86</td>
<td>68,000</td>
<td>6,300</td>
<td>490</td>
<td>NA</td>
<td>36.0</td>
<td>2,700</td>
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<tr>
<td>B8279601</td>
<td>Raven Group dump</td>
<td>NA</td>
<td>100</td>
<td>300</td>
<td>2.5</td>
<td>34.0</td>
<td>50</td>
<td>47,000</td>
<td>170</td>
<td>410</td>
<td>NA</td>
<td>31.0</td>
<td>100</td>
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<tr>
<td>B8309701</td>
<td>Black Horse dump</td>
<td>NA</td>
<td>140</td>
<td>99</td>
<td>26.0</td>
<td>29.0</td>
<td>86</td>
<td>40,000</td>
<td>860</td>
<td>1,200</td>
<td>NA</td>
<td>58.0</td>
<td>6,500</td>
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<td>B8089701</td>
<td>Crystal Lead dump</td>
<td>NA</td>
<td>220</td>
<td>2.5</td>
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<td>53</td>
<td>43,000</td>
<td>400</td>
<td>5,100</td>
<td>NA</td>
<td>27.0</td>
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<tr>
<td>B9229701</td>
<td>Silver Strike dump, oxidized</td>
<td>NA</td>
<td>2400</td>
<td>55</td>
<td>16.0</td>
<td>27.0</td>
<td>180</td>
<td>77,000</td>
<td>8,100</td>
<td>1,000</td>
<td>NA</td>
<td>20.0</td>
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<tr>
<td>B9229702</td>
<td>Silver Strike dump, unoxidized</td>
<td>NA</td>
<td>110</td>
<td>87</td>
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<td>14.0</td>
<td>45</td>
<td>33,000</td>
<td>120</td>
<td>590</td>
<td>NA</td>
<td>29.0</td>
<td>140</td>
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<tr>
<td>B7269604</td>
<td>Paragon Gulch jig tailings, north sample</td>
<td>NA</td>
<td>160</td>
<td>51</td>
<td>230.0</td>
<td>210.0</td>
<td>660</td>
<td>30,000</td>
<td>7,100</td>
<td>1,100</td>
<td>NA</td>
<td>52.0</td>
<td>65,000</td>
</tr>
<tr>
<td>B7269605</td>
<td>Paragon Gulch jig tailings, south sample</td>
<td>NA</td>
<td>100</td>
<td>35</td>
<td>160.0</td>
<td>140.0</td>
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<td>28,000</td>
<td>8,400</td>
<td>1,300</td>
<td>NA</td>
<td>39.0</td>
<td>43,000</td>
</tr>
<tr>
<td>B7309604</td>
<td>Orofino Mine jig tailings</td>
<td>NA</td>
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<td>41</td>
<td>230.0</td>
<td>240.0</td>
<td>850</td>
<td>15,000</td>
<td>40,000</td>
<td>680</td>
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<td>76.0</td>
<td>53,000</td>
</tr>
<tr>
<td>B8019604</td>
<td>Silver Strike flotation tailings</td>
<td>NA</td>
<td>2100</td>
<td>49</td>
<td>3.3</td>
<td>19.0</td>
<td>72</td>
<td>54,000</td>
<td>2,800</td>
<td>1,800</td>
<td>NA</td>
<td>20.0</td>
<td>290</td>
</tr>
<tr>
<td>B8159601</td>
<td>Monarch Mine jig tailings</td>
<td>NA</td>
<td>170</td>
<td>10</td>
<td>330.0</td>
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<td>23,000</td>
<td>1,200</td>
<td>NA</td>
<td>31.0</td>
<td>68,000</td>
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</table>

### Clark Fork Superfund BC Levels (mg/Kg) = ppm

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>As</th>
<th>Cd</th>
<th>Pb</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Mean Soil</td>
<td>6.7</td>
<td>0.7</td>
<td>20.0</td>
</tr>
<tr>
<td>Helena Valley Mean Soil</td>
<td>16.5</td>
<td>0.2</td>
<td>11.5</td>
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<tr>
<td>Missoula Lake Bed Sediments</td>
<td>NA</td>
<td>0.2</td>
<td>34.0</td>
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<tr>
<td>Blackfoot River</td>
<td>4.0</td>
<td>&lt;0.1</td>
<td>NA</td>
</tr>
<tr>
<td>Phytotoxic Concentration</td>
<td>100.0</td>
<td>100.0</td>
<td>1000.0</td>
</tr>
</tbody>
</table>

**Explanation**
- Below Detection Limit is ---
- Not analyzed equals NA
Table 2.5-4. Toxicity Characteristic Leaching Procedure results for tailings and dump samples in the Prichard-Eagle Creek area

<table>
<thead>
<tr>
<th>FIELD NO.</th>
<th>REMARKS</th>
<th>As (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Pb (ppm)</th>
<th>Hg (ppm)</th>
<th>Se (ppm)</th>
<th>Ag (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7269604</td>
<td>Paragon Gulch mill tailings, north sample</td>
<td>2.40</td>
<td>1.90</td>
<td>3.60</td>
<td>160.00</td>
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<td>---</td>
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<tr>
<td>B7269605</td>
<td>Paragon Gulch mill tailings, south sample</td>
<td>1.10</td>
<td>1.30</td>
<td>1.40</td>
<td>62.00</td>
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<tr>
<td>B7309604</td>
<td>Orofino mill tailings</td>
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<td>---</td>
<td>1.20</td>
<td>130.00</td>
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<tr>
<td>B7309607</td>
<td>Mother Lode dump</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
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<td>---</td>
</tr>
<tr>
<td>B8019604</td>
<td>Silver Strike mill</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>B8089701</td>
<td>Crystal Lead dump</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>B8159601</td>
<td>Black Horse dump</td>
<td>---</td>
<td>0.17</td>
<td>0.12</td>
<td>0.64</td>
<td>---</td>
<td>---</td>
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</tr>
<tr>
<td>B8159601</td>
<td>Monarch Mine jig tailings</td>
<td>0.64</td>
<td>0.72</td>
<td>0.50</td>
<td>330.00</td>
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<tr>
<td>B8169602</td>
<td>Silver Scott Mine, upper dump</td>
<td>---</td>
<td>0.03</td>
<td>---</td>
<td>18.00</td>
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<tr>
<td>B8279601</td>
<td>Raven Group</td>
<td>---</td>
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**EXPLANATION**

Not Detected is ND

**WATER QUALITY STANDARDS**

<table>
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<tr>
<th></th>
<th>As (mg/L)</th>
<th>Cd (mg/L)</th>
<th>Cr (mg/L)</th>
<th>Pb (mg/L)</th>
<th>Hg (mg/L)</th>
<th>Se (mg/L)</th>
<th>Ag (mg/L)</th>
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</thead>
<tbody>
<tr>
<td>Primary MCL</td>
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<td>0.005</td>
<td>0.100</td>
<td>0.050</td>
<td>0.002</td>
<td>0.05</td>
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<tr>
<td>Secondary MCL</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Aquatic Life, Acute</td>
<td>0.360</td>
<td>0.004 - 0.009</td>
<td>1.7 - 3.1</td>
<td>0.082 - 0.2</td>
<td>0.0024</td>
<td>0.0041 - 0.0134</td>
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<tr>
<td>Aquatic Life, Chronic</td>
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<td>0.001 - 0.002</td>
<td>0.21 - 0.37</td>
<td>0.003 - 0.008</td>
<td>0.000012</td>
<td>0.00012</td>
<td></td>
</tr>
</tbody>
</table>
3.0 SITE DESCRIPTIONS

3.1 JACK WAITE MINE (Site No. WL-28)

3.1.1 Site Location and Access (Figures 2.1-1)

The Idaho part of the Jack Waite Mine (Figure 3.3-1) is in T. 50 N., R. 6 E., Sec. 19, on the Black Peak 7.5-minute topographic map. The main road to the mine used to be USFS Road #152 up the East Fork of Eagle Creek, but this road was washed out in the spring flood of 1996 and will probably not be rebuilt. Access is now by one of two routes that parallel the East Fork at higher elevations. USFS Road #3019, which turns into USFS Road #3017, parallels the East Fork on the north side of the creek and comes down Pennsylvania and Goat gulches to rejoin USFS #152. USFS Road #2349 is on the south side of the East Fork and joins USFS #152 by way of a bridge across the East Fork at Toboggan Creek. Traveling to the Jack Waite on either road takes considerably longer than travel by the East Fork main road. Both alternate roads are narrow with many switchbacks and curves, and both are susceptible to washouts. Above the junctions of these roads with the main East Fork Road, USFS #152 is again washed out before the confluence of the East Fork and Tributary Creek. At this confluence, USFS Road #152 turns up Tributary Creek. The Jack Waite lies about two miles southeast from the turn. Road #152 continues past the four main tailings dumps, the burned-out mill and the 1500 level portal of the Jack Waite, then climbs to the Idaho-Montana border. The 1000 level of the mine is on this road in Montana (Dixie Creek), which also provides alternate access to the Idaho workings from the Montana side. Most of the mine workings are on patented ground, but the bulk of the tailings piles appear to be on National Forest Service land.

3.1.2 Geologic Features (Figure 2.2-1)

The Jack Waite Mine was primarily a zinc-lead mine hosted in a shear zone in the Prichard Formation. Hosterman (1956) describes the geology of the mine as follows (p. 742-743): The Jack Waite vein is a mineralized shear zone striking about N. 60º W. and dipping 45º to 55º SW. The shear zone has been exposed along its strike for about 5,500 feet on the 1500 level and downdip for about 1,700 feet. The ore occurs in shoots which generally have a southeastern rake, although a few ore shoots have a southwestern rake. This pattern is especially noticeable on the Montana side of the mine where more careful stope mapping has been done. The vein ranges in thickness from less than 1 inch to 12 feet; an average stope width is about 5 feet. The ore minerals are galena and sphalerite; the principal gangue is quartz, carbonate minerals, and country rock, which is the lower part of the Prichard formation. The ore is commonly, but not always, found on the footwall of the shear zone, which has several inches of gouge. In the stopes on the Montana side of the mine secondary shears that diverge upward from the main Jack Waite shear have been observed. At the junctions of these secondary shears and the main shear zone the country rock has been extremely broken and shattered. It seems quite
possible that these junctions have played an important part in localizing the ore. Sheared and shattered galena indicates postmineralization movement. The lithologic character of the enclosing rocks does not seem to have had any control of the placement of the ore. The bedding of the lower part of the Prichard formation dips from 20° to 40° to the northeast.

3.1.3 Site History

The history of the Jack Waite mine is discussed in Mitchell (1996).

The mine was discovered around 1900 and began shipping in 1911. It operated until 1918, shipping ore during most of those years, but was closed after floods in November 1917 made the roads impassable. The mine reopened in 1923, and a 125-tpd flotation plant was built in 1926. The Jack Waite Mining Co. took over the mine in 1927 and merged with the Silver King Mining Co. the following year. As a result of the merger, the company acquired the Montana portion of the Jack Waite orebody (Figure 3.1-2). The mill was enlarged in 1928, and construction of a new 500-tpd mill was started in 1930. The company started production from the Montana side of the mine during 1930, but all the ore was processed at the mill in Idaho. The mine was closed in March 1932 due to low metal prices caused by the Great Depression, but was reopened in July 1933. In May 1934, the American Smelting & Refining Co. (Amarc) acquired a 40-year lease on the property (Figure 3.1-3). Asmarc operated the mine until February 1961, when the company relinquished its lease. Lessees operated the mine from 1962 to 1965, since which time the mine has been inactive except for periodic exploration programs conducted at or near the mine. The Jack Waite mill burned in July 1985.

3.1.4 Environmental Condition

3.1.4.1 Site Features

The Jack Waite Mine was visited by Earl Bennett and Falma Moyer on July 23, 1996, and by Earl Bennett with USFS personnel on July 25, 1996. A video segment of the mine is on the Prichard-Eagle Creek videotape (Tape 1, index 00:00:00-00:16:40).

An excellent overview of the mine just prior to the rehabilitation work done by the Idaho National Guard in 1980-81 is presented in Gailhot and Ralston (1979) and Gailhot (1979). From southeast to northwest down Tributary Creek, the Idaho workings of the Jack Waite (Figure 3.1-4) include: the 1000 level portal and dump (elevation, about 4,800 feet); the 1500 level portal, close to the level of Tributary Creek; the 500-tpd flotation mill, which burned in 1985 (only the foundation and scrap iron is left); and the tailings piles. The T-1 tailings dump is across Tributary Creek from the mill. The old townsite of Duthie and the T-2 tailings pile are at the junction of Tributary Creek and Duthie Creek. The T-3 tailings pile is located about 1.5 miles northwest of Duthie on the south side and in Tributary Creek. The T-4 tailings pile is at the confluence of Tributary Creek and the East Fork of Eagle Creek. Each feature will be described in turn.
The 1000 level adit of the Jack Waite mine (Figure 3.1-5; also, see video) is caved and dry. It has a substantial waste rock dump.

The 1500 level adit is just above and south of Tributary Creek (see video). The dump at one time probably covered Tributary Creek as rock is piled on both sides of the creek. The creek was probably flumed under the pile and has since eroded out the flume and overlying waste rock. The dump at this level measures 60 feet wide by 300 feet long by 40 feet thick, for an estimated volume of 26,700 yards (Figure 3.1-6). The adit has a concrete portal but is caved (see video) and has a substantial flow of water (50 gpm). This is to be expected as this is the lowest level of the mine on the Idaho side and is draining the entire mine workings above the tunnel level. The adit water flows over the dump to Tributary Creek (Figure 3.1-7) and is a major source of water for the creek. A sample of the adit water and samples from upstream and downstream of the adit were collected.

West of the 1500 level dump is a wet spot on the north side of the road. This is either a spring or a seep and was sampled.

Ore from the 1500 level adit was carried by rail on the north side of Tributary Creek northwest about 200 yards to the 500-tpd flotation mill (Figure 3.1-3). This rail grade contains substantial waste rock as does the area around the mill. The waste rock has been substantially eroded where it is crossed by a small tributary just north of the adit. As noted, the mill burned in 1985 (Figure 3.1-8); all that is left is scrap iron and the concrete footings.

Across from the mill, on the south side of Tributary Creek is the large T-1 tailings disposal area (Figure 3.1-9). On the east end of this dump, USFS Road #152 crosses Tributary Creek, which flows under the road in a culvert. The road continues up the hill towards the Montana-Idaho state line. The T-1 dump (which measures 400 feet long, 260 feet wide, and an average of 40 feet thick) contains about 155,000 cubic yards of mill wastes (Gaillot, 1979; Gaillot and Ralston, 1979). At the time of the Gaillot and Ralston study, Tributary Creek flowed in a 3-foot-in-diameter culvert under this pile. As part of a major rehabilitation program to stabilize the tailings dumps, the National Guard moved the channel to the north of the pile, where it now flows between the pile and the mill in about the location where Ralston and Gaillot show the overflow channel in Figure 3.1-10. This new creek bed contains several rock gabions to control water flow and filter sediment (Figure 3.1-11). Just past the T-1 dump, the creek flows under the road in a culvert and remains on the south side of the road all the way to the confluence with the East Fork of Eagle Creek. The Guard armored the flanks of the T-1 pile and placed 18 to 24 inches of topsoil and waste rock on the top of the pile to support planted vegetation (Figure 3.1-12). A notch is cut into the north side of the T-1 dump, indicating that some erosion has occurred since the Guard’s work. A bermed trench was constructed at the west end of the dump to catch any fine material (Figure 3.1-13). The armored pile held up well in the spring flood of 1996 and is still intact.
As noted, Tributary Creek used to flow through a 3-foot-in-diameter culvert under the T-1 pile, but was diverted to a new channel north of the pile. However, the outlet side of this flume is located at the base of the T-1 dump on the west end (shown as station T-1B in Figure 3.1-10). There is a substantial flow from this outlet (Figure 3.1-14). The source of this water is an enigma and may be one of the main environmental concerns in the mine area. The creek is iron stained below this outlet, which is clogged with debris, and a water sample was collected. There is a small tributary that flows near the east end of the T-1 pile. However, the volume of water in this tributary is much less that the outlet of the flume under T-1. This could indicate that there is a spring or seep under the T-1 pile.

The T-2 tailings dump (Figure 3.1-15) is located near the old townsite of Duthie on the north side of Tributary Creek. It has been vegetated (Figure 3.1-16) and poses little threat to the waterways. This dump (180 feet long, 80 feet wide, and 15 feet thick) contains an estimated 7,400 cubic yards of mill tailings.

The T-3 tailings dump (Figure 3.1-17) is about 1.5 miles northwest of Duthie on the south side of Tributary Creek. Mill tailings were pumped in a pipeline to this dump from the mill. The grade for the pipeline is still visible along the road from Duthie to T-3 and T-4. The northeast and northwest corners of this large dump (800 feet long, 150 feet wide, and 30 feet thick, or about 133,000 cubic yards) are susceptible to erosion by Tributary Creek, as was noted in the flood of 1993. Although heavily armored by the National Guard, the spring flood of 1996 also damaged the pile (Figure 3.1-18). Like the other piles, T-3 was planted with trees and grasses. These have stabilized the tops of the piles and kept metal-contaminated dust from blowing off the top of the piles into the surrounding area (Figure 3.1-19).

The T-4 dump lies near the active waterway of the East Fork of Eagle Creek (Figure 3.1-20) and undoubtedly much of this dump has been washed away. At one time a log dam held back the tailings, but this was breached long ago. Interestingly, the T-4 tailings have the best vegetative cover of all of the four dumps, even though T-4 was not planted. It was naturally reseeded, according to USFS personnel. The part of the dump that is left measures 110 feet long, 110 feet wide, and 10 feet thick, or about 4,400 cubic yards of material.

3.1.4.2 Sample Locations

3.1.4.2.1 Soil Samples

No samples were collected from the tailings dumps for this study as auger samples were collected from all four piles and reported in Gaillot (1979) and Gaillot and Ralston (1979). Table 3.1.4-1 is reproduced from their paper showing the analytical results from the four tailings impoundments. Comparing Tables 3.1.4-1 and 1.5-3 shows that the lead, zinc, cadmium, and silver in these tailings are at least 10 times the expected background rock values and also exceed all EPA standards (Table 1.5-5). The results are typical of flotation tailings from lead-zinc mines in the area.
3.1.4.2.2 Water Samples

Sample B7239601 was collected from the Jack Waite 1500 level adit. Sample B7239602 was collected from above the 1500 level on Tributary Creek, and sample B7239603 was taken downstream from the Jack Waite adit. Sample B7239604 was collected from the west outlet of the culvert under tailings pile T1. Sample B7239606 was from a spring(?) or seep from just west of the dump at the 1500 adit.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature</th>
<th>pH</th>
<th>Flow (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7239601</td>
<td>Jack Waite 1500 level adit</td>
<td>250-260 μs/cm</td>
<td>6.6-6.7</td>
<td></td>
<td>~10</td>
</tr>
<tr>
<td>B7239602</td>
<td>Tributary Creek above the Jack Waite 1500 level</td>
<td>110 μs/cm</td>
<td>7.3</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>B7239603</td>
<td>Downstream from the Jack Waite adit</td>
<td>120 μs/cm</td>
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<td></td>
</tr>
<tr>
<td>B7239604</td>
<td>West outlet of the culvert under tailings pile T1</td>
<td>100 μs/cm</td>
<td>6.2</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>B7239606</td>
<td>Spring(?) from west of the 1500 adit dump</td>
<td>30 μs/cm</td>
<td>6.6</td>
<td></td>
<td>0.5</td>
</tr>
</tbody>
</table>

3.1.4.2.3 Analytical Results

The total metal values in water sample B7239601 (Tables 2.5-1 and 2.5-2) exceeded all EPA standards for cadmium, the Aquatic Life, Chronic, standard for lead, and both Aquatic Life standards for zinc. The dissolved metals in B7239601 exceeds all EPA water quality standards for cadmium, both Aquatic Life standards for copper and zinc, and the Aquatic Life, Chronic, standard for lead.

Total metals in sample B7239604 (Tables 2.5-1 and 2.5-2) exceed all EPA standards for cadmium, the Aquatic Life, Chronic, standard for lead, and both Aquatic Life standards for zinc. The dissolved metals exceed all standards for cadmium, both Aquatic Life standards for copper and zinc, and the Aquatic Life, Chronic, standard for lead.

Total metals in sample B7239606 (Table 2.5-2), from a spring(?) from just west of the 1500-level dump, exceed the Aquatic Life, Chronic, standard for lead.
Sample B7239602 (Table 2.4-1), collected from above the 1500 level on Tributary Creek, is within EPA specifications for both dissolved and total metals for all elements.

Sample B7239603 (Tables 2.5-1 and 2.5-2) was collected downstream from the Jack Waite adit. In the dissolved metals sample, cadmium and lead exceed all EPA standards, copper exceeds the Aquatic Life, Chronic, standard, and zinc exceeds both Aquatic Life standards. In the total metal sample, lead exceeds all standards and zinc is above both Aquatic Life standards.

As with many water samples in this area, cadmium exceeds all EPA water quality standards in some samples. However, this may well be because the very low cadmium value used by the EPA as its standard is close to the analytical capability of our instruments. Lead and zinc exceed only the Aquatic Life standards. This supports the findings of Gaillot and Ralston (1979), who determined that high zinc values in Tributary Creek were a potential problem and that over 50% of these loadings came from the 1500 level drainage. Their study was based on a much more extensive water sampling program than the few samples collected for the present study. The metal loadings in water collected from the culvert on the west side of T1 are a concern because of the uncertainty as to where this water is coming from.

The most serious problems at the Jack Waite are the water coming out of the 1500 level, which contributes about half of the zinc loading to Tributary Creek, and the four tailings piles, which contain about 300,000 cubic yards of tailings (Gaillot and Ralston, 1979).

3.1.5 Structures

The only structure in the area is the burned-out mill. The scrap around this mill constitutes a minor hazard.

3.1.6 Safety

The adit on the 1500 level could pose a safety hazard.
Figure 3.1-1. Topographic map of the Jack Waite Mine, Shoshone County, Idaho (U.S. Geological Survey Black Peak and Murray 7.5-minute topographic maps). Water samples B7239601, B7239602, B7239603, B7239604, and B7239606 were collected at the mine site (see Section 3.1.4.2.2 for descriptions of the locations). Sites WL-16, WL-18, WL-19, and WL-23 are discussed in Volume IV of this report.
Figure 3.1-2. Underground workings of the Jack Waite Mine (Figure 3 from Gaillot, 1979).
Figure 3.1-3 Jack Waite Mine, June 1951. The mill is in the center of picture, and the old millsite is just to the right of the new mill. T1 tailings dump is just visible, a little left of the bottom of the main mill building. The 1500 level adit is at the lower right corner. Snowshed-covered rails extend snakelike from the portal of the 1500 level to the mill. The road above the snowshed goes to the right and uphill to the 1000 level. The covered rails going left from the 1500 adit lead to the waste dump; the tracks crossing Tributary Creek lead to another waste dump on the south side of the creek. The road to Montana is just above where the covered rails cross Tributary Creek, and this road also goes to the left down Tributary Creek to Eagle Creek. Part of the old town of Duthie is visible on the left side of picture, and the location of the T2 tailing pile is nearby (B.H. Hope picture from Asarco, Inc. files).
Figure 3.1-5. Looking down on the 1000-level dump on the Idaho side of the Jack Waite Mine from the top of the erosional scar above the site for the 1000-level portal (Roll 559695, frame #19).

Figure 3.1-6. Tributary Creek and the face of the 1500-level waste dump, looking downstream (Roll 559695, frame #1).
Figure 3.1-7. Drainage from the 1500-level adit of the Jack Waite Mine, as it flows across the dump. This channel drains into Tributary Creek (Roll 559695, frame #0).
Figure 3.1-8. Footings of the burned-out Jack Waite mill. This picture was taken from the T1 tailings pile across Tributary Creek (Roll 560565, frame #5).
Figure 3.1-9. Looking down Tributary Creek toward the Jack Waite millsite (right) and tailings pile T-1 (left). Note the culvert that channels Tributary Creek between the millsite and the tailings pile (Roll 560565, frame #4).
Figure 3.1-10. Detailed map of the T-1 tailings pile at the Jack Waite Mine (Figure 4 from Gailhot, 1979).
Figure 3.1-11. Rock gabion in Tributary Creek, with the Jack Waite millsite in the background (Roll 560565, frame #14).

Figure 3.1-12. Jack Waite millsite and tailings pile T-1. Photograph was taken from the rail grade from the 1500-level portal to the mine. The light-colored material on the lower slope in the center of the photograph is fine-grained tailings. The dark gray rock is mine waste (quartzite) which was placed on top of the tailings. The reddish material on the top, which is most visible in the treed area, is topsoil which was brought in by the National Guard. The slope face of the tailings is armored with coarse rock. The species of trees planted on the tailings include spruce, fir, white pine, and alder (Roll 559695, frame #3).
Figure 3.1-13. Bermed trench built at the west end of T1 to catch fine sediment (Roll 560565, frame #13).

Figure 3.1-14. Debris-clogged outlet of the flume under T1. There is a substantial flow of water from this outlet, and many of the rocks are iron-stained (Roll 560565, frame #12).
Figure 3.1-15. Map of tailings pile T-2 at the Jack Waite Mine (Figure 5 from Gaillot, 1979).
Figure 3.1-16. Tailings pile T-2 by the townsite of Duthie at the Jack Waite Mine. Note the effects of the reclamation work (Roll 560565, frame #23).
Figure 3.1-17. Map of tailings pile T-3 at the Jack Waite Mine (Figure 6 from Gallot, 1979).
Figure 3.1-18. Tailings pile T3, with Tributary Creek in the lower right corner of the photograph. Dark reddish, angular rock was used to armor the tailings pile; the lighter colored, rounded boulders are in the creek bed (Roll 559695, frame #12).

Figure 3.1-19. Upper end of tailings pile T-3, showing the dense vegetation on the reclaimed surface (Roll 559695, frame #13).
Figure 3.1-21. Dense vegetation on the T4 tailings pile. This is the oldest of the tailings piles and was naturally reseeded by native vegetation (Roll 560564, frame #15).
Table 3.1.4-1. Total metals content of tailings samples collected from the tailings piles at the Jack Waite Mine (Table 7 from Gaillot, 1979).

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<th>Date</th>
<th>Sample Point</th>
<th>Depth</th>
<th>Pb  ug/g</th>
<th>Zn ug/g</th>
<th>Fe ug/g</th>
<th>Cd ug/g</th>
<th>Ag ug/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/14/78</td>
<td>T-1 (Tailings Pile No. 1)</td>
<td>Surface</td>
<td>7.974</td>
<td>4.565</td>
<td>20.831</td>
<td>23.6</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 foot</td>
<td>7.700</td>
<td>4.150</td>
<td>23.500</td>
<td>22.1</td>
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<td>23.700</td>
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<tr>
<td></td>
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<td></td>
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<td></td>
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<td>9 foot</td>
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<td></td>
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<td>11 foot</td>
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Precision and accuracy measurements for tailings samples analysis as recorded by State of Idaho, Department of Health and Welfare, Bureau of Laboratories.

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<th>Zn</th>
<th>Fe</th>
<th>Cd</th>
<th>Ag</th>
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<td>85 %</td>
<td>95.5%</td>
<td>83.0%</td>
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<tr>
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<td>± 2.0%</td>
<td>± 0.8%</td>
<td>± 2.5%</td>
<td>± 0 %</td>
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</tbody>
</table>
3.2 MOTHER LODE MINE (Site No. WL-89)
Alternate names—Yosemite, Daddy, Treasure Box, Occident, Patricia, Meade, Treasure

3.2.1 Site Location and Access (Figure 2.1-1)

The Mother Lode Mine (Figure 3.2-1) is located on the south side of Prichard Creek, about a mile southeast of Murray (Burke 7.5-minute quadrangle; T. 49 N., R. 5 E., Sec. 5) and is visible from the Thompson Pass Road (FH9). A bridge to the property across Prichard Creek was washed out in the spring flood, but one can walk across the creek just east of the mine where the river has disappeared and is flowing under the placered gravels. Numerous drifts and crosscuts at several levels have been driven on the property, but when Shenon visited the site in 1935, only six levels were open (Figure 3.2-2). The camp contained a flotation mill, compressor house, and blacksmith shop. We believe that most of the property is on patented land within the BLM enclave that includes Murray. However, this property impinges on Prichard Creek, which then flows back onto land administered by the Forest Service.

3.2.2 Geologic Features (Figure 2.2-1)

Shenon (1938, p. 31) noted that, “Most of the production of the Mother Lode group has come from three veins, known as the Mother Lode, Daddy, and Meade. Some work also has been done on the Gold Back lode. . . . The Mother Lode and Daddy veins are relatively flat bedding deposits of the type most common in the Murray district, whereas the Meade and Gold Back shear zones cut the bedding at a steep angle.” The mine is in rocks of the Prichard Formation (Hosterman, 1956; Shenon, 1938).

3.2.3 Site History

History and production

According to Shenon (1938, p. 30-31):

The present Mother Lode group of claims was first located and worked as the Yosemite, Daddy, Treasure Box, Mother Lode, and Occident mines. The first location was in 1883, but the mines were most productive in 1892-93 [William Wylie, personal communication to P.J. Shenon]. At first, the ore was treated in arrastres, and several continued in use until about 1892 although stamp mills were also used. The total production of the Mother Lode group is not known. In 1908, Ransom stated that the Yosemite claim had produced $500,000, but he does not report the total production of the other claims of the group [Ransome and Calkins, 1908]. He does state that in 1887 the Treasure Box was producing as much as $10,000 a week.

According to the IMIR and USBM Yearbook chapters, a little gold ore was amalgamated at the Mother Lode Mine in a 5-stamp mill in 1911. The next mention was in 1934 when the value of
the metal output of the Summit district increased appreciably, due largely to production from the Golden Chest, Idaho Mother Lode, Mountain Lion, and Bear Top mines. One car of rich gold concentrates was shipped from the Idaho Mother Lode, gold bullion was recovered by amalgamation at the Mountain Lion, and ore containing chiefly gold was treated by flotation at the Golden Chest Mine. In 1938, the value of the metal output of the Summit district increased owing chiefly to the improved output of gold ore from the Idaho Mother Lode and Golden Chest mines. The ore from both properties (about 5,900 tons) was treated in the 100-ton flotation plant owned by Idaho Mother Lode Gold Mines, Inc.

There is little further mention of the Mother Lode until Newmont Mining began an exploration project in the Murray area in the late 1980s. As noted in reports by the IGS, in 1989 Newmont obtained permits for a 22-hole drilling program on the Mother Lode property under a lease agreement with International Basic Resources, Inc. The next year, International Basic Resources announced that it had signed a joint venture lease on the historic Mother Lode, Daddy Lode, and Golden Slipper Mines.

3.2.4 Environmental Condition

3.2.4.1 Site Features

The Mother Lode Mine was visited on July 17, 1996, by Falma Moye and on July 30, 1997, by Earl Bennett. A video segment of the site is on the Prichard-Eagle Creek videotape (Tape 1, index 00:21:20-00:33:47).

The extensive property consists of a main, lower, open adit above a big dump that is iron stained (Figures 3.2-3 and 3.2-4). A sample of the red-colored, iron-stained portion of this dump indicates significant metal content, and the dump is probably the old millsite as well as a waste dump. This dump and associated metals are actively eroding into Prichard Creek. A trickle of water flows from the main adit (Figure 3.2-5) and has a pH of 7.3 and conductivity of 260.

East of the main tunnel and almost level with Prichard Creek is another adit with a pit in front of it. Above this adit/pit on the steep hillside, two large dumps are visible from the road. About 100 feet to the east of these dumps is another dump.

An access road to the upper workings goes west and up the hill from the main adit and dump. This road switch backs to the east and then leads to one collapsed (Figure 3.2-6) and four more open, dry adits (Figures 3.2-7, 3.2-8, 3.2-9, and 3.2-10), which are strung out along the road. The first open adit up this road has a portal with the sign No. 6 painted on it. The dumps from these adits are overgrown and partially destroyed by the road construction. The road then switches back to the west again and goes further up the hill, but no other workings were observed. This area has been logged, which may have removed some workings.
3.2.4.2 Sample Locations

3.2.4.2.1 Soil Samples

Sample B7309607 (Table 2.5-3) was taken in front of the concrete pad from the red-colored, iron-stained portion of the dump.

3.2.4.2.2 Water Samples

Water sample B7309606 (Tables 2.5-1 and 2.5-2) was taken from the lower adit at the Mother Lode Mine.

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<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature</th>
<th>pH</th>
<th>Flow (gpm)</th>
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<td>Mother Lode main adit</td>
<td>260 μS/cm</td>
<td></td>
<td>7.3</td>
<td>trickle</td>
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</table>

3.2.4.2.3 Analytical Results

Water Samples

The water sample from the lower adit at the Mother Lode Mine (B7309606) has the highest arsenic values of all samples collected in the Eagle-Prichard Creek study area, exceeding the Primary MCL in both the filtered and unfiltered samples. It also exceeds the Primary MCL and both Aquatic Life standards for lead and cadmium in the unfiltered sample, and both Aquatic Life standards for zinc and copper in filtered and unfiltered samples.

Waste Dump Sample

The waste dump sample contains 1,300 ppm arsenic, 4,200 ppm lead, 760 ppm copper, and 1,700 ppm zinc, all far in excess of established background (Tables 1.5-3 and 1.5-4) or environmental (Table 1.5-5) standards. For comparison, the average rock in the Prichard Formation contains 34 ppm lead, 22 ppm copper, 60 ppm zinc, and arsenic below the detection limit (Table 1.5-3; Gott and Cathrall, 1980). On the leaching test (Table 2.5-4), all metals were below detection limits.

3.2.5 Structures

No structures remain at this site.

3.2.6 Safety

The open adits are a safety hazard. However, a black bear sow and cub were present at Adit No. 6 and may have been using it as a den.
Figure 3.2-1. Topographic map of the Mother Lode Mine, Shoshone County, Idaho (U.S. Geological Survey Burke 7.5-minute topographic map). Samples B7309606 and B7309607 were collected at the mine (see Sections 3.2.4.2.1 and 3.2.4.2.2 for descriptions of the locations). Sites WL-68, WL-70, WL-77, WL-90, and WL-111 are discussed in Volume IV of this report.
Figure 3.2-2. Mother Lode Mine and mill, 1897. Note the line of openings on the hillside (Idaho Geological Survey files).
Figure 3.2-3. Sketch map of the Mother Lode Mine, showing surface features.
Figure 3.2-4. Big, iron-stained dump at the main lower adit at the Mother Lode Mine (Roll 779-968, frame #21).

Figure 3.2-5. Open adit with seep at the Mother Lode Mine. This adit is visible from the Thompson Pass Road and is about 30 feet above Prichard Creek. Note the grasses in the seepage flow (Roll 779-968, frame #13).
Figure 3.2-6. Adit No. 2 at the turn in road at the Mother Lode Mine. The dry adit is collapsed (Roll 779-968, frame #15). Adit numbers are as shown in Figure 3.2-3.
Figure 3.2.7. Adit No. 3 at the Mother Lode Mine. This dry adit is open (Roll 779-968, frame #16).
Figure 3.2-8. Adit No. 4 at the Mother Lode Mine. This adit is open and dry (Roll 779-968, frame #17).
Figure 3.2-9. Adit No. 5 at the Mother Lode Mine. This adit is collapsed and dry (Roll 779-968, frame #18).
Figure 3.2-10. Adit No. 6 at the Mother Lode Mine. This dry adit is open. It appears to have been used as a bear den (Roll 779-968, frame #19).
3.3 MONARCH MINE (Lower Workings; Site No. WL-123)

3.3.1 Site Location and Access (Figure 2.1-1)

The Monarch Mine is located on the Burke 7.5-minute topographic quadrangle map (Figure 3.3-1). The mine has two main access points, the lower workings (T. 49 N., R. 5 E., Sec. 13; elevation 3,400 feet) located just west of Cement Gulch and just south of Prichard Creek, and the upper adit in Barton Gulch (T. 49 N., R. 5 E., Sec 23; elevation, about 4,500 feet). Access for the lower workings (main adit and millsite) is from the Thompson Pass Road (FH9) over a bridge (flooded out) that crosses Prichard Creek. The upper adit in Barton Gulch can be reached from a series of logging roads that goes up the hill from the lower workings or from USFS Road 1505 that goes up Cascade Gulch from Prichard Creek about one mile east of the lower Monarch workings. Both the upper and lower workings, including the millsite and tailings dump, are on private land (Crown Pacific), but the tailings directly impact Prichard Creek.

3.3.2 Geologic Features (Figure 2.2-1)

According to Hosterman (1956, p. 743-744):
The Monarch mine has about 10,650 feet of crosscuts and drifts, of which about 6,550 feet are on the 1400 level. It has approximately 1,200 feet of raises and winzes. The 1400 level is connected to the 600 level by the 875-foot C raise, and the 600 level is connected to the 300 level by the 237-foot A raise. The veins in the Monarch mine belong to the mineralized shear zone type; they have a strike of about N. 45° W. and dips ranging from vertical to 75° NE. . . On the 1400 level two drifts, the Barton drift, 1,100 feet from the portal and the Atlantic drift 2,400 feet from the portal, follow structures that contain barren quartz and siderite. The country rock in the Monarch mine is the Burke formation; the upper part of the Prichard formation, which underlies the Burke, is found near the portal of the 1400 level. The principal ore minerals are galena and sphalerite. Copper minerals, such as chalcopyrite, malachite, chrysocolla, and azurite, are common but not so abundant as galena and sphalerite. Veins containing 10 inches of solid galena and sphalerite have been mined. The principal gangue minerals are quartz and siderite.

3.3.3 Site History

In 1905, the Monarch Mining Company's development work on the property consisted of a 90-foot-deep shaft and tunnels aggregating 4,985 feet. The extensive development of the mine included a 3,700-foot adit, which tapped the main vein at a vertical depth of 1,380 feet. A 75 tons-per-day mill operated for two months.

In 1909, the Idaho Northern Railroad was completed to a terminal 6 miles east of Murray. Several shipments were made from the Monarch Mine, and the 75-ton mill ran part of the time. By 1910, a 200-ton concentration plant had been completed. It included rolls, jigs, a Huntington
mill, Wilfley tables, and Frue vanners. A 40-ton sampling mill was used during the year. The following year, the largest part of the output of the district came from the Monarch. The greater part of the product was lead concentrate, but a 40 percent zinc product was also separated.

Although still shipping ore, the company passed into the hands of a receiver on April 1, 1912. Until the middle of December, it was operated by lessees. The next year, the Monarch mill was active for only a short time. Concentrates were shipped until 1917, when shipments of lead ore were made by the Fidelity Co. A washout on the railroad curtailed shipments in 1918, but Fidelity continued to ship some ore until 1923, when the mine was idled. One car of sulphide lead-zinc ore from the Monarch Mine was shipped to Portland, Oregon, for export to Belgium in 1925. This is believed to be the last activity at the mine to date.

3.3.4 Environmental Condition

3.3.4.1 Site Features

This mine was visited by Falma Moye on July 17, 1996, and Earl Bennett on August 14, 1996. A video segment showing this property is on the Prichard-Eagle Creek videotape I (index 00:33:47-00:47:40). Figure 3.3-2 shows a sketch map of the site.

The main portal of the Monarch Mine is located just south of Prichard Creek, about 1 mile east of Granite Gulch (Figures 3.3-3 and 3.3-4). According to Hosterman (1956), this was the 1440 level (elevation 3,400 feet); the 300 level is located in Barton Gulch (elevation 4,500 feet). These mine levels were named opposite from the usual convention (lowest level = lowest elevation). The levels are connected, so this property contains considerable workings. Hosterman (1956) estimates 10,650 feet of crosscuts and drifts (with 6,550 on the 1440 level) and 1,200 feet of raises and winzes.

A bridge, which crosses Prichard Creek to the mine, was washed out in the spring 1996 flood (Figure 3.3-4). Once across the creek, a road goes from the lower level of the mine to the upper level and to other USFS and logging roads.

Next to the Jack Waite Mine, the second largest concentration of jig tails in the Prichard-Eagle creeks study area is at the Monarch. The tails lie within and on both sides of the active drainage of Prichard Creek for about ¼ mile to the west from the bridge and millsite. The dump can be divided into two parts: an east part that is 540 feet long, 275 feet wide, and averages 4 feet thick (21,600 cubic yards); and a west part that is thinner and more eroded and measures about 810 feet long, 50 feet wide, and 2 feet thick (3,000 cubic yards). The total amount of material is 24,600 cubic yards, or 16,400 tons. The tails have been redistributed by floods in Prichard Creek.

After crossing the bridge and about 100 feet of tailings, a road heads up the mountain. The access road to the lower level splits off this road about 100 yards up the hill. From where the mine access road leaves the uphill road, it is on the waste dump. About due south of the bridge is
a small building on the waste dump (Figure 3.3-6) with a log retaining wall behind it to shore up the hillside (Figure 3.3-7). About 100 feet to the east of this building is a caved adit (Figure 3.3-8). About 50 feet farther east is an open adit that appears newer and is well hidden by brush. There is some water seeping from the caved adit and a fair flow coming from the open one. The water disappears into the waste dump and no seeps were noted at the bottom of the dump. The waste dump is approximately 200 feet long and at least 50 feet deep (Figure 3.3-9).

At the bottom of the steep dump face and in line with the small building near the adits are footings for what was probably a mill. Wood and timbers down the front of the dump may have been from an old ore chute or other structure. Just in front of these footings is a collapsed building that is relatively new (it has insulation). As noted, from the mill site and for about ¼ mile down Prichard Creek, the entire area is covered with varying thicknesses of jig tailings (Figures 3.3-10, 3.3-11, and 3.3-12).

3.3.4.2 Sample Locations

3.3.4.2.1 Soil Samples

Sample B8159601 of the tailings was collected from a channel cut through the east dump.

3.3.4.2.2 Water Samples

Water samples were taken from the main adit at the Monarch Mine (B8149605) and from a tributary to Prichard Creek that cuts the west tailings disposal site (B8159603).

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<td>Main adit sample</td>
<td>172 μS/cm</td>
<td>49°F</td>
<td>7.8</td>
<td>5-8 gpm</td>
</tr>
<tr>
<td>B8159603</td>
<td>Tailings tributary</td>
<td>110 μS/cm</td>
<td>60°F</td>
<td>7.0</td>
<td></td>
</tr>
</tbody>
</table>

3.3.4.2.3 Analytical Results

Monarch Mine

Water sample B8149605 (Tables 2.5-1 and 2.5-2) from the main adit at the Monarch Mine exceeds the Aquatic Life, Chronic, standard for mercury in the unfiltered sample; and both Aquatic Life standards for zinc, the Aquatic Life, Chronic, standard for lead, and both Aquatic Life Standards and the Primary MCL for cadmium in the filtered and unfiltered samples.

Water sample B8159603 (Tables 2.5-1 and 2.5-2) is from a tributary to Prichard Creek that cuts across the tailings disposal site at the Monarch Mine. For both filtered and unfiltered samples, the
sample exceeds the Primary MCL and both Aquatic Life standards for cadmium, the Primary MCL and Aquatic Life, Acute, standards for lead, and both Aquatic Life standards for zinc.

Monarch mill tailings

The sample from the Monarch jig tails (Table 2.5-3) exceeds background values for arsenic cadmium, and lead, and expected background soil values for copper and zinc (Tables 1.5-3 and 1.5-4). Metals that leached from these tailings on the TCLP test (Table 2.5-4) were arsenic, cadmium, chromium, and lead.

3.3.5 Structures

On the waste dump due south of the bridge, there is a small building. A log retaining wall behind it shores up the hillside. At the bottom of the steep dump face and in line with this building are the footings for what appears to have been a mill. Wood and timbers down the front of the dump may have been from an old ore chute or other structure. In front of the footings is a collapsed building.

3.3.6 Safety

The open adit is a safety hazard.
Figure 3.3-1. Topographic map of the lower Monarch Mine, Shoshone County, Idaho (U.S. Geological Survey Burke 7.5-minute topographic map). Samples B8159601, B8159603, and B8149605 were collected at the mine (see Sections 3.3.4.2.1 and 3.3.4.2.2 for descriptions of the locations). Samples B8019605 and B8019606 are background water samples. Sites WL-129, B8149604, and B8159602 are discussed in Volume IV of this report.
Figure 3.3-2. Sketch map of the lower Monarch Mine, showing surface features.
Figure 3.3-3. Geologic map of the workings of the Monarch Mine (Plate 60 from Hosterman, 1956).
Figure 3.3-4. Aerial view of the lower mine workings of the Monarch Mine (Roll 216-382, frame #19).

Figure 3.3-5. Bridge and jig tailings at the Monarch Mine (Roll 559693, frame #14).
Figure 3.3-6. Dump and jig tailings at the Monarch Mine (Roll 559693, frame #18)

Figure 3.3-7. Mine building with log barricade in back (Roll 779-968, frame #9)
Figure 3.3.8. Collapsed adit at the lower Monarch Mine (Roll 779-968, frame #6).
Figure 3.3-9. View of waste dump (foreground) and tailings (middle ground). Prichard Creek flows from right to left in the upper part of the photograph. New highway construction can be seen at the top of photo. Note eroded channel in the tailings (Roll 779-968, frame #10).

Figure 3.3-10. Main jig tailings at the Monarch Mine, looking west (Roll 559693, frame #15).
Figure 3.3-11. Jig tailings at the Monarch Mine, looking west from the end of the main jig tailings dump (Roll 559693, frame #19).

Figure 3.3-12. Jig tailings sample site at the Monarch Mine (Roll 559693, frame #13).
3.4 MONARCH MINE (Upper workings; Site No. WL-128)
Alternate names—Coeur d'Alene, North Fork, Barton, Silverado, Coeur d'Alene North Fork

3.4.1 Site Location and Access (Figure 2.1-1)

The Monarch Mine (Figure 3.4-1) is located on the Burke 7.5-minute topographic quadrangle map. The mine has two main access points. The lower workings (T. 49 N., R. 5 E., Sec. 13; elevation 3,400 feet) are located just west of Cement Gulch and just across Prichard Creek, and the upper adit is in Barton Gulch (T. 49 N., R. 5 E., Sec 23; elevation, about 4,500 feet). The upper adit can be reached from a series of logging roads that goes up the hill from the lower workings or from USFS Road #1505 that goes up Cascade Gulch from Prichard Creek (the Thompson Pass Road), about one mile east of the lower Monarch workings. Both the upper and lower workings, including the millsite and tailings dump, are on private land (Crown Pacific).

3.4.2 Geologic Features (Figure 2.2-1)
See Section 3.3.2.

3.4.3 Site History
See Section 3.3.3.

3.4.4 Environmental Condition

3.4.4.1 Site Features

The upper workings (300 Level) of the Monarch Mine were visited by Falma Moye on July 17, 1996, and by John Kauffman and Bill Rember on August 27, 1996. A video segment showing these workings is on the Prichard-Eagle Creek videotape I (index 00:47:40-00:52:00). Figure 3.4-2 is a sketch map of the site.

The property consists of a collapsed dry adit (Figure 3.4-3) and a large dump measuring some 200 feet long, 90 feet wide, and 125 feet thick down a steep face (Figures 3.4-4a, 3.4-4b, 3.4-5, and 3.4-6). The dump has two levels. The lower level was graded to make an area for a loading chute, which remains as a rubble pile of timbers and scrap iron. This dump has some seedlings growing on it but is mostly barren.

3.4.4.2 Sample Locations

3.4.4.2.1 Soil Samples
No soil or rock samples were collected at this site.

3.4.4.2.2 Water Samples
No water samples were taken from this site.
3.4.5 Structures
   No structures remain at this site.

3.4.6 Safety
   No safety concerns were noted at this site.
Figure 3.4-1. Topographic map of the upper Monarch Mine, Shoshone County, Idaho (U.S. Geological Survey Burke 7.5-minute topographic map). Sites WL-129 and B8159602 are discussed in Volume IV of this report.
Figure 3.4-2. Sketch map of the upper Monarch workings.
Figure 3.4-3. The collapsed adit at the upper Monarch Mine (Roll #K3, frame #9).
Figure 3.4-4a. Looking south at the upper portion of the dump and collapsed loading chute at the upper workings of the Monarch Mine. This photograph overlaps the left side of Figure 3.4-4b (Roll #K3, frame #13).

Figure 3.4-4b. Looking south across the face of the upper Monarch dump. An old clear-cut slope is in the distance (Roll #K3, frame #14)
Figure 3.4-5. Looking west down the face of the dump at the upper workings of the Monarch Mine (Roll #K3, frame #10).

Figure 3.4-6. Looking north across the dump at the upper workings of the Monarch Mine (Roll #K3, frame #12).
3.5 PARAGON/BLACK HORSE MILL TAILINGS SITE (Site No. WL-120)

3.5.1 Site Location and Access (Figure 2.1-1)

The Paragon (Chicago-London) mill tailings disposal site (Figure 3.5-1) T. 49 N., R. 5 E., Sec. 13) is located at the mouth of Paragon Gulch (on the border between the Thompson Pass and Burke 7.5-minute quadrangles) and impinges on the Thompson Pass Road (FH9). Access is from a short road from FH9 up the east side of Paragon Gulch. The jig tails and the collapsed mill are highly visible from FH9. The tails are probably on USFS-administered land, and they are in the active waterway of Paragon Creek. The mill is probably on patented land.

3.5.2 Geologic Features (Figure 2.2-1)

The country rock in this area is Prichard Formation. Alluvial deposits occur in the streambed.

3.5.3 Site History

Mitchell (in preparation) gives a detailed history of the Black Horse and Paragon (lower Paragon or Chicago-London and upper Paragon) mines.

In 1905, the Black Horse, Rialto, and other claims operated by the Idaho-Montana Summit Mining Company were opened by a tunnel. Large bodies of high-grade ore were said to have been opened near the surface, and several shipments were made.

The Idaho Northern Railroad was completed in 1909 to the terminal 6 miles east of Murray, where the principal shipping mines of the district were located. Considerable development was done on many properties, and lead ore or concentrate was shipped from the Bear Top, Monarch, and Black Horse mines. One shipment of ore worth $65 per ton in lead and silver was made from the Black Horse.

In 1910 a 150-ton concentration plant was built at the mouth of Paragon Gulch for the Black Horse Mine. Several small shipments were made the following year. Ore was also processed from the Chicago Mine of the Paragon Consolidated Mining Co. Production continued until 1917.

Development was under way in 1921 at the Paragon, Giant Ledge, and Cedar Creek mines. Several lots of lead ore were shipped from the Monarch and Paragon properties in 1923. However, by 1924 the Paragon properties were idle.

The last mention of the Black Horse was in 1948, when 110 tons of zinc-lead ore were shipped from the mine.
3.5.4 Environmental Condition

3.5.4.1 Site Features

The Paragon jig tailings disposal site was visited by Falma Moye on July 17, 1996, and by Earl Bennett on July 26, 1996. In addition, a water sample was collected from the site on August 14, 1996. A video segment of this site is on the Prichard-Eagle Creek videotape I (index 00:52:00-01:03:08). Figure 3.5-2 shows a sketch map of the site.

As noted, following completion of the railroad, a 150-tpd mill was built at the mouth of Paragon Gulch in 1910. The mill apparently operated until about 1916 (Figure 3.5-3). The metallurgy of the day dictated a gravity plant, and the wreck of the mill and footings (on the west side of the gulch) are all that is left of this structure. There is a significant dump of jig tailings at the mouth of Paragon Gulch, just below the mill, and the metal-rich tails are impinging on the main creek (Figure 3.5-4).

Most of the jig tailings are located on the east side of the creek. Cribbing was installed to keep the tails out of the creek, but this has long since been breached. Large parts of the west side of the dump have eroded into the creek, as evidenced by the spring floods. The dump averages about 8 feet in depth, being deeper in the north and thinning to the south, and contains an estimated 11,472 cubic yards (approximately 7,648 tons) of material. The coarse tails contain lenses of oxidized (red-colored) metal-rich sediment. A trench at the north end of the dump indicates that a small portion of this material has been removed for some unknown purpose. A sample was channeled down the side of this trench for an upper dump sample. Another sample was collected near the south end of the dump. The new Thompson Pass-Murray road impinges on the south end of this dump and the access road up Paragon Gulch marks the east boundary.

3.5.4.2 Sample Locations

3.5.4.2.1 Soil Samples

Two samples of jig tailings were collected from the Paragon millsite. Sample B7269604 was collected from the north side of the trench on the north side of the tailings pile. Sample B7269605 was taken from the southeast edge of the tailings pile just above the flood high-water mark.

3.5.4.2.2 Water Samples

Sample B8149603 was taken from Paragon Creek at the south end of the Paragon/Black Horse jig tailings pile.
<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature</th>
<th>pH</th>
<th>Flow (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8149603</td>
<td>Paragon Creek at the south end of the jig tailings pile</td>
<td>15 μs/cm</td>
<td>53° F.</td>
<td>7.3</td>
<td></td>
</tr>
</tbody>
</table>

3.5.4.2.3 Analytical Results

The two samples of jig tailings (B7269604 and B7269605) collected from the Paragon millsite (Table 2.5-3) are both similar. The background values for arsenic, cadmium, and lead are exceeded and the expected values in similar soils are exceeded for copper and zinc (Table 1.5-4). In addition, arsenic, cadmium, chromium, and lead were leached from both samples of these tailings (Table 2.5-4).

Water sample B8149603 (Tables 2.5-1 and 2.5-2), from Paragon Creek on the south end of the Paragon jig tailing pile, exceeds the Primary MCL and both Aquatic Life standards for cadmium in the unfiltered and in the filtered samples, and the Aquatic Life, Chronic, standards for mercury in the unfiltered sample and for copper in the filtered sample.

3.5.5 Structures

The remains of the 150-tpd mill and the footings for the structure remain on the west side of the gulch.

3.5.6 Safety

No significant safety hazards were noted at the site.
Figure 3.5-1. Topographic map of the Paragon/Black Horse mill tailings disposal site, Shoshone County, Idaho (U.S. Geological Survey Burke and Thompson Pass 7.5-minute topographic maps). Samples B7269604, B7269605, and B8149603 were collected at the millsite (see Sections 3.5.4.2.1 and 3.5.4.2.2 for descriptions of the locations. Sample B8159602 is a background water sample. Sites WL-112 and B8149604 are discussed in Volume IV of this report. The left side of this figure overlaps the right side of Figure 3.3-1.
Figure 3.5-2. Sketch map of the Paragon/Black Horse mills site.
Figure 3.5-3. Paragon/Black Horse millsite, with Prichard Creek in the foreground. The tailings are behind where the photographer stood to take this picture (Roll 779-968, frame #24).
Figure 3.5-4. Paragon Gulch jig tailings at the mouth of the gulch (Roll 566260, frame #10).
3.6 UPPER PARAGON MINE (Site No. WL-108)

3.6.1 Site Location and Access (Figure 2.1-1)

The upper Paragon Mine (Figure 3.6-1) is located about 1.5 mile up Paragon Gulch from the confluence of the gulch and Prichard Creek. A short road goes off the main Paragon Gulch road about 200 feet to the mine, which is on a north tributary of the gulch. The property is on the Thompson Pass 7.5-minute quadrangle (T. 49 N., R. 6 E., Sec. 7) and is on USFS property.

3.6.2 Geologic Features (Figure 2.2-1)

Hosterman (1956) described the geology of the upper Paragon mine as follows (p. 745):

The country rock includes both the upper and lower parts of the Prichard formation. The Prichard formation forms the eastern flank of Trout Creek anticline, strikes almost due north, and dips steeply to the east or is overturned to the west.

3.6.3 Site History

Mitchell (in preparation) gives a detailed history of the Black Horse and Paragon (lower Paragon or Chicago-London and upper Paragon) mines.

3.6.4 Environmental Condition

3.6.4.1 Site Features

This site was visited by Earl Bennett on July 26 and August 14, 1996. A video segment showing this property is on the Prichard-Eagle Creek videotape (Tape 1, index 01:03:08-01:09:19).

The upper and lower Paragon mines are two separate properties located in Paragon Gulch. The Black Horse Mine is located about halfway between the two Paragon properties. The lower Paragon (also called the Chicago-London Mine) is at the mouth of Paragon Gulch and the upper Paragon is about 1.5 miles to the north, up the gulch.

The Paragon Gulch road is washed out just below the Black Horse Mine. The upper Paragon Mine is about 200 feet up the road that follows the northern fork of the headwaters of the gulch. The surface features include a vertical shaft (Figure 3.6-2) and a large, double waste dump. The shaft was collared in the stream and was 300 feet deep in 1904 or 1906, according to Ransome and Calkins (1908). It was inaccessible in 1953 when visited by Hosterman (1956). The size of the dump and the fact that the top of the shaft is now about 90 feet above the stream and surrounded by dump material indicates that considerable work was done here after 1908. The top of the shaft, which is full of water, is covered with boards that have been partially removed. Air or water pipes go down the shaft. "Danger" is spray painted on the rocks behind the shaft (Figure 3.6-3).
The old waste dump is about 200 feet long and 90 feet wide. It lies along the east side of and impinges on the tributary (Figure 3.6-4). It is about 80 feet deep on the downstream and thickest end. The spring flood definitely removed part of the dump, and some side sloughing of dump material into the creek also occurred. The upper dump is about 100 feet long, 25 feet wide, and 15 deep, and sits on top of the old dump. Both dumps have 8-inch-in-diameter or larger trees growing on them. There are a few prospect pits above and just south of the shaft.

3.6.4.2 Sample Locations

3.6.4.2.1 Soil Samples

No soil or rock samples were taken from this site.

3.6.4.2.2 Water Samples

Sample B7269602 was collected just above the confluence of the tributary where the Upper Paragon workings are located and the main stream in Paragon Gulch.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature</th>
<th>pH</th>
<th>Flow (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7269602</td>
<td>Upper Paragon tributary</td>
<td></td>
<td></td>
<td>7.7</td>
<td>trickle</td>
</tr>
</tbody>
</table>

3.6.4.2.3 Analytical Results

All analyses (Table 2.5-2) are within EPA water standards guidelines.

3.6.5 Structures

There are no structures left at this site.

3.6.6 Safety

The shaft is dangerous.
Figure 3.6-1. Topographic map of the upper Paragon Mine, Shoshone County, Idaho (U.S. Geological Survey Thompson Pass 7.5-minute topographic map). Sample B7269602 was collected near the mine (see Section 3.6.4.2.2 for the description of the location. Sites WL-112 and B7269603 are discussed in Volume IV of this report.
Figure 3.6-2. Partially open, water-filled shaft at the Upper Paragon Mine (Roll 560564, frame #18).

Figure 3.6-3. Danger sign painted on the rocks above the shaft at the upper Paragon (Roll 560564, frame #19).
Figure 3.6-4. Upper Paragon Mine waste dump adjacent to a west tributary of Paragon Gulch, looking north (Roll 560564, frame #20).
3.7 BLACK HORSE MINE (Site No. WL-114)
Alternate names—Murray Hill Mine

3.7.1 Site Location and Access (Figure 2.1-1)

The Black Horse Mine (Figure 3.7-1) is located about halfway between the upper and lower workings of the Paragon Mine in Paragon Gulch and is right on the Paragon Gulch Road. It is on the Thompson Pass 7.5-minute quadrangle (T. 49 N., R. 6 E., Sec. 7) and appears to be on patented land. The gulch is washed out near an old, collapsed cabin about 200 feet south of the mine. There is another open adit (B7269606) right on the road and about halfway between the upper Paragon and Black Horse mines, which will be described separately.

3.7.2 Geologic Features (Figure 2.2-1)

Hosterman (1956) describes the geology of the mine as follows (p. 744-745):

The Black Horse (Murray Hill) mine exposes a mineralized shear zone that strikes N. 55° to 65° W. and dips 65° to 75° SW. The shear zone is exposed on the lower level for about 500 feet and on the upper level for 200 feet. The dip distance from the upper level to the lower level is about 625 feet. . . . The ore consists of sphalerite mainly and some galena in a gangue of quartz and carbonate minerals. . . . The enclosing rocks, of the lower part of the Prichard formation, strike N. 15° to 20° W. and dip steeply east, forming part of the east limb of the Trout Creek anticline.

3.7.3 Site History

Mitchell (in preparation) gives a detailed history of the Black Horse and Paragon (lower Paragon or Chicago-London and upper Paragon) mines.

3.7.4 Environmental Condition

3.7.4.1 Site Features

The mine was visited by Earl Bennett on July 26, 1996, and August 30, 1997, and Earl Bennett and John Kauffman on August 14, 1996. A videotaped segment of this mine is on the Prichard-Eagle Creek videotape (Tape 1, index 01:09:19-01:20:28).

As shown in Hosterman’s (1956) map of the workings (Figure 3.7-2), there are three adits at the Black Horse. The lower, or No. 1, adit is just off the gulch road, which also crosses the upper part of the dump. The No. 1 adit is open and has about 2-3 gpm flowing from it (Figure 3.7-3). There is considerable cold air coming out of the adit, indicating a connection to upper workings. A collapsed shack is just south of the adit (Figure 3.7-4).
The dump at this adit is about 275 feet long and 15 feet wide; it is 40 feet thick on the north end and 80 feet thick on the south end. The dump impinges on the creek in Paragon Gulch and suffered considerable erosion during the spring flood (Figure 3.7-5). It appears as if, at one time, the dump covered the entire gulch and the creek may have been flumed under this dump. If so, all of this dump material has been eroded down to the level of the creek bed by this spring's flood.

Just outside the adit to the south is an old building. At the south end of the dump is an old log ore bin and ore pass to the road (Figure 3.7-6). The road has been washed out from just below the ore pass down to an old, collapsed, tar paper-covered shack, which is about 200 feet to the south. From the shack, the road is good down to the Lower Paragon (Chicago-London) workings.

The No. 2 adit is 443 feet above and just east of the No. 1 adit (Figures 3.7-2 and 3.7-7). It is partially caved and dry, but like Adit No. 1, also emits cold air, indicating connections to other openings. The dump from this adit is on a very steep hillside (Figure 3.7-8). Bits of wood on the dump could be from an old ore pass. There was very little sulfide visible in the Prichard argillite that composes the dump, but a small pile of ore and quartz is by the adit. The access to the No. 2 adit is by a trail/road that connects to the main Paragon Gulch road about halfway between the No. 1 adit at the Black Horse and the Upper Paragon Mine.

One hundred and forty feet above and just south of the No. 2 adit is the No. 3 adit (Figures 3.7-2 and 3.7-9). This adit is dry and partially caved, but accessible, and has cold air coming from it. Again, the dump is on a very steep hillside (Figure 3.7-10).

3.7.4.2 Sample Locations

3.7.4.2.1 Soil Samples

A sample (B8309701) was collected from the Black Horse waste dump.

3.7.4.2.2 Water Samples

Sample B7269603 was collected from the outflow from the lower adit at the Black Horse Mine.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature</th>
<th>pH</th>
<th>Flow (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7269603</td>
<td>Black Horse main adit</td>
<td>100 μS/cm</td>
<td></td>
<td>7.1</td>
<td>3-5 gpm</td>
</tr>
</tbody>
</table>
3.7.4.2.3 Analytical Results

Water Samples

The filtered (Table 2.5-1) and unfiltered (Table 2.5-2) splits of sample B7269603 equal or exceed all cadmium standards, exceed both Aquatic Life standards for zinc, and may exceed the Aquatic Life, Chronic, standard for lead (depending on the exact hardness of the water). The filtered split exceeds the Secondary MCL and Aquatic Life, Chronic, standards for aluminum, and the unfiltered sample exceeds both Aquatic Life standards for copper.

Dump Sample

The waste dump sample B8309701 (Table 2.5-3) contains 140 ppm arsenic, 860 ppm lead, 86 ppm copper, and 6,500 ppm zinc, all in excess of established background (Tables 1.5-3 and 1.5-4) or environmental (Table 1.5-5) standards. For comparison, the average rock of the Prichard Formation contains 34 ppm lead, 22 ppm copper, 60 ppm zinc, and arsenic below detection level (Table 1.5-3; Gott and Cathrall, 1980). On the TCLP metal screen (Table 2.5-4), cadmium, chromium, and lead showed significant amounts of leaching.

3.7.5 Structures

A collapsed shack is just south of the No. 1 adit. An old log ore bin and ore pass to the road are at the south end of the dump. An old, collapsed, tar paper-covered shack is about 200 feet to the south.

3.7.6 Safety

The open adits are safety hazards.
Figure 3.7-1. Topographic map of the Black Horse Mine, Shoshone County, Idaho (U.S. Geological Survey Thompson Pass 7.5-minute topographic map). Samples B7269603 and B8309701 were collected at the mine (see Sections 3.7.4.2.1 and 3.7.4.2.2 for descriptions of the locations. Sites WL-112 and B7269603 are discussed in Volume IV of this report.
Figure 3.7-2. Geologic map of the underground workings of the Black Horse Mine (Plate 61 from Hatterman, 1956).
Figure 3.7-3. Water coming out of the main, or No. 1, adit at the Black Horse Mine (Roll 560564, frame #24).

Figure 3.7-4. Old rails and collapsed small shed (behind trees) just to the left of the main Black Horse adit (Roll 566260, frame #1).
Figure 3.7-5. Flood damage at the main Black Horse waste rock dump on Paragon Creek (Roll 566260, frame #4).

Figure 3.7-6. Ore chute on the south end of the main Black Horse waste rock dump (Roll 566260, frame #6).
Figure 3.7-7. No. 2 Black Horse adit, open and dry. Cold air is coming out of the adit, which is about 400 feet above the main adit (Roll 566260, frame #3).

Figure 3.7-8. Looking down from the No. 2 Black Horse dump (Roll 566260, frame #2).
Figure 3.7-9. The No. 3 adit of the Black Horse Mine (Roll 559693, frame #1).

Figure 3.7-10. Dump at Adit No. 3 of the Black Horse Mine (Roll 559693, frame #2).
3.8 LOWER PARAGON MINE (Site No. WL-120)
Alternate names—Chicago-London Mine

3.8.1 Site Location and Access (Figure 2.1-1)

The lower Paragon, or Chicago-London, Mine (Figure 3.8-1) is at the mouth of Paragon Gulch only a few hundred feet north of the Thompson Pass Road. The mine is easily reached by the road up Paragon Gulch, although a bridge along this road was washed out in the spring flood. The mine is on the border between the Burke and Thompson Pass 7.5-minute quadrangles (T. 49 N., R. 5 E., Sec. 13, and T. 59 N., R. 6 E., Sec. 18). It is on patented land.

3.8.2 Geologic Features (Figure 2.2-1)

Hosterman (1956) describes the geology of the mine as follows (p. 745):
The inaccessible lower Paragon mine, often called the Chicago-London mine, is near the junction of Paragon Gulch and Prichard Creek. According to Umpleby and Jones (1923, p. 103), the mine has about 1,500 feet of drifts exposing a mineralized shear-zone type of vein that strikes N. 77° W. and dips 70° S. The ore minerals are sphalerite, galena, and pyrrhotite in a gangue of quartz and carbonate minerals. The enclosing country rock is the lower part of the Prichard formation which has a northerly strike, an easterly dip, and is also part of the east limb of the Trout Creek anticline.

3.8.3 Site History

Mitchell (in preparation) gives a detailed history of the Black Horse and Paragon (lower Paragon or Chicago-London and upper Paragon) mines.

3.8.4 Environmental Condition

3.8.4.1 Site Features

The site was visited by Falma Moye on July 22, 1996, and Earl Bennett on July 26, 1996, August 14, 1996, and August 30, 1997. A videotape of this site is on the Prichard-Eagle Creek videotape (Tape 1, index 1:20:28-01:25:24). Figure 3.8-2 shows a sketch map of the site.

The lower Paragon Mine is near the mouth of Paragon Gulch about 200 feet north of the old mill site. A road to the main (No.1) adit joins the road that continues up the west side of Paragon Gulch. Workings include the caved and dry No. 1 adit and a smaller dump (No.2; Figure 3.8-3) uphill and north of the main tunnel. There is a little water seeping from the No. 1 adit but not enough to sample. The waste rock dump at the No. 1 adit is very large and completely overgrown. The No. 2 adit is open (Figure 3.8-4) and has several hundred feet of workings, based on the size of the dump (Figure 3.8-5). About halfway between the No. 1 adit and the junction
with the main Paragon Gulch road is a hole in the road. This hole is a stope or other mine working that has opened to the surface (Figure 3.8-6). A section of a cedar tree was the only thing plugging the hole in 1996. By the next year the hole engulfed the road and was completely open. This hole is extremely dangerous and could easily swallow a four-wheeler, a snowmobile, or an unsuspecting cross-country skier.

3.8.4.2 Sample Locations

3.8.4.2.1 Soil Samples
   No soil or rock samples were collected at this site.

3.8.4.2.2 Water Samples
   No water samples were taken at this site.

3.8.5 Structures
   No structures remain at this site.

3.8.6 Safety

The No. 2 adit is not safe. *The collapsed stope which opens in the roadway is extremely dangerous.*
Figure 3.8-1. Topographic map of the lower Paragon Mine, Shoshone County, Idaho (U.S. Geological Survey Burke and Thompson Pass 7.5-minute topographic maps). Sites WL-112, B7269603, B8149604, and B8159602 are discussed in Volume IV of this report.
Figure 3.8-2. Sketch map of the Chicago-London (lower Paragon) Mine, showing surface features.
Figure 3.8-3. Main waste dump at the lower Paragon (Chicago-London) Mine at the mouth of Paragon Gulch. The adit is caved and dry (Roll 566260, frame #9).

Figure 3.8-4. Upper adit at the lower Paragon (Chicago-London) Mine in Paragon Gulch (Roll 559693, frame #10).
Figure 3.8-5. Looking down the upper dump at the lower Paragon (Chicago-London) Mine in Paragon Gulch (Roll 559693, frame #12).

Figure 3.8-6. Hole on the road to the lower Paragon (Chicago-London) Mine in Paragon Gulch. This hole is a collapsed stope or other mine working that opens to the surface (E. Bennett, 1997, Roll #B11, frame #18)
3.9 SILVER STRIKE MINE (Site No. WL-137)
Alternate names—Cedar Creek Mine

3.9.1 Site Location and Access (Figure 2.1-1)

The Silver Strike Mine (Figure 3.9-1) is divided into two parts. Both sites are on the Burke 7.5-minute quadrangle topographic map. The main level, or lower, workings consist of an open adit, a large dump, and a millsite (WL-137). These workings are in Granite Gulch, about 1.3 miles from the confluence with Prichard Creek (T. 49 N, R. 5 E., SE ¼, Sec. 22). South of the main workings is the junction of Granite Gulch and a tributary, Cedar Creek. About ¼ mile up Cedar Creek on an old road are the middle and upper workings (Levels 2 and 3) of the mine (also called the Cedar Creek Mine) consisting of a caved adit and large dump right on the road (T. 49 N., R. 5 E., NE ¼, Sec. 27) and an open adit about 225 feet above the caved adit. The road up Granite Gulch is not maintained by the Forest Service but was passable by motorcycle or four-wheeler in 1996. However, it was completely closed by trees downed in the ice storm in the winter of 1996-97. Prichard Creek must be forded to get to the Granite Gulch road. The millsite at the main level is on Forest Service-administered land, but the mine workings are on patented land. A small area of mill tailings, located about ¼ mile north of the main mine workings on Granite Gulch, is on private land, according to recent USFS survey markers at the site.

3.9.2 Geologic Features (Figure 2.2-1)

Hosterman (1956) described the geology of the mine as follows (p. 746-747):
The Silver Strike mine is about 6 miles from Murray and about 2.5 miles up Granite Gulch, a tributary to Prichard Creek. Three main levels and one sublevel expose a vein which strikes N. 25° W. and dips 60° SW. The lower level has a crosscut 2,460 feet long to the vein and a drift that follows the vein for about 1,200 feet. The middle level, now inaccessible, is 175 feet above the lower level, has a crosscut about 1,000 feet long to the vein, and has a drift that follows the vein for about 1,000 feet. The upper level, partly accessible, is 225 feet above the middle level (400 feet above the lower level), has a 500-foot crosscut to the vein, and has a drift that follows along the vein for 600 feet. . . . The country rock in the mine is predominantly quartzite and argillite of the lower part of the Prichard formation, which here strikes northerly and dips 30° to 60° W. About 1,000 feet in from the portal of the lower level a strong fault, which is believed to be a continuation of the O’Neill Gulch fault, is marked by a sheared and brecciated zone 40 feet wide. In the northern faces of both the lower and middle levels, monzonite that has a normal intrusive contact against the Prichard formation is exposed. . . . The vein ranges from several inches to 1 foot in thickness, and is reported to have contained, in places, 4 to 8 inches of solid galena. The ore minerals are galena and some sphalerite in a gangue of quartz, carbonate minerals, and some pyrite.
3.9.3 Site History

According to the USGS/USBM annual reports, small shipments were made from the Black Horse, Cedar Creek (which would become the Silver Strike Mine in 1936), Granite, and Allie properties in 1911. Although no shipments were made in 1922, the Cedar Creek Mining Co. was said to have opened considerable silver-lead ore through a 3,000-foot crosscut. By 1928, most of the ore produced in the district was lead ore of milling grade from the Cedar Creek property. A new 100-ton flotation plant was constructed and operated two months, treating more than 2,000 tons of ore. The lead concentrates were hauled 12 miles to Prichard, a station on the branch line of the Oregon-Washington Railroad & Navigation Co. From there, the ore was shipped to Bradley for smelting. The property was opened by two inclined shafts aggregating 1,343 feet, three tunnels aggregating 4,050 feet, 3,280 feet of drifts, and 580 feet of crosscuts. Again in 1929, most of the ore in the district was lead ore of milling grade from the Cedar Creek property. The flotation mill operated intermittently for four months and treated 1,235 tons of lead ore, making 380 tons of lead concentrates. The concentrate, which contained 10,130 ounces of silver and 416,866 pounds of lead, was shipped to Bradley. The Cedar Creek Mining & Development Co. (Ltd.) worked the mine nine months, after which it was shut down on account of a fire that destroyed the compressor house. The following year the mill operated intermittently for two months and treated 756 tons of lead ore, making 151 tons of lead concentrates. This product contained 4,498 ounces of silver and 161,769 pounds of lead and was shipped to Bradley. Drifting for 480 feet in the No. 3 tunnel opened a new orebody at a depth of 520 feet. Work continued until 1933, when the mine closed and the mill was rented to the Golden Chest Mine for 2 months.

The company was reorganized in 1936 as the Silver Strike Mining Company with the same officers. In 1937, another fire destroyed the compressor and shop buildings, which were rebuilt. However, the property never operated again. There is no further mention of the company until 1952, when the mill equipment was sold. The company’s last report was filed with the Idaho Inspector of Mines in 1954, and the property has been idle ever since. Production from 1909 to 1930 was 5,421 tons of ore, 33.88 ounces of gold, 23,481 ounces of silver, 5,039 pounds of copper, and 910,713 pounds of lead.

3.9.4 Environmental Condition

3.9.4.1 Site Features

The Silver Strike (Cedar Creek) Mine was visited by Earl Bennett on July 18, 1996, and August 1, 1996, and by Earl Bennet and USFS personnel on September 22, 1997. The mine has two sets of workings, a lower adit, dump, and mill on the main stem of Granite Gulch and upper workings on a western tributary of Granite Gulch (Cedar Creek) just south of the lower workings (Figures 3.9-1 and 3.9-2). Both sets of workings were videotaped (Prichard-Eagle Creek videotape I, index 01:25:24-01:45:54).
The lower workings consist of an open adit (2,460 feet long according to Hosterman, 1956; Figures 3.9-2a and 3.9-3) with substantial water flowing from it, a large double-pile waste dump (Figure 3.9-4), and a fallen-down mill. A short access road goes from the main gulch road to the adit and waste dump. Some of the flotation tailings from this mill were found impinging on the creek about ¼ mile north of the mill on the east side of the road. The waste dump at the main adit is a double dump with a cone-shaped pile, which is separated by a gap from an elongate dump at the adit. The cone-shaped pile measures about 100 feet across at the base, 20 feet across at the top, and is at least 100 feet thick. The cone-shaped dump is about 75 feet from the stream in Granite Gulch and abuts the road up the gulch. On the south end of the adit dump, there is a strongly iron-stained zone crossing the dump from the top to the road. This is where part of the adit water is discharging after it flows down the access road. The floor of a small building is just north of the adit, another building (which could be the old power shack) is north of the building floor, and the footings for the fallen-down mill are just north of this shack (Figure 3.9-5). Recent survey markers installed by the USFS go between the power shack and the mill; these markers show that the mill is on USFS land but the mine, power shack, and dumps are on private ground. The portal at the adit is caved but is still accessible. Tracks lead from the adit to the dump and towards the mill. Only the footings, scrap wood, and metal remain of the mill. There is lots of junk laying around this site.

The spot of mill tailings (about 100 feet by 40 feet and 2-3 feet deep; Figure 3.9-6) is also on private ground, based on new USFS survey markers at the site. There is good vegetation growing on the tailings, but the tails are visible along the stream bank. It is quite possible that there are more mill tailings obscured by the dense vegetation growing along the creek. Any flooding of the creek would have redistributed these mill tailings down the drainage. About half way between the mill and the tailings site is an old wooden dam that was probably installed to provide hydropower for the mine and mill (Figure 3.9-7). There is a collapsed wooden building near the dam.

About ½ mile up a west tributary of Granite Gulch (Cedar Creek) are the middle and upper adits of the Silver Strike. (According to Hosterman, 1956, the middle adit was 1,000 feet long but was inaccessible when he visited the property). The middle adit (Figures 3.9-2b and 3.9-8) is dry and caved for at least 100 feet from the portal. This adit is on the west end of the dump. The dump measures roughly 200 feet long, 30-50 feet wide, and 40 feet thick. It is just north of the road and about 50 feet from the tributary creek (Figure 3.9-9). Survey markers near the dump are at T. 49, N. R. 5 E., Sec. 22. Part of this dump has been removed and probably was used for road metal. There are 4-inch-in-diameter trees growing on this dump (Figure 3.9-10). A few pieces of iron-stained bull quartz were noted in the dump material.

Unknown at the time of the visit, an upper adit about 225 feet above this collapsed adit was discovered during a helicopter survey. According to Hosterman (1956), this adit was 500 feet long. This adit is open and has a reddish colored dump (Figure 3.9-11).
3.9.4.2 Sample Locations

3.9.4.2.1 Soil Samples

Sample B8019604 was collected from the area of probable mill tailings in Granite Gulch about ¼ mile north of the Silver Strike mill. The sample was taken from private land, but the north end of the tailings pile appears to be on USFS land. Samples B9229701 and B9229702 are oxidized and unoxidized waste rock samples from the cone-shaped waste rock dump.

3.9.4.2.2 Water Samples

Sample B8019603 was collected from the main adit at the Silver Strike Mine. Sample B8019601 is from the tributary to Granite Gulch (Cedar Creek), where it crosses the road below the middle and upper workings. Sample B8019602 was taken from Granite Gulch Creek at the fork in the road that leads to the middle and upper Silver Strike workings (just above the confluence with Cedar Creek). Sample B8019605 was taken from near the mouth of Granite Gulch Creek, about 100 yards from Prichard Creek.

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<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature</th>
<th>pH</th>
<th>Flow (gpm)</th>
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<td>90 μs/cm</td>
<td></td>
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</tr>
<tr>
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<td>Granite Gulch Creek above Cedar Creek</td>
<td>30 μs/cm</td>
<td></td>
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<tr>
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<td>Adit water sample</td>
<td>220-240 μs/cm</td>
<td></td>
<td>6.9-7.0</td>
<td>5 gpm</td>
</tr>
<tr>
<td>B8019605</td>
<td>Near mouth of Granite Gulch Creek</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.9.4.2.3 Analytical Results

Sample B8019603 (Tables 2.5-1 and 2.5-2) the Aquatic Life, Chronic, standard for copper in the filtered sample. The rest of the analyses are below the Aquatic Life standards. Analyses for samples B8019601, B8019602, and B8019605 were below the Aquatic Life standards for all elements (Table 2.4-1).

The sample of flotation tails (B8019604; Table 2.5-3) contains the most arsenic of any of the tailings sampled in the study area (2,100 ppm) and exceeds expected soil (Table 1.5-4) and environmental standards (Table 1.5-5) for lead, cadmium, copper, and zinc. For comparison, the
average soil above the Prichard Formation contains 10 ppm arsenic, 54 ppm lead, 21 ppm copper, and 140 ppm zinc (Table 1.5-4; Gott and Cathrall, 1980). In the TCLP metals screen, there was no significant leaching from this sample.

Sample B9229701 (Table 2.5-3), the oxidized sample from the Silver Strike dump, contains 2,400 ppm arsenic, 8,100 ppm lead, 180 ppm copper, and 3,300 ppm zinc. Sample B9229702 (Table 2.5-3), the unoxidized sample, contains 110 ppm arsenic, 120 ppm lead, 45 ppm copper, and 140 ppm zinc. These values in the oxidized samples are all far in excess of established background (Tables 1.5-3 and 1.5-4) or environmental (Table 1.5-5) standards. For comparison, the average rock in the Prichard Formation contains 34 ppm lead, 22 ppm copper, 60 ppm zinc, and arsenic below the detection limit (Table 1.5-3; Gott and Cathrall, 1980).

3.9.5 Structures

The floor from a small building is just north of the adit. A building which could be the old power shack is north of the building floor. North of this shack are the footings for the fallen-down mill. Only the footings, scrap wood, and metal remain of the mill. There is lots of junk laying around this site.

3.9.6 Safety

No safety concerns were noted at this property.
Figure 3.9-1. Topographic map of the Silver Strike Mine, Shoshone County, Idaho (U.S. Geological Survey Burke 7.5-minute topographic map). Samples B8019603 and B8019604 were collected at the mine (see Sections 3.9.4.2.1 and 3.9.4.2.2 for descriptions of the locations). Sample B8019601 is a background water sample. Sites WL-149 and K8159607 are discussed in Volume IV of this report.
Figure 3.9-2a. Sketch map of the main workings at the Silver Strike Mine.

Figure 3.9-2b. Sketch map of the middle adit at the Silver Strike Mine.

Figure 3.9-2. Sketch maps of the Silver Strike Mine.
Figure 3.9-3. Open, wet adit (lower level) at the Silver Strike Mine in the main Granite Gulch (Roll 558550, frame #24).

Figure 3.9-4. Iron-stained zone on the south end of the Silver Strike dump where water from the wet adit has gone over the dump (Roll 560563, frame #3a).
Figure 3.9-5. Looking up at the old mill foundation at the Silver Strike Mine (Roll 560563, frame #5a).

Figure 3.9-6. USFS boundary markers at the small spot of mill tailings just north of the Silver Strike mill on Granite Gulch (Roll 560563, frame #7a).
Figure 3.9-7. Possible log dam in Granite Gulch, just north of the mine dump at the Silver Strike Mine. The dam could have been for power or, possibly, for tailings (Roll 560563, frame #6a).

Figure 3.9-8. Looking east at 100 feet of caved dry adit at the middle level of the Silver Strike Mine in Cedar Creek (Roll 558550, frame #21).
Figure 3.9-9. East end of the middle Silver Strike dump from the Cedar Creek road (Roll 558550, frame #23).

Figure 3.9-10. Middle adit of the Silver Strike Mine in Granite Gulch (adit up west tributary to the gulch). Looking N 20° E along the long dimension of the dump (Roll 558550, frame #20).
Figure 3.9-11. Upper adit of the Silver Strike Mine (E. Bennett, 1997, Roll #B15, frame #4).
3.10 BEAR TOP/OROFINO MILL TAILINGS (Site No. WL- 93)

3.10.1 Site Location and Access (Figure 2.1-1)

The collapsed ruins and jig tailings from the old Bear Top-Orofino mill (Figure 3.10-1) are located about three miles north of the Thompson Pass Road (USFS Road FH9) up Bear Gulch on USFS Road #938 (Thompson Pass 7.5-minute quadrangle; T. 49 N., R. 6 E., Sec. 6). The mill is on the main road just after a bridge, which was washed out by the spring flood, crosses Bear Gulch. The mill and tailings appear to be on U.S. Forest Service-administered land.

3.10.2 Geologic Features (Figure 2.2-1)

See the discussion of the Bear Top Mine (Section 3.11) for the general geology of this area.

3.10.3 Site History

In 1905, the Bear Top Mining Company, while developing its mine by tunnel, turned out a good product through its concentrator. In 1906, the company put in new concentrating machinery and a boiler plant. The capacity of the water-powered mill was increased to 60 tpd. The company was driving a long crosscut tunnel near the mill. Crude ore and a lead-silver concentrate was shipped to the smelter.

Like all of the mines in this area, access to the Bear Top was a real problem. In 1908, the IMIR noted that the Black Horse, Chicago-London, Paragon, Monarch, Bear Top, Granite, Allie, and Gold Back were some of the mines where the advent of the railroad was expected to encourage development. The following year, the Idaho Northern Railroad was completed to a terminal 6 miles east of Murray. This stimulated considerable development at many properties, and lead ore or concentrate was shipped from the Bear Top, Monarch, and Black Horse mines. The largest shipper was the Bear Top. The mill was overhauled and began operations in July.

By 1911, the Bear Top and Orofino mines were consolidated, and the (by now) 150-ton mill produced rich lead concentrates for a short time. Operations continued through 1913, when the mine was operated by the Henrietta Exploration Company.

In 1918 a washout on the Murray branch of the Oregon-Washington Railroad & Navigation Co. interrupted ore shipments, but some production came from the Monarch and Bear Top mines. There is little further information until 1924, when one lot of sulfide lead ore was shipped from the Bear Top Mine by the Northwestern Silver & Lead Corporation. The mine and surface plant were put in working order and an electric power line was constructed more than 3 miles to the 150-ton mill, which had been idle for several years. The next year, the Bear Top was worked by Northwestern, but the lease was relinquished in December.

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In 1928, the Bear Top was operated by a lessee, who shipped a car of sulfide lead ore to Bradley for smelting. The next year, no ore was shipped, but a little development work was done and the mill was rebuilt, increasing capacity to 200 tons a day. The following year, a car of sulfide lead ore was shipped. In 1931, the output of the Summit district consisted of 195 tons of ore, old tailings, etc., yielding metals valued at $7,017. Most of the material was first-class lead ore of smelting grade from the Bear Top Group, operated by lessees. Small shipments were made in 1934 and 1935, but then the property was idled until near the end of World War II.

3.10.4 Environmental Condition

3.10.4.1 Site Features

The Bear Top tailings site was visited by Earl Bennett on July 19, 1996, and was sampled on July 30, 1996. A video segment showing this site is on the Prichard-Eagle Creek videotape (Tape 1, index 01:00:54-01:50:40).

The road up Bear Gulch bridges Bear Gulch Creek and turns into the access road to the Orofino, Bear Top, and Lone mines up the hill. Just past this bridge at creek level are the stone footings and other remains of an old jig mill (Figure 3.10-2). 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 (Figure 3.10-3). The old mill is totally collapsed. The remaining jig tails form a dump about 200 feet long, 40 feet wide, and 5 feet thick. A sample of the tailings (B7309604) was collected for analysis. There is an old loading ramp about 100 feet south of the mill on the west side of the gulch road (Figure 3.10-4).

3.10.4.2 Sample Locations

3.10.4.2.1 Soil Samples

Sample B7309604 was collected from the jig tailings south of the bridge over Bear Gulch Creek and just below the millsite.

3.10.4.2.2 Water Samples

No water samples were collected from this site.

3.10.4.2.3 Analytical Results

These tailings (Sample B7309604; Table 2.5-3) contain 160 ppm arsenic, 250 ppm cadmium, 850 ppm copper, 40,000 ppm lead, and 53,000 ppm zinc. These values exceed the suggested backgrounds (Table 1.5-5) for arsenic, cadmium, and lead, and far exceed expected soil sample backgrounds (Table 1.5-4) for zinc and copper. For comparison, the average soil above the
(Table 1.5-4; Gott and Cathrall, 1980). In the TCLP metal screen (Table 2.5-4), arsenic, chromium, and lead showed significant leaching.

3.10.5 Structures
No structures are left at this site.

3.10.6 Safety
No safety hazards were noted at this site
Figure 3.10-1. Topographic map of the Bear Top/Orofino mill tailings site, Shoshone County, Idaho (U.S. Geological Survey Thompson Pass 7.5-minute topographic map). Sample B7309604 was collected from the millsite (see Section 3.10.4.2.1 for the description of the location). Sample B730965 is a background water sample. Site WL-92 is included with the Ione Mine (Section 3.13), and Site WL-112 is discussed in Volume IV of this report.
Figure 3.10-2. Bear Top-Orofino mill. The bridge crosses Bear Gulch Creek. Jig tailings cover part of this area, which was heavily eroded by flooding in the spring of 1996 (Roll 566260, frame #24).

Figure 3.10-3. Jig tailings just south of the Orofino mill in Bear Gulch. The bridge crosses Bear Gulch Creek. The mill is just to the left of this picture (Roll 566260, frame #23).
Figure 3.10-4. Loading ramp on Bear Gulch Creek about 200 feet south of the Orofino mill on the Bear Gulch road (Roll 566259, frame #1).
3.11 BEAR TOP MINE (Site No. WL-93)

3.11.1 Site Location and Access (Figure 2.1-1)

The Bear Top Mine (Figure 3.11-1) is located near the headwaters of Bear Gulch on a southern tributary to the gulch. The property is accessible from a four-wheel-drive road that connects to the main Bear Gulch Road. This access road was washed out where it crosses the tributary about 1/4 mile below the Bear Top. The mine is located on the Thompson Pass 7.5-minute quadrangle (T. 49 N., R. 6 E., Sec. 6), and the main level is at an elevation of about 4,200 feet. The mine appears to be on patented land.

3.11.2 Geologic Features (Figure 2.2-1)

Hosterman (1956) describes the geology of the Bear Top Mine as follows (p. 745-746):

The Bear Top, Ione, and Orofino mines are on the south slope above Bear Gulch, a tributary to Prichard Creek, about 7 miles east of Murray. The country rock at these mines is the lower part of the Prichard formation, which forms part of the east flank of the Trout Creek anticline and here strikes almost due north and dips steeply to the east. Although these mines are close together and are close to the mines in Paragon Gulch, each of them has opened up a different but almost parallel mineralized shear zone.

At the Bear Top mine three levels expose the vein, which strikes N. 45° to 65° W. and has dips ranging from 60° S. to vertical. The [lower] level consists of a 2,235-foot crosscut to the vein and 500 feet of drift along the vein. The middle level is 420 feet vertically above the lower level; it consists of a 450-foot crosscut to the vein and about 400 feet of drift along the vein. The upper level is 605 feet vertically above the lower level; it has a 40-foot crosscut to the vein and a drift about 50 feet in length along the vein. . . . The ore minerals are galena and some sphalerite and chalcopyrite in a gangue of quartz, pyrite, and carbonate minerals. The vein is reported to have had, in places, a seam of pure galena up to 10 inches thick.

3.11.3 Site History

In 1905, the Bear Top Mining Company, while developing its mine by tunnel, turned out a good product through its concentrator. In 1906, the company put in new concentrating machinery and a boiler plant. The capacity of the water-powered mill was increased to 60 tpd. The company was driving a long crosscut tunnel near the mill. Crude ore and a concentrate containing lead and silver was shipped to the smelter.

As with all of the mines in this area, access to the Bear Top was a real problem. In 1908, the IMIR noted that the Black Horse, Chicago-London, Paragon, Monarch, Bear Top, Granite, Allie,
and Gold Back were some of the mines where the arrival of the railroad was expected to encourage development. The following year, the Idaho Northern Railroad was completed to a terminal 6 miles east of Murray. This stimulated considerable development at many properties, and lead ore or concentrate was shipped from the Bear Top, Monarch, and Black Horse mines. The largest shipper was the Bear Top. The mill was overhauled and began operations in July.

By 1911, the Bear Top and Orofino mines were consolidated, and the (by now) 150-ton mill produced rich lead concentrates for a short time. Operations continued through 1913, when the mine was operated by the Henrietta Exploration Company.

In 1918, a washout on the Murray branch of the Oregon-Washington Railroad & Navigation Co. interrupted ore shipments, but some production came from the Monarch and Bear Top mines. There is little further information until 1924, when one lot of sulfide lead ore was shipped from the Bear Top Mine by the Northwestern Silver & Lead Corporation. The mine and surface plant were put in working order and an electric power line constructed more than 3 miles to the 150-ton mill, which had been idle for several years. The next year, the Bear Top was worked under lease by Northwestern Silver & Lead, but the lease was relinquished in December.

In 1928 the Bear Top was operated by a lessee, who shipped a car of sulfide lead ore to Bradley for smelting. The next year, no ore was shipped, but a little development was done and the mill was rebuilt, increasing its capacity to 200 tons a day. The next year, a car of sulfide lead ore was shipped. In 1931, the output of the Summit district consisted of 195 tons of ore, old tailings, etc., yielding metals valued at $7,017. Most of the material was first-class lead ore of smelting grade from the Bear Top Group, operated by lessees.

Small shipments were made in 1934 and 1935. After that, the property was idle until near the end of World War II.

There was little activity until 1961, when lessees mined and shipped lead-zinc ore from the Bear Top, the only active lode operation in the district. In 1963, Ray Simmons operated the mine under a lease from Merger Mines Corp. Approximately 25 tons of lead ore from the property yielded 78 ounces of silver, 10 tons of lead, and 1 ton of zinc. Simmons continued the lease the next year, shipping approximately 21 tons of ore to the Bunker Hill lead smelter. This material yielded 66 ounces of silver, 9 tons of lead, and 2 tons of zinc.

In 1969, Silver Crystal Mines, Inc., reported an ore strike at the Bear Top. The company developed ore from the No. 1 and No. 3 levels, completed repair work, and explored veins on the No. 3 level of the adjoining Silver Crystal Mine the following year.

All work ceased until 1977 when Silver Crystal resumed development work. The following year the company shipped ore to the Nabob concentrator near Pinehurst. Shipments continued in 1979 and 1980, with the mine operated under a 50/50 lease with the owner, Merger Mines Corporation. There has been no further activity reported to date.
3.11.4 Environmental Condition

3.11.4.1 Site Features

There are three levels of workings at the Bear Top mine numbered from #1 (main level) to #3 (uppermost level). The property was visited by Earl Bennett on July 19, 1996. Video segments showing this property are on the Prichard-Eagle Creek videotape (Tape 1, index 1:50:40 to the end of the tape, and Tape 2, index 00:01:15-00:06:15).

The No. 1, or lowest, level contains a very large dump and the main adit (Figures 3.11-2, 3.11-3, and 3.11-4). The road to the adit is built on the dump from where the mine road joins the main access road. There are some gas tanks and a fallen-down structure near the junction. A large sheet metal building (living quarters) is located about halfway from the junction to the adit as one goes east across the dump. Just east of the adit are two more yellow plywood buildings with tin roofs, one of which is a core shack (nearest the adit). The big dump is about 300 feet long and forms a crescent open to the north. The dry adit has a well timbered portal and a gate, but the gate is open. Heavy gauge rails emerge from the adit, and there is a pile of drill core by the portal. Sheets of tin and other junk litter the ground in front of the portal.

The No. 2 level is 420 feet above the No. 1 (Hosterman, 1956). A large ore chute ends at this level and extends up the hill at least another 100 feet to the No. 3 level (Figure 3.11-5). Just east of the ore chute is a large, dry, partially caved adit with no rails (Figure 3.11-6). There is standing water in the adit but none flowing out. There is some sulfide ore stockpiled near the bottom of the loading chute. The dump hugs the drainage, much like the dump on the No. 1 level, and is about 150 feet deep on the face.

The No. 3, or upper, level is 605 feet above the No. 1 level (Hosterman, 1956) and has three adits. From the junction with the main access road, the road crosses the dump to a fallen-down building that is just west of the main adit on this level (Figure 3.11-7). Rails from this dry adit go to the waste dump and to about 30 feet above the top of the ore chute to Level 2, described above (Figure 3.11-8). This adit is gated but open. The presence of drill steel and air hoses on this dump indicates relatively recent activity. The main adit was stope to the surface about 30 feet in from the portal. This forms a very dangerous, 20-foot-in-diameter hole on the hillside above the adit (Figure 3.11-9). Daylight further down this adit indicates that there is another hole to the surface, but in the interest of safety, this was not investigated further. There is some sulfide material on the dump in front of this adit.

About 50 feet above and just west of the No. 3 level main adit are another adit (Figure 3.11-10) and dump. The toe of this dump rests on the main No. 3 dump (Figure 3.11-11). This adit is dry and open, and is partially hidden behind a tree.

About 30 feet below the dump from the main adit on Level No. 3 is the top of the ore chute and another adit (Figures 3.11-12 and 3.11-13). This adit is open and has about 1 gpm flowing from
it; however, this may be surface water as it rained the previous night. There is an air pipe at the portal and a pile of new timbers.

3.11.4.2 Sample Locations

3.11.4.2.1 Soil Samples
No soil or rock samples were collected.

3.11.4.2.2 Water Samples
No water samples were collected.

3.11.5 Structures

There are some gas tanks and a fallen-down structure near the junction of the mine road with the main access road on the No. 1 level. A large sheet metal building (living quarters) is located about halfway from the junction to the adit as one goes east across the dump. Just east of the adit are two more yellow plywood buildings with tin roofs; the one nearest the adit is a core shack. A large ore chute extends at least 100 feet from the No. 2 level to the No. 3 level. There is a fallen-down building just west of the main adit on the No. 3 level.

3.11.6 Safety

The open adits pose a significant safety hazard. On the No. 3 level, the stopes that open to the surface are very dangerous.
Figure 3.11-1. Topographic map of the Bear Top Mine, Shoshone County, Idaho (U.S. Geological Survey Thompson Pass 7.5-minute topographic map). Sample B730965 is a background water sample. Site WL-92 is included with the Ione Mine (Section 3.13), and Site WL-112 is discussed in Volume IV of this report.
Figure 3.11-2. Main, or No. 1, level of the Bear Top Mine (Roll 216382, frame #14).

Figure 3.11-3. South end of the No. 1 level of the Bear Top Mine (Roll 216382, frame #2).
Figure 3.11-4a. No. 1 level of the Bear Top Mine. One of these buildings contains drill core. This level is the lowest on the hill of the three levels and is below the loading level shown in Figure 3.11-6. This series of pictures swings from north to south, starting from these buildings and ending with the main road (Roll 558551, frame #11).

Figure 3.11-4b. No. 1 level of the Bear Top Mine. This is the next picture south of Figure 3.11-4a (Roll 558551, frame #12).
Figure 3.11-4c. The Bear Top No. 1 level adit is visible on the right side of this photograph. This is the next picture south of Figure 3.11-4b (Roll 558551, frame #13).

Figure 3.11-4d. No. 1 level adit at the Bear Top Mine. This is the next picture south of Figure 3.11-4c (Roll 558551, frame #14).
Figure 3.11-4e. Tin-covered building at the No. 1 level of the Bear Top Mine. This is the next picture south of Figure 3.11-4d (Roll 558551, frame #15).

Figure 3.11-4f. Tin building, fuel tanks, and access road to No. 1 level of the Bear Top Mine. This is the next picture south of Figure 3.11-4e (Roll 558551, frame #16).
Figure 3.11-5. Looking up the ore chute from the No. 2 level at the Bear Top Mine (Roll 558551, frame #10).
Figure 3.11-6. No. 2 level and adit at the bottom of the chute at the Bear Top Mine (Roll 558551, frame #9).

Figure 3.11-7. Adit and shack from the front of the No. 3 level dump at the Bear Top Mine (Roll 560563, frame #21).
Figure 3.11-8. Looking down from the No. 3 level adit to the rails and dump at the No. 2 level adit of the Bear Top Mine. The ore chute from next adit down the hill is in center of the picture. The chute goes to the No. 2 level (Roll 558551, frame #2).
Figure 3.11-9. Stope to the surface from inside the adit on the No. 3 level of the Bear Top Mine (Roll 560563, frame #22).
Figure 3.11-10. Bear Top No. 1 level adit from the portal (Roll 558551, frame #3).

Figure 3.11-11. The lower part of the upper dump (No. 3 level), as seen from the lower adit (Roll 560563, frame #19).
Figure 3.11-12. Adit at the top of the ore chute. This adit is about 50 feet below the No. 3 level (Roll 558551, frame #6).
Figure 3.11-13. Looking towards the top of the ore chute from the portal of the No. 2 level adit shown in Figure 3.11-12 (Roll 558551, frame #7).
3.12 OROFINO MINE (Site No. WL-85)
Alternate names—Silver Crystal Mine

3.12.1 Site Location and Access (Figure 2.1-1)

The Orofino Mine (Figure 3.12-1) is located near the head of Bear Gulch on a north-flowing tributary to the gulch. The main road up Bear Gulch (USFS #938) provides access to the Orofino, Bear Top, and Ione mines. This road was washed out by the spring 1996 flood about ¼ mile downstream from the old Bear Top mill, which is at the level of Bear Gulch Creek. About ¼ mile past this washout is a poor access road that splits off the main road and leads to the lower workings of the Orofino Mine. The mine is on the Thompson Pass 7.5-minute quadrangle (T. 49 N., R. 6 E., Sec. 6) and is on patented land.

3.12.2 Geologic Features (Figure 2.2-1)

Hosterman (1956) describes the geology of the Orofino Mine as follows (p. 745-746):
The Bear Top, Ione, and Orofino mines are on the south slope above Bear Gulch, a tributary to Prichard Creek, about 7 miles east of Murray. The country rock at these mines is the lower part of the Prichard formation, which forms part of the east flank of the Trout Creek anticline and here strikes almost due north and dips steeply to the east. Although these mines are close together and are close to the mines in Paragon Gulch, each of them has opened up a different but almost parallel mineralized shear zone.

The Orofino mine is directly down slope from the Ione mine, and its two levels expose a vein that strikes from N. 60° W. to N. 80° E. and dips 50° to 60° S. The lower level consists of a 950-foot crosscut to the vein and about 400 feet of drift along the vein. The upper level is about 197 feet vertically above the lower level; it consists of a 300-foot crosscut to the vein and about 150 feet of drift along the vein. . . . The ore minerals are galena and sphalerite in a gangue of quartz and a carbonate mineral. Production figures for the Orofino mine are not available, but, considering the size of the stopes, this mine was probably the largest producer in Bear Gulch.

3.12.3 Site History

Highlights of the history of the Orofino Mine include the following: By 1911, the Orofino had been consolidated with the Bear Top Mine, and the 150-ton-per-day mill produced rich lead concentrates for a short time. Operations continued through 1913, when the mine was operated by the Henrietta Exploration Company.

In 1926, the Orofino was operated by Harry L. Day, and one car of rich lead ore was shipped to East Helena, Montana. In 1928, several cars of lead-zinc ore were shipped from the Orofino by
lessees and milled at a custom flotation plant. A few cars of first-class lead ore were shipped to East Helena for smelting. In 1929, one car of rich lead ore and several cars of lead-zinc milling ore were shipped. There was little further activity until the Dan Murphy Leasing Co. worked the mine in 1945 and shipped 315 tons of zinc-lead ore to the Hercules custom mill near Wallace. In 1947, a lessee produced 3,927 tons of zinc-lead ore and 27 tons of high grade lead ore. In 1952, about 500 tons of zinc-lead ore was shipped to the Golconda custom mill. The Smith & Murphy lease sent 336 tons of crude shipping ore to the Golconda mill in 1954. Lessees reclaimed dump ore at the Orofino the next year.

3.12.4 Environmental Condition

3.13.4.1 Site Features

The mine was visited by Earl Bennett on July 19, 1996, and water samples were taken from the adits on July 30, 1996. A video segment of this site is on the Prichard-Eagle Creek videotape (Tape 2, index 00:06:15-00:12:35).

The access road to the Orofino splits off the main road to the Bear Top and Ione mines and then crosses the Orofino dump (over 100 feet long and very steep) at the mine, which has a fallen-down wooden structure (ore bin) near the east end of the dump (Figure 3.12-2). Concrete footings for another building are just before the adit. The open adit has a fair flow of water (at least 5 gpm) that is collected in a sunken concrete cistern located in front of the portal (Figure 3.12-3). This water is very clear and cold and tasted great on a hot July afternoon. According to Hosterman (1956), the main adit is 950 feet long.

Just west of the main adit is a north-flowing tributary. Another dump and open adit (about 300 feet long, according to Hosterman, 1956) are about 200 feet up this tributary. I could not find any road access to this dump and climbed up to it in the tributary, which is very steep and slippery. This open adit is right in the creek and has about 1 gpm flowing from it (Figure 3.12-4). The dump is about 70 feet long and 100 feet deep on the slope where it extends down the drainage (Figure 3.12-5). An 8-inch-in-diameter galvanized pipe extends from the adit down the dump towards the lower workings.

3.12.4.2 Sample Locations

3.12.4.2.1 Soil Samples

No soil or rock samples were taken from this site.

3.12.4.2.2 Water Samples

Sample B7309602 was taken from the main (lower) adit at the Orofino Mine, and sample B7309603 was taken from the upper adit.

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3.12.4.2.3 Analytical Results

The unfiltered upper adit sample (B7309603; Table 2.5-2) exceeds the Primary MCL for lead. Both of the filtered (Table 2.5-1) and unfiltered (Table 2.5-2) samples for the upper (B7309603) and lower adits (B7309602) exceed the Aquatic Life standards (Acute and Chronic) for zinc and the Aquatic Life, Chronic, standard for lead. The unfiltered lower adit sample (Table 2.5-2) exceeds the Aquatic Life, Chronic, standard for cadmium.

3.12.5 Structures

The remains of a wooden ore bin are near the east end of the dump. Concrete footings for another building are near the adit. A sunken concrete cistern is located in front of the portal.

3.12.6 Safety

The open adits are a significant safety hazard.
Figure 3.12-1. Topographic map of the Orofino Mine, Shoshone County, Idaho (U.S. Geological Survey Thompson Pass 7.5-minute topographic map). Samples B7309602 and B7309603 were collected from the mine (see Section 3.10.4.2.2 for the description of the locations). Sample B730965 is a background water sample. Site WL-92 is included with the Ione Mine (Section 3.13), and Site WL-112 is discussed in Volume IV of this report.
Figure 3.12-2. Dump and old ore bin at the main level of the Orofino Mine (Roll 558551, frame #18).

Figure 3.12-3. Main level (the lower of two levels) of the Orofino Mine. The Orofino was largest producer in Bear Gulch and the lowest of the three mines at the head of the gulch. Concrete tanks in the right foreground contain water from the open adit (Roll 558551, frame #17).
Figure 3.12-4. The upper adit at the Orofino Mine in Bear Gulch. This adit is open, with cold air blowing from it. Only minor seepage is coming from this adit (Roll 566260, frame #20).

Figure 3.12-5. Looking at the main Orofino dump from the upper dump, which is right in the tributary (Roll 566260, frame #21).
3.13 IONE MINE (Site No. WL-100)
Alternate names—Pirate Chief Claims; site includes Silver Crystal Mine (WL-92)

3.13.1 Site Location and Access (Figure 2.1-1)

The Ione Mine (Figure 3.13-1) is located near the head of Bear Gulch on a north-flowing tributary to the gulch. The main road up Bear Gulch (USFS #938) provides access to the Orofino, Bear Top, and Ione mines. During the spring 1996 flood, this road was washed out about ¼ mile downstream from the old Bear Top mill, which is at the level of Bear Gulch Creek. About ½ mile past this washout is a poor access road that splits off the main road and leads to the Ione Mine. The mine is on the Thompson Pass 7.5-minute quadrangle (T. 49 N., R. 6 E., Sec. 7) and is on patented land.

3.13.2 Geologic Features (Figure 2.2-1)

Hosterman (1956) describes the geology of the Bear Top Mine as follows (p. 745-746):

The Bear Top, Ione, and Orofino mines are on the south slope above Bear Gulch, a tributary to Prichard Creek, about 7 miles east of Murray. The country rock at these mines is the lower part of the Prichard formation, which forms part of the east flank of the Trout Creek anticline and here strikes almost due north and dips steeply to the east. Although these mines are close together and are close to the mines in Paragon Gulch, each of them has opened up a different but almost parallel mineralized shear zone. . . .

At the Ione mine, two levels expose a mineralized shear zone striking N. 70° E. and dipping about 65° SE. The lower level has a 700-foot crosscut to the vein and about 50 feet of drift along the vein. The upper level is 147 feet vertically above the lower level, and its portal is in the gully to the west of the lower level portal. The upper level has a 250-foot crosscut to the vein and about 60 feet of drift along the vein. An inclined raise was driven on the vein from the lower level to the upper level. The mineralized shear zone is offset, the west side to the north, by a north-striking fault on the upper level, the displacement corresponds to apparent reverse faulting. The ore minerals are galena and a little sphalerite in a gangue of quartz and a carbonate mineral. The vein, as seen in the raise, ranges from about 3 to 10 inches in width.

3.13.3 Site History

In 1954, production was reported by Ione Mining Co. from the Ione Mine. The next activity was in 1969 and 1970, when Silver Crystal Mines, Inc., completed repair work and explored veins on the No. 3 level of the Silver Crystal Mine.
3.13.4 Environmental Condition

3.13.4.1 Site Features

This site was visited by Earl Bennett on July 19, 1996. A video segment showing this property is on the Prichard-Eagle Creek videotape (Tape 2, index 00:12:35-00:15:09).

The Ione is the third mine located up a north-flowing tributary of Bear Gulch. The access road is the same as used for the Orofino and Bear Top mines. The Ione is located above the Orofino. The access road continues beyond the Ione for about \( \frac{1}{4} \) mile, ending in a series of pits and possible diamond drill pads. Down from these pits about \( \frac{1}{4} \) mile is an improved adit at what was the Ione and is now called the Silver Crystal Mine. Hosterman (1956) noted that the Ione was developed by two tunnels, the lower being 700 feet long and the upper 147 feet. The portal described here is believed to be the lower Ione working. It is in good shape and is open, although there is some sloughing (Figure 3.13-2). A minor seep waters a good stand of grasses at the mouth of the adit. There is a small building on the west end of the dump. The dump goes downhill steeply and is about 80 feet long on a level with the adit and building. A yellow steel ore car is overturned on the rails leading from the adit. There is some drill steel on the dump and the workings appear to be relatively recent.

Not visited on the ground but visible by helicopter is a dry adit believed to be the upper tunnel (Figure 3.13-3). This adit is on a very steep slope and, as noted by Hosterman (1956), lies west and above the lower tunnel.

3.13.4.2 Sample Locations

3.13.4.2.1 Soil Samples
   No soil or rock samples were collected at these sites.

3.13.4.2.2 Water Samples
   No water samples were collected at these sites.

3.13.5 Structures

There is a small building on the west end of the dump at the lower adit.

3.13.6 Safety

The open adits are a safety hazard.
Figure 3.13-1. Topographic map of the Ione Mine, Shoshone County, Idaho (U.S. Geological Survey Thompson Pass 7.5-minute topographic map). Sample B730965 is a background water sample. Site WL-112 is discussed in Volume IV of this report.
Figure 3.13-2. Ione Mine in Bear Gulch. The photograph was taken from the road, looking at the lower open adit and shack (Roll 560563, frame #15a).

Figure 3.13-3. Upper open adit at the Ione Mine in Bear Gulch. This photograph was taken from a helicopter (E. Bennett, 1997, Roll #B15, frame #9).
3.14 CRYSTAL LEAD MINE (Site No. WL-4)
Alternate names—Lead Crystals Mining Company

3.14.1 Site Location and Access (Figure 2.1-1)

The Crystal Lead Mine (Figure 3.14-1) is located about ¾ mile above the confluence of Cottonwood Creek and the West Fork of Eagle Creek. An impassable, reclaimed road goes from the West Fork to mine site No. B7179601, where the road is again driveable. The mine is shown on Cottonwood Creek as an adit symbol (Murray 7.5-minute quadrangle; T. 50 N., R. 5 E., SW ¼, Sec. 3). The property is entirely on patented claims.

3.14.2 Geologic Features (Figure 2.2-1)

According to Hosterman (1956, p. 743):

The Crystal Lead mine consists of 5,000 feet of drifts and crosscuts on 4 main and 3 intermediate levels, and it has about 500 feet of raises and winzes. The vein is a mineralized shear zone striking about N. 35° W. and dipping 80° SW. . . . The ore minerals are galena and sphalerite; the gangue is mostly quartz, some carbonate minerals, and country rock. The ore minerals are extremely irregular in occurrence, which makes prospecting expensive and risky. The lithologic character of the enclosing Burke formation does not seem to have had any control on the placement of the ore; but, as in the Jack Waite mine, junctions of the main shear zone and secondary shears have been important in ore control. . . . These beds are on the steep-dipping west limb of the Trout Creek anticline.

3.14.3 Site History

The Crystal Lead Mine was owned by the Lead Crystals Mining Co. from about 1911 until 1931. In 1914, the mine had about 250 feet of total development. By 1922, there were three tunnels on the property and development totaled about 1,900 feet. Work continued at the mine throughout the 1920s, with total development reaching 2,400 feet by the end of the decade. In 1924, several lots of sulfide lead ore were shipped from the property. Two cars of sulfide lead ore were shipped to the Bunker Hill smelter in 1925, and two cars of crude lead ore were shipped from the mine the following year.

The mine was sold to the Crystal Lead Mining Co. in 1931. Only minor activity occurred at the property in the next decade. In 1941, a lessee hauled 300 tons of lead ore to the Silver Crescent custom mill near Osburn and shipped 20 tons of similar ore to a smelter. In 1943, lessees sent 456 tons of zinc-lead ore to the Hercules mill and sold 5 tons of high-grade crude lead-silver ore to the Bunker Hill smelter. The following year, Crystal Lead Mines Co. took 994 tons of lead ore to the Hercules custom mill. The Crystal Lead Lease operated the mine in 1945. The mine produced 4,288 tons of lead ore, which was sent to the Galena custom mill near Wallace, and 36 tons of high-grade lead ore, which was shipped to a smelter. Lessees worked the Crystal Lead for
part of 1947 and hauled 1,517 tons of lead ore to the Galena mill. The mine had four tunnels and a total of 5,809 feet of workings in 1947.

On October 1, 1947, Day Mines, Inc., was formed by the consolidation of the Crystal Lead Mines Co. and several other mining companies. Little work seems to have been done on the property after 1948.

3.14.4 Environmental Condition

3.14.4.1 Site Features

This property was visited by Earl Bennett on July 19, 1996, and the dump was sampled on August 8, 1997. A video segment showing this property is on the Prichard-Eagle Creek videotape (Tape 2, index 00:15:09-00:20:55).

The Crystal Lead was a major mine in this area and the largest producer in the drainage of the West Fork of Eagle Creek. Hostonman (1956) noted that the mine was developed by four levels, with No. 4 at the creek level having the most workings (Figure 3.14-2). This was the only level open at the time of his visit. Day Mines, Inc., owned the mine, but much of the work was done by lessees.

The mine has a long (about 300 feet) and skinny (about 40 feet wide) dump on the south side of Cottonwood Creek. The dump is about 15-20 feet deep and impinges on the creek. A caved adit (No.4) at this dump was the main access to the mine (Figure 3.14-3). The course of a seep from the adit is heavily vegetated, and the water disappears into the dump. There is a collapsed ore bin at the west end of this dump (Figure 3.14-4). Another collapsed structure (Figure 3.14-5) and a partially collapsed cabin (Figure 3.14-6) are about halfway between the adit and the ore bin. There was never a mill at this property. The ore was shipped to Day Mine's mill at Wallace.

About 300 feet above the lower adit is another adit (No.3) and dump, and 95 feet above this level is another adit (No. 2) that were not visited. A crude and almost impassible road connects the No.3 and No. 4 levels, but easier access is gained from logging roads above the upper adit.

3.14.4.2 Sample Locations

3.14.4.2.1 Soil Samples

Sample B8089701 was collected from the Crystal Lead dump.

3.14.4.2.2 Water Samples

No water samples were collected at this site.
3.14.4.2.3 Analytical Results

The waste dump sample (Table 2.5-3) contains 400 ppm lead, 53 ppm copper, 46 ppm zinc, and arsenic was below the detection level. Only the lead values are significantly in excess of established background (Tables 1.5-3 and 1.5-4) or environmental (Table 1.5-5) standards. For comparison, the average rock in the Prichard Formation contains 34 ppm lead, 22 ppm copper, 60 ppm zinc, and arsenic below the detection limit (Table 1.5-3; Gott and Cathrall, 1980). On the TCLP metal screen, no leaching was detected for any of the elements tested.

3.14.5 Structures

There is a collapsed ore bin at the west end of the dump. Another collapsed structure and a partially collapsed cabin are about halfway between the adit and the ore bin.

3.14.6 Safety

There are no significant safety hazards at this property.
Figure 3.14-1. Topographic map of the Crystal Lead Mine, Shoshone County, Idaho (U.S. Geological Survey Murray 7.5-minute topographic map). Sample B8089701 was collected at the mine (see Section 3.14.4.2.2 for the description of the location). Sample B8019612 is a background water sample. Site WL-2 is discussed in Volume IV of this report.
Figure 3.14-3. Caved adit #1 at the Crystal Lead Mine (Roll 558550, frame #13).

Figure 3.14-4. Crystal Lead Mine on Cottonwood Creek. This old ore bin is on the west end of the dump (Roll 566259, frame #22).
Figure 3.14-5. Old foundation for a collapsed building at the Crystal Lead Mine (Roll 558550, frame #16).

Figure 3.14-6. Collapsed cabin just west of the adit at the Crystal Lead Mine (Roll 558550, frame #17).
3.15 TERRIBLE EDITH (PONTIAC) MINE (Site No. WL-46)
    Alternate Names—Midland, Edith Murray, Johnson Property

3.15.1 Site Location and Access (Figure 2.1-1)

The Terrible Edith, or Pontiac, Mine (Figure 3.15-1) is located near the head of Wesp Gulch, 2½ miles by road from the mouth of the gulch, which is also the junction between the Wesp Gulch Road and the old Thompson Pass Road. The Wesp Gulch road follows a circuitous route up the ridge between Wesp and Cougar gulches and rises over 1,000 feet between the Thompson Pass Road and the lower tunnel of the Pontiac. The dump for this tunnel is on the Wesp Gulch road. The upper levels of the mine can be reached by a road that goes north from the Wesp Gulch Road from a junction about ¼ mile south of the lower tunnel. It is shown as a jeep road on the topographic map [Murray 7.5-minute quadrangle (T. 50 N., R. 5 E., Sec. 33)]. The mine appears to be on USFS land.

3.15.2 Geologic Features (Figure 2.2-1)

Shenon (1938) notes that (p. 42):
    At the Pontiac mine the ore lies along shear zones in dark gray banded argillite of the Prichard formation. . . . The ore minerals included abundant quartz with variable amounts of pyrite, galena, sphalerite, and chalcopyrite; only a little chalcopyrite is present. In some places, the ore does not contain much quartz, but is of wall-rock partly replaced by sulphides. The ore occurs as shoots in the shear zone that range from a few feet to more than 100 feet in length, and from a few inches to several feet in thickness. In places, the shoots are composed almost entirely of sulphides.

3.15.3 Site History

Shenon (1938, p. 41) notes the following early history:
    The Terrible group was located by James Woods and the Edith by Wash Snyder about 1886 [historical data by H. C. Stapleton]. These claims were consolidated as the Terrible Edith and were so known until 1925, when the property was acquired by the Chester Mining Company. The Chester Company was later reorganized as the Pontiac Mining Company. The total production is not known, but, according to estimates made by Mr. Stapleton, it is about $200,000.

From 1912 to 1916, ore was shipped from the Terrible Edith Mine, and both lead and zinc products were shipped to the smelters. By 1917, the best product of the district was high-grade lead and zinc ore from the Terrible Edith. The lead ore was steel galena, and some of it in carload lots assayed 63 percent lead. One small shipment of lead ore was made from the Terrible Edith in 1921. In 1926, one lot of crude lead ore and two cars of lead-zinc milling ore were shipped from the mine.
The Terrible Edith Mine was worked by the Pontiac Land & Mineral Co. in 1928, and one car of lead-zinc ore was shipped to a custom flotation mill as a test. The company did 200 feet of raising in 1928, and it is said that enough ore was opened to justify the construction of a 50-ton flotation mill. Pontiac Mining Co. shipped one car of lead ore from the Terrible Edith in 1929. In 1930, a lessee operated the property and shipped 115 tons of lead-zinc ore to the Hercules flotation mill in Wallace. A little lead-zinc ore was shipped from the mine to a custom milling plant in Utah in 1934.

In 1947, 495 tons of zinc-lead ore was produced from the Terrible Edith. Lessees worked the mine during the latter part of 1950; the zinc ore milled from the mine yielded 68 tons of concentrates containing 147 ounces of silver, 300 pounds of copper, 16,800 pounds of lead, and 63,500 pounds of zinc. D.A. Phillips produced ore from the mine in 1954.

3.15.4 Environmental Condition

3.15.4.1 Site Features

Shenon (1938) notes (p. 41):
The Pontiac is developed through three principal levels - Nos. 2, 3, and 4. Between levels 3 and 4 there are two intermediate levels 200 and 300 feet, respectively, above level 4. Level 3 is about 500 feet above level 4 and level 2 about 670 feet above level 4. . . . There are more than 2,000 feet of drifts and crosscuts on level 4, more than 800 feet on level 3, more than 400 feet on level 2, and more than 500 feet on each of the two intermediate levels. A two-compartment inclined raise connects level 4 with the intermediate levels (fig. 19 [Figure 3.15-2])."

The Terrible Edith, or Pontiac, Mine was visited by Falma Moye on July 20, 1996, and by Earl Bennett on August 23, 1996. A video segment of this mine is on the Prichard-Eagle Creek videotape (Tape 2, index 00:15:09-00:26:58).

The main adit (Level 4 of Shenon, 1938) of the property (Figure 3.15-3) is caved but has a significant flow of water. A large dump measures about 100 feet long in a north-south direction and 50 feet wide. The face extends about 200 feet from the adit level (Figure 3.15-4) to the Wesp Gulch road below the dump. The water from the adit flows across and down the face of the dump. There is evidence of considerable erosion of the nose of the dump, both above and below the road (Figure 3.15-5). An old ore bin rests on the west side of the dump (Figure 3.15-6). There is a lot of fine red rock that may contain metals by the ore bin.

Another level of the mine (probably Level 2 of Shenon, 1938) is reached by a poor road that branches from the main Wesp Gulch road about ¼ mile east of the main Terrible Edith workings. About 1 mile up this poor road is an open dry adit (Figure 3.15-7). The road crosses between this adit and its dump, and rails from the mine stick out into the road. Just above this adit is what
appears to be another dump, perhaps related to a pit; there is no sign of another adit. A search was made for Level 3, which is supposed to be 500 feet above the main level. An overgrown road was followed west from the Level 2 access road about halfway from the Wesp Gulch road to Level 2, but no other adits were found. The dump from this level should be evident and probably exists.

3.15.4.2 Sample Locations

3.15.4.2.1 Soil Samples
No soil or rock samples were taken from this site.

3.15.4.2.2 Water Samples

Sample B8239604 was taken from the main, collapsed adit at the Terrible Edith Mine.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature</th>
<th>pH</th>
<th>Flow (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8239604</td>
<td>Terrible Edith main adit</td>
<td>140 μS/cm</td>
<td>50º F</td>
<td>6.6</td>
<td>&gt;10 gpm</td>
</tr>
</tbody>
</table>

3.15.4.2.3 Analytical Results

For both filtered and unfiltered splits, the Terrible Edith main adit water sample (B8239604; Tables 2.5-1 and 2.5-2) exceeds both Aquatic Life standards for zinc and cadmium, and the Primary MCL for cadmium. In addition, the filtered samples exceed the Secondary MCL and Aquatic Life, Chronic, standards for aluminum.

3.15.5 Structures

There are no structures left at this site.

3.15.6 Safety

The open upper adit is a safety hazard.
Figure 3.15-1. Topographic map of the Terrible Edith Mine, Shoshone County, Idaho (U.S. Geological Survey Murray 7.5-minute topographic map). Sample B239604 was collected at the mine (see Section 3.15.4.2.2 for the description of the location). Site WL-51 is discussed in Volume IV of this report.
Figure 3.15-2. Map of the underground workings of the Terrible Edith (Pontiac) Mine (Figure 19 from Shenon, 1938).
Figure 3.15-3. Collapsed No. 4 adit with drainage at the Terrible Edith Mine (Roll 095-640, frame #17).

Figure 3.15-4. Looking south from the collapsed adit across the dump at the Terrible Edith Mine (Roll 561250, frame #13).
Figure 3.15-5. View from top of waste dump at the Terrible Edith Mine, showing severe erosion of the dump (Roll 095-640, frame #18).
Figure 3.15-6. Ore bin on the west side of the Terrible Edith dump (Roll 561250, frame #10).

Figure 3.15-7. Open and dry No. 2 adit at the Terrible Edith (Roll 561250, frame #14).
3.16 GIANT LEDGE MINE (Site No. WL-126)

3.16.1 Site Location and Access (Figure 2.1-1)

The Giant Ledge Mine (Figure 3.16-1) is located about one mile north of the Silver Strike Mine in Granite Gulch. The property is on the Burke 7.5-minute quadrangle (T. 49 N., R. 5 E., Sec. 22) and is believed to be totally on U.S. Forest Service-administered land.

3.16.2 Geologic Features (Figure 2.2-1)

Hosterman (1956) described the Giant Ledge as follows (p. 747):

The Giant Ledge prospect is 4.5 miles east of Murray, about 1 mile up Granite Gulch. A 400-foot shaft, which collars at creek level, has been sunk; from the bottom of the shaft, 2,250 feet of drifting has exposed a fault between the monzonite and the Prichard formation. This fault, the French Gulch fault, strikes about N. 30° W. and dips 85° NE. The average trend of the bedding is about N. 10° W. and the dip is 75° NE., but near the fault zone the bedding is irregular and highly folded. No mineralized rock other than very small (up to half an inch wide) stringers of quartz containing specks of galena were found. No stopes have been developed, and there apparently has been no production.

3.16.3 Site History

In 1919, development work at the Giant Ledge consisted of 800 feet of drifting. Development proceeded at the mine in 1921. Several hundred tons of copper-lead ore was milled at the new plant of the Giant Ledge Syndicate in 1926. However, the property was closed after a short run, a small lot of lead concentrates was shipped from the Giant Ledge in 1930, and 24 tons of lead ore was produced in 1947.

3.16.4 Environmental Condition

3.16.4.1 Site Features

This property was visited by Earl Bennett on July 18, 1996. A video segment of this property is on the Prichard-Eagle Creek videotape (Tape 2, index 00:26:58-00:33:00).

The Giant Ledge Mine is located about halfway between the Silver Strike Mine and the confluence of Granite Gulch Creek and Prichard Creek. There is a very large dump (irregular in shape and about 50 feet thick) that is located between the road on the east and Granite Gulch Creek on the west. This dump has been eroded by the creek (Figure 3.16-2). The shaft, caved and/or full of water is located on the north side of the dump (Figure 3.16-3). Track rails and the frame of an old automobile are in the shaft. There is no sign of mineralization on the dump, which is overgrown by substantial trees. Even more perplexing is the mill on the property (Figure 3.16-
4). There is no equipment in the mill, which has fallen down. Also, there is no road to the top of the mill, which makes one wonder how it would have operated, since all of these mills used gravity feed. A small pile of waste rock across the road from the mill is connected to the vicinity of the shaft by a roadway made from waste rock. This may have been the railbed to move hoped-for ore to the mill. A 14-inch-in-diameter pipe is exposed in the creek bed across from the mill. This could have been a tailings discharge pipe, with the tails going directly into the creek (Figure 3.16-5). These kinds of properties often resulted when stockholders were being "mined," since there was no ore on the property in which they were investing.

3.16.4.2 Sample Locations

3.16.4.2.1 Soil Samples

No soil or rock samples were collected at this site.

3.16.4.2.2 Water Samples

No water samples were collected at this site.

3.16.5 Structures

The remains of a very large mill are on the hillside on the east side of the gulch.

3.16.6 Safety

The shaft could be a safety problem, depending on the stability of the material plugging the opening.
Figure 3.16-1. Topographic map of the Giant Ledge Mine, Shoshone County, Idaho (U.S. Geological Survey Burke 7.5-minute topographic map). Sites WL-122, WL-127, WL-129, B8159602, and K8279601 are discussed in Volume IV of this report.
Figure 3.16-2. Giant Ledge Mine in Granite Gulch. View of the top of the dump, looking from the east to the west edge of the dump (Roll 560563, frame #8a).

Figure 3.16-3. Close-up of the Giant Ledge shaft (Roll 560563, frame #11a).
Figure 3.16-4. Mill foundations at the Giant Ledge Mine (Roll 560563, frame #12a).

Figure 3.16-5. Fourteen-inch pipe sticking into Granite Gulch Creek from just north of the Giant Ledge mill. This is a possible discharge pipe for mill tailings (Roll 560563, frame #14a).
3.17 SILVER SCOTT MINE (Site No. WL-71)
Alternate names—Lost Cabin Mine

3.17.1 Site Location and Access (Figure 2.1-1)

The Silver Scott Mine (Figure 3.17-1) is located on the Murray 7.5-minute quadrangle (extreme southeast corner of the quadrangle in T. 49 N., R. 5 E., Sec. 1). The mine is located on the northwest side of Bear Gulch. It is reached by a road that joins the Bear Gulch road (USFS #938) about 3.5 miles from the junction of #938 and the Thompson Pass Road. The mine road is rough but passable on a motorcycle or four-wheeler. The property is at an elevation of about 4,300 feet and, according to the forest map, is on USFS land.

3.17.2 Geologic Features (Figure 2.2-1)

The Silver Scott is in rocks of the Prichard Formation (Hosterman, 1956).

3.17.3 Site History

According to the IGS report for 1977, Silver Scott Mines entered an agreement with Silver Baron Mining Company for a 20-year lease on the Lost Cabin Mine. Silver Baron continued efforts on the Silver Scott property in 1978, and some ore was stockpiled. In 1983, Silver Scott planned to ship 1,200 tons of silver-bearing ore stockpiled at the Lost Cabin Mine. Silver Scott had been trying to interest a larger company in the property for several years.

3.17.4 Environmental Condition

3.17.4.1 Site Features

The Silver Scott Mine was visited by Earl Bennett on August 16, 1996. A video segment showing this property is on the Prichard-Eagle Creek videotape (Tape 2, index 00:33:00-00:40:15).

The mine lies on the north side of Bear Gulch, about 3.5 miles from the mouth of the gulch and the new Thompson Pass road. An access road from the main Bear Gulch road snakes up the hill to the mine workings at an elevation of about 4,300 feet. The disturbed area covers about 1 acre. The mine consists of two adits and a metal building with the words “Silver Scott” painted on the side (Figure 3.17-2). The lower main adit is dry and well timbered. It has a wooden gate, but the gate is open inside the portal (Figure 3.17-3). Heavy gauge rails lead from the portal about 50 feet to the dump face and a collapsed wooden ore bin or loading platform. The work is recent, with rock wire and bolts securing loose rock above the portal. The waste dump is large and fills in the drainage in this area, which is very steep. A small creek, which flows just east of the main adit, must have been a raging torrent in the spring, as the flood washed away a significant part of
the main waste dump. The galvanized tin building is about 50 feet east of the creek and main adit. The condition of the building and lower adit indicates recent work at this property.

About 100 feet above the lower adit and dump is another open but dry adit (Figures 3.17-3 and 3.17-4). The dump at this adit is iron-stained red and has a heavy sulphur smell (Figure 3.17-5). Like many “red dumps,” the adit at this one was probably driven on the vein and therefore has sulfides in the dump. A grab sample (B8169602) of the dump material was collected for analysis.

3.17.4.2 Sample Locations

3.17.4.2.1 Soil Samples

Sample B8169602 was collected from the dump at the upper adit.

3.17.4.2.2 Water Samples

Sample B7309601 was collected from the tributary stream that flows by the upper dump and the lower adit at the Silver Scott Mine.

<table>
<thead>
<tr>
<th>Sample No</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature</th>
<th>pH</th>
<th>Flow (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7309601</td>
<td>Tributary by the Silver Scott adit</td>
<td>10(?)</td>
<td></td>
<td>7.4</td>
<td></td>
</tr>
</tbody>
</table>

3.17.4.2.3 Analytical Results

The water sample (B7309601) collected from the tributary near the adit meets or is below suggested thresholds for all metals in the EPA Primary and Secondary MCL and Aquatic Life water standards.

The sample (B8169602) from the upper oxidized dump at the Silver Scott Mine exceeds background soil (Tables 1.5-3 and 1.5-4) and environmental values (Table 1.5-5); the sample contains significant amounts of cadmium (21 ppm), copper (86 ppm), lead (6,300 ppm), and zinc (2,700 ppm). For comparison, the average rock in the Prichard Formation contains 34 ppm lead, 22 ppm copper, 60 ppm zinc, and arsenic below the detection limit (Table 1.5-3; Gott and Cathrall, 1980). The average soil above the Prichard Formation contains 10 ppm arsenic, 54 ppm lead, 21 ppm copper, and 140 ppm zinc (Table 1.5-4; Gott and Cathrall, 1980).

3.17.5 Structures

A metal building with the words “Silver Scott” painted on the side is about 50 feet east of the creek and main adit.
3.17.5 Structures

A metal building with the words “Silver Scott” painted on the side is about 50 feet east of the creek and main adit.

3.17.6 Safety

The open adits are a safety hazard.
Figure 3.17-1. Topographic map of the Silver Scott Mine, Shoshone County, Idaho (U.S. Geological Survey Murray 7.5-minute topographic map). Samples B7309601 and B7309602 were collected at the mine (See Sections 3.17.4.2.1 and 3.17.4.2.2 for descriptions of the locations).
Figure 3.17-2. Main level of the Silver Scott Mine in Bear Gulch (Roll 216382, frame #12).

Figure 3.17-3. Main portal at the Silver Scott Mine (Roll 566260, frame #17).
Figure 3.17-4. Main level of the Silver Scott Mine, with the upper dump visible in the tributary above the buildings (Roll 216382, frame #10).

Figure 3.17-5. The upper adit at the Silver Scott Mine is behind the bushes in this photograph (Roll 566260, frame #12).
Figure 3.17-6. Looking down the upper, iron-stained dump at the Silver Scott Mine (Roll 566260, frame #13).
3.18 RAVEN MINE (Site No. WL-119)
Alternate names—Midnight Group

3.18.1 Site Location and Access (Figure 2.1-1)

What is believed to be the Raven Mine is located on the south bank of Prichard Creek about ½ mile west of Bear Gulch (Figure 3.18-1). It is due south of the word “tailings” on Prichard Creek, as shown on the Burke 7.5-minute quadrangle (T. 49 N., R. 5 E., Sec. 10). The Raven adit is on USFS-administered land, but the waste dump is probably on private land. The dump has several iron-stained, red-colored zones and is visible from the Thompson Pass road (FH9).

3.18.2 Geologic Features (Figure 2.2-1)

This property is in rocks of the Prichard Formation (Hosterman, 1956).

3.18.3 Site History

The property was owned by the Raven Mining Co., Ltd., from about 1907 to 1936. In 1908, there were three tunnels and several hundred feet of workings at the mine. Small amounts of development work were done most years from 1926 to 1931. By 1935, the mine had three tunnels, a 12-foot shaft, and about 1,440 feet of workings.

3.18.4 Environmental Condition

3.18.4.1 Site Features

A property believed to be the Raven Mine was visited by Earl Bennett on August 27, 1996. A video segment showing this property is on the Prichard-Eagle Creek videotape (Tape 2, index 00:40:15-00:45:44).

The caved, dry adit (Figure 3.18-2) and dump are on the south bank of Prichard Creek about ½ mile west of Bear Gulch. The dump is about 100 feet long, 30 feet wide, and about 5 feet deep. The iron-stained, red-colored zones in the dump are clearly visible from the Thompson Pass highway along Prichard Creek (Figure 3.18-3). The top of the dump is overgrown in places with 10-inch-in-diameter trees (Figure 3.18-4). A composite sample (B8279601) was collected from the face of this dump, which has eroded into Prichard Creek. According to USFS survey markers at the site, the caved adit is on Forest Service land but the dump is not.

3.18.4.2 Sample Locations

3.18.4.2.1 Soil Samples

A composite sample (B8279601) was collected from the red oxidized zone on the face of the dump, which impinges on Prichard Creek.
3.18.4.2.2 Water Samples
No water samples were collected at this site.

3.18.4.2.3 Analytical Results
Sample B8279601, collected in the Raven dump (Table 2.5-3), exceeds suggested background standards (Table 1.5-5) for arsenic, cadmium, and lead. The sample contains about twice the value of background soil samples for copper and contains about the expected background for zinc (Tables 1.5-3 and 1.5-4). On the TCLP metal screen (Table 2.5-4), none of the elements analyzed showed any significant leaching.

3.18.5 Structures
There are no structures left at this site.

3.18.6 Safety
No safety concerns were noted at this site.
Figure 3.18-1. Topographic map of the Raven Mine, Shoshone County, Idaho (U.S. Geological Survey Burke 7.5-minute topographic map). Sample B8279601 was collected at the mine (See Section 3.18.4.2.1 for the description of the location). Samples B8019605 and B8019606 are background water samples. Sites WL-111, WL-122, and K8279601 are discussed in Volume IV of this report.
Figure 3.18-2. Caved adit at the Raven Group on Prichard Creek (Roll 214578, frame #1).

Figure 3.18-3. Dump from the adit at the Raven Group (Roll 214578, frame #2).
Figure 3.18-4. View of the Raven dump from the new Thompson Pass Road (Roll 214578, frame #3).
3.19 WASHINGTON MINING COMPANY (Site No. WL-180)
Alternate names—Admiral Consolidated

3.19.1 Site Location and Access (Figure 2.1-1)

Mine workings believed to belong to the Washington Mining Company are located in the headwaters of Granite Gulch (Figure 3.19-1). There is a series of five adits and associated dumps extending down from the ridge top at an elevation of nearly 6,000 feet to about 4,800 feet. Access is from Burke Canyon via the French Gulch or Humboldt Gulch roads (3.3 miles from Canyon Creek to the divide). The mines are on the Burke 7.5-minute quadrangle in T. 49 N., R. 5 E., Sec. 34. The upper adits may be on private patented land, but the lower workings are on U.S. Forest Service lands.

3.19.2 Geologic Features (Figure 2.2-1)

The adits are all near the contact between the Burke and Prichard formations and are close to the French Gulch fault (Hosterman, 1956).

3.19.3 Site History

There is little known about the mining history of the series of adits at the headwaters of Granite Gulch.

3.19.4 Environmental Condition

3.19.4.1 Site Features

The property was visited by Earl Bennett on July 31, 1996. This property was not videotaped, but it is indexed on the Prichard-Eagle Creek videotape (Tape 2, index 00:45:44).

Starting from the ridge top and heading to the north and down Granite Gulch, the road goes past five adits and a cabin (numbered from the top—No. 1—down the hill to No. 5). A divide is just north of the junction between the #137 road and the Granite Gulch road. There is a dry pit beside the #137 road about 200 feet to the east of the divide between French Gulch and Granite Gulch.

Adit No. 1 is on the Granite Gulch road a couple of hundred feet north of the junction of USFS #137 road and the Granite Gulch road. The adit is open and dry and has rails in it (Figure 3.19-2). The Granite Gulch road crosses the dump from this adit, and the dump face is very steep.

Down the hill approximately ¼ mile is Adit No. 2 (Figure 3.19-3). This open and dry adit is about 300 feet to the east of an old cabin that is right on the Granite Gulch road (Figure 3.19-4). The dump at this adit is sizeable, measuring about 75 feet thick on the dump face. This adit is about 100 feet uphill from the drill hole (DH) shown on the Burke 7.5-minute quadrangle.
Continuing down the Granite Gulch road, Adit No. 3 (Figure 3.19-5) is about 100 yards below Adit No. 2. Adit No. 3 looks caved on casual inspection but is open for about 18 inches at the back of the adit. It has cold air coming out of it, so it is probably connected to other workings. The dump is about 75 feet long from the adit to the face and about 80 feet high on the face slope (Figure 3.19-6). A few pieces of scrap steel pipe were noted.

Further down the road is Adit No. 4, which is open, partially covered by a piece of tin, and has the number 11 painted in red on the portal (Figure 3.19-7). The road curves to the right just above this adit, then switches back abruptly and crosses the dump in front of the adit.

Down the road about another 100 yards is Adit No. 5 (Figure 3.19-8), which is open and has about 2 gpm flowing from it. There are rails laying across the portal, which is made of logs and is collapsed. The portal area is open behind a plywood bulkhead. The water flows down the road and disappears into the road gravel.

3.19.4.2 Sample Locations

3.19.4.2.1 Soil Samples
No soil or rock samples were taken from this site.

3.19.4.2.2 Water Samples

A water sample (B7319604) was collected from Adit No. 5.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature</th>
<th>pH</th>
<th>Flow (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7319604</td>
<td>Adit No. 5</td>
<td>60 μS/cm</td>
<td></td>
<td>6.8</td>
<td>2 gpm</td>
</tr>
</tbody>
</table>

3.19.4.2.3 Analytical Results

Analyses from Sample B7319604 from Washington Mining Company Adit No. 5 meet or are below suggested thresholds for all metals in the EPA Primary and Secondary MCL and Aquatic Life water standards, except for copper. This metal exceeds the Aquatic Life, Chronic, standard in the filtered sample.

3.19.5 Structures

An old cabin is on the Granite Gulch road near Adit No. 2.

3.19.6 Safety

The open adits are a safety hazard.
Figure 3.19-1. Topographic map of the Washington Mining Co. property, Shoshone County, Idaho (U.S. Geological Survey Burke 7.5-minute topographic map). Sample B7319604 was collected at the mine. Sites WL-171, WL-189, and WL-192 are discussed in Volume IV of this report.
Figure 3.19-2. Adit No. 1 at the Washington Mining Company property. This is the adit closest to the top of the ridge (Roll 566259, frame #11).

Figure 3.19-3. Adit No. 2 by the old cabin on the Washington Mining Company property. The adit is open and dry. It is about 100 feet above the DH (drill hole) shown on the topographic map (Roll 566259, frame #2).
Figure 3.19-4. Old cabin at the Washington Mining Company property. The road to the far left (in the middle distance through the trees) goes to the ridge; the road in the center left (foreground) goes to the adit in Figure 3.19-3 (Roll 566259, frame #3).

Figure 3.19-5. Mostly buried, open Adit No. 3 and dump at the Washington Mining Company property. The adit is dry and has cold air coming from the opening (Roll 566259, frame #5).
Figure 3.19-6. Waste dump of Adit No. 3 at the Washington Mining Company (Roll 566259, frame #10).

Figure 3.19-7. Open adit No. 4 at the Washington Mining Company. Water is flowing from the adit (Roll 566259, frame #6).
Figure 3.19-8. Adit No. 5 at the Washington Mining Company property. Note the water in the foreground (Roll 566259, frame #8).
3.20 GOLD BACK MINE (Site No. WL-64)

3.20.1 Site Location and Access (Figure 2.1-1)

The Gold Back claims (Figure 3.20-1) are located at the mouth of Gold Run Gulch, immediately east of Murray. Two adit symbols for the mine are shown on the Burke 7.5-minute quadrangle in T. 49 N., R. 5 E., Sec. 5, but the property is very close to the boundary between the Burke and Murray quadrangles. The mine is on land administered by the federal Bureau of Land Management.

3.20.2 Geologic Features (Figure 2.2-1)

Shenon (1938) reported the following information on the Gold Back (p. 43):
The lode explored at the Gold Back and Gray Eagle is one of the most extensively mineralized shear zones in the Murray district and is known as the Gold Back lode. It appears to lie along the Murray Peak fault. The lode crops out in Oregon Gulch, in Gold Run and Cougar gulches, at the Mother Lode mine, and in Ophir Gulch. Because of dense timber and deep soil, it cannot be followed continuously, but it can be traced much of the distance from Ophir Gulch to Alder Gulch by outcrops, underground exposures, and surface pits. Between Alder Gulch and the ridge south of Oregon Gulch, it is entirely masked by timber and soil. The strike of the Gold Back lode ranges from nearly northwest near Ophir Gulch to nearly north in Oregon Gulch. The dip is nearly everywhere almost vertical.

For the most part, the Gold Back lode lies in the Prichard formation that was intensely silicified and replaced by variable amounts of sulphide minerals. In places, the shear zone is several hundred feet wide, but the silicified areas are generally less than 100 feet wide, and the intensely silicified part is less than 25 feet. . .

The ore minerals include pyrrhotite, pyrite, sphalerite, galena, chalcopyrite, and arsenopyrite. The gangue is principally quartz and altered wall-rock, but ankerite and sericite are nearly everywhere present and in some places in appreciable amounts. Chlorite is common.

Shenon (1938, p. 43) described the workings as follows:
The principal opening on the Gold Back claims is a crosscut 400 feet long, which starts on the north side of Prichard Creek just below the county road [see Figure 3.20-3]. From the crosscut, drifts have been driven 400 feet northwest and 25 feet southeast along the Gold Back lode. Shorter tunnels have been driven on the lode in Cougar Gulch, but only one is now accessible.
3.20.3 Site History

In 1908, the USGS noted that the Gold Back was one of the mines which was expected to be developed by the advent of the railroad. Shenon (1938, p. 43) stated: "The Gold Back group, consisting of four claims, is owned by John Murphy, M. B. Lafon, and B. Breckbrul. The Grey Eagle was recorded in 1924 by Walter Hansen and C. J., Walter A., Arthur, and Fred C. Johnson."

In 1977, development work continued at the Gold Back claims. In 1984, Goldback Mines Corporation mined gold ore from the property. The ore was milled at the Rex flotation plant near the summit of Dobson Pass. Nesco Resources, Inc., acquired a 30 percent interest in Goldback in February.

3.20.5 Environmental Condition

3.20.5.1 Site Features

The Gold Back Mine was visited by Falma Moye on July 18, 1996, and by Earl Bennett on August 23, 1996. A video segment showing this property is on the Prichard-Eagle Creek videotape (Tape 2, index 00:46:00-00:51:53).

The mine is located at the mouth of Cougar Gulch. A large, breached dump is visible from the old Murray-Thompson Pass road, and the road goes over the extension of this dump (Figure 3.20-2). About 150 feet east of and below the dump, and just below the old road, is the adit described by Shenon (1938). This adit (Figure 3.20-3) is open and has a seep of water coming from it. The seep quickly disappears into what is left of the dump, which is in the flood plain of Prichard Creek.

Just north of the main dump are two adits on the east and west sides of Cougar Gulch. The adit on the east side of the gulch (Figure 3.20-4) is open, dry, and has a large piece of flattened galvanized pipe lying beside it. The open and dry adit on the west side of the gulch was covered by boards (Figure 3.20-5), but these have been ripped off. The dump, which crosses the gulch, is a mess, with lots of torn-up track rail and PVC pipe scattered about in addition to the general erosion caused by the spring flood (Figure 3.20-6). A significant amount of waste rock was washed to the south, out onto the flood plain of Prichard Creek.

3.20.5.2 Sample Locations

3.20.4.2.1 Soil Samples

No soil or rock samples were collected from this site.

3.20.4.2.2 Water Samples

No water samples were collected from this site.
3.20.6 Structures
There are no structures remaining at this site.

3.20.7 Safety
The open adits are a safety hazard.
Figure 3.20-1. Topographic map of the Gold Back Mine, Shoshone County, Idaho (U.S. Geological Survey Burke and Murray 7.5-minute topographic maps). Sites WL-70, WL-77, WL-90, and WL-111 are discussed in Volume IV of this report.
Figure 3.20-2. Waste rock and erosion channel (on the left) at the Gold Back Mine (Roll 095-640, frame #3).

Figure 3.20-3. Lowermost adit and wetland at the Gold Back Mine in Cougar Gulch (Roll 214578, frame #15).
Figure 3.20-4. Adit on the east side of Cougar Gulch at the Gold Back Mine (Roll 095-640, frame #6).

Figure 3.20-5. Open adit covered by boards on the west side of Cougar Gulch at the Gold Back Mine (Roll 561250, frame #6).
Figure 3.20-6. View from the top of the waste dump (Figure 3.20-2), showing the extent of erosion which occurred in 1996 (Roll 095-640, frame #2).
3.21 CONSOLIDATED SILVER-LEAD MINES (Site No. WL-21)

3.21.1 Site Location and Access (Figure 2.1-1)

The Consolidated Silver-Lead Mine (Figure 3.21-1) is located on the Black Peak 7.5-minute quadrangle (T. 50 N., R 6 E., Sec. 19). USFS Road #152, which goes up the East Fork of Eagle Creek, turns at Tributary Creek and heads for the Jack Waite Mine. At the old townsite of Duthie, a tributary branches off of Tributary Creek to the northeast. A road that follows this tributary from Duthie goes to the mine. The mine is on USFS land at an elevation of approximately 4,300 feet.

3.21.2 Geologic Features (Figure 2.2-1)

The country rock in the area around the mine is the Prichard Formation (Hosterman, 1956).

3.21.3 Site History

Hosterman (1956) notes that the Consolidated Silver-Lead Mine is an example in his study of an unproductive property. He described it as follows (p. 748):

At the Consolidated Silver-Lead mine a drift, about 1,400 feet in from the portal of the lower level, has been driven along a mineralized shear zone for about 1,100 feet. The vein is about 1,200 feet northeast of, and parallel to, the Jack Waite vein. It is almost vertical (much steeper than the Jack Waite vein) and is composed of 3 to 5 feet of quartz, a carbonate mineral, and some pyrite and specks of galena. The upper level intersects the vein, and a 200-foot raise connects the lower level with the upper level.

Twenty-one claims were purchased from Charles Statler in 1946. The purchasers incorporated as Consolidated Silver-Lead Mines, Inc. This company held the property into the early 1970s, but apparently did only development work on the property (IGS mineral property files).

3.21.4 Environmental Condition

3.21.4.1 Site Features

The site was visited by Falma Moye on July 7, 1996. Although not videotaped, this property is indexed at 00:51:53 on Tape 2 of the Prichard-Eagle Creek videotape.

The mine consists of a single, overgrown, open adit and part of an old building (Figure 3.21-2). The adit has a small seep.
3.21.4.2 Sample Locations

3.21.4.2.1 Soil Samples
No soil or rock samples were taken from this site.

3.21.4.2.2 Water Samples
Water sample F7239604 was taken from the adit. Sample F7239605 was taken upstream from the adit, and sample F7239606 was taken downstream from the adit.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature</th>
<th>pH</th>
<th>Flow (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F7239604</td>
<td>Adit sample</td>
<td>120 ( \mu \text{s/cm} )</td>
<td></td>
<td></td>
<td>&lt;1 gpm</td>
</tr>
<tr>
<td>F7239605</td>
<td>Upstream sample</td>
<td>30 ( \mu \text{s/cm} )</td>
<td></td>
<td>15</td>
<td>gpm</td>
</tr>
<tr>
<td>F7239606</td>
<td>Downstream sample</td>
<td>20 ( \mu \text{s/cm} )</td>
<td></td>
<td></td>
<td>15 gpm</td>
</tr>
</tbody>
</table>

3.21.4.3.3 Analytical Results
In water sample F7239604 from the adit of the Consolidated Silver-Lead Mine, the unfiltered sample exceeds the Aquatic Life, Chronic, standards for mercury, cadmium, and lead, and both Aquatic standards for zinc. The filtered sample exceeds the Aquatic Life, Chronic, standard for copper; may exceed the Aquatic Life, Acute, standard for copper, depending on the hardness of the water; and is above the Secondary MCL and Aquatic Life, Chronic, standards for aluminum. The upstream and downstream water samples meet or are below suggested thresholds in the EPA Primary and Secondary MCL and Aquatic Life water standards.

3.21.5 Structures
Part of an old building is at the site.

3.21.6 Safety
The adit is a safety hazard.
Figure 3.21-1. Topographic map of the Consolidated Silver-Lead Mine, Shoshone County, Idaho (U.S. Geological Survey Black Peak 7.5-minute topographic map). Samples F7239604, F7239605, and F7239606 were collected from the mine area (see Section 3.21.4.2.2 for descriptions of the locations). Site WL-16 is discussed in Volume IV of this report.
Figure 3.21-2. Open, wet adit and part of an old mine building completely covered by vegetation at the Consolidated Silver-Lead Mine above the old townsite of Duthie (Roll 559695, frame #15).
3.22 SUNRISE MINE (Site No. WL-164)

3.22.1 Site Location and Access (Figure 2.1-1)

The Sunrise Mine (Figure 3.22-1) is located on the Burke 7.5-minute quadrangle (T. 49 N., R. 5 E., Sec. 28). It is in the West Fork of Granite Gulch (which is not named on the topographic map) on patented land.

3.22.2 Geologic Features (Figure 2.2-1)

The Sunrise Mine is in granitic rocks near the contact between the Burke and Prichard formations (Hosterman, 1956; Hobbs and others, 1965).

3.22.3 Site History

The Sunrise Mine was discovered in 1897. The Sunrise Mining Company, Ltd., was formed in 1907, and the Sunrise Mines Company took over the property in 1928. The mine had three tunnels, with total workings variously reported at lengths of 2,500 to 3,000 feet. Little, if any, work has been done on the property since World War II (IGS mineral property files).

3.22.4 Environmental Condition

3.22.4.1 Site Features

This site (Figure 3.22-1) was visited by John Kauffman on August 15, 1996. The property was not videotaped but is indexed on the Prichard-Eagle Creek videotape (Tape 2, index 00:52:25).

The prospect occupies about 1 acre on the floor of the gulch. Waste rock has been used to create a wedge-shaped flat area with 3 or 4 collapsed cabins and sheds. There is a considerable amount of metal roofing, a wheelbarrow, track rails, glass, and metal bars on the dump (Figure 3.22-3). The main adit is on the west side of the gulch and trends S. 68° W. (Figure 3.22-4). There is some seepage and the flow rate is difficult to estimate, but it is probably less than 2 gpm.

3.22.4.2 Sample Locations

3.22.4.2.1 Soil Samples

No soil or rock samples were taken from this site.

3.22.4.2.2 Water Samples

Water sample K8159603 was taken from the seep at the adit. Sample K8159602 was taken upstream and sample K8159604 downstream from the adit.
<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature</th>
<th>pH</th>
<th>Flow (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K8159603</td>
<td>Adit sample</td>
<td>42 μs/cm</td>
<td>42° F.</td>
<td>7.5</td>
<td>1-2 gpm</td>
</tr>
<tr>
<td>K8159602</td>
<td>Upstream sample</td>
<td>30 μs/cm</td>
<td>45° F.</td>
<td>7.6</td>
<td></td>
</tr>
<tr>
<td>K8159604</td>
<td>Downstream sample</td>
<td>38 μs/cm</td>
<td>49° F.</td>
<td>7.6</td>
<td></td>
</tr>
</tbody>
</table>

### 3.22.4.2.3 Analytical Results

Sample K8159603 (Sunrise adit, unfiltered; Table 2.5-2) exceeds the Aquatic Life, Chronic, standards for mercury and cadmium, and may exceed the Aquatic Life, Chronic, standard for lead, depending on the hardness of the water. The filtered split of sample K8159603 (Table 2.5-1) exceeds or may exceed all standards for cadmium (depending on the hardness of the water), and may exceed the Aquatic Life, Chronic, standard for copper, depending on the hardness of the water. Sample K8159602 (upstream sample from the Sunrise No. 1 adit; Table 2.4-1) was below all metal thresholds.

### 3.22.5 Structures

All structures at this site have collapsed.

### 3.22.6 Safety

There are no significant safety hazards at this site, but some of the junk and scrap metal could be removed.
Figure 3.22-1. Topographic map of the Sunrise Mine, Shoshone County, Idaho (U.S. Geological Survey Burke 7.5-minute topographic map). Samples K8159602, K8159603, and K8159604 were collected near the mine (see Section 3.22.4.2.2 for descriptions of the locations). Site WL-171 is discussed in Volume IV of this report.
Figure 3.22-2. Sketch map of the Sunrise Mine area.
Figure 3.22-3. Looking north-northeast across the waste dump from the caved adit at the Sunrise Mine (Roll 559694, frame #13).
Figure 3.22-4. Caved adit with mine drainage at the Sunrise Mine. The water is flowing along the logs in the lower right (Roll 559694, frame #14).
3.23 CURRENCY MINE (Site No. WL-29)
Alternate names—Old Gray Eagle Mine, Gray Eagle Mine, Oregon Group

Also, see the discussion on the Gold Back Mine (Site No. WL-64).

3.23.1 Site Location and Access (Figure 2.1-1)

The Currency (Gray Eagle) Mine (Figure 3.23-1) is located about \( \frac{3}{4} \) mile up Oregon Gulch, a tributary of the East Fork of Eagle Creek. There is an adit symbol shown at the site on the Murray 7.5-minute quadrangle in T. 50 N, R. 5 E., Sec. 29. The mine is on U.S. Forest Service-administered land.

3.23.2 Geologic Features (Figure 2.2-1)

The Currency Mine is hosted by rocks of the Prichard Formation. The mine is in part of the Gold Back shear zone, which lies along the Murray Peak fault. The shear zone is intensely silicified and replaced by variable amounts of sulfide minerals. The sulfide-rich zone is about 7 feet wide at the mine (Shenon, 1938).

3.23.3 Site History

The original claims at this site were located in 1897. In 1928 (and for an indeterminate period before and after that date), the property was held by the Gray Eagle Mining Company and/or the family of one of the original locators. The property was relocated in 1941 as the Oregon Group, and these claims were later operated by Currency Mines, Inc. (IGS mineral property files).

3.23.4 Environmental Condition

3.23.4.1 Site Features

Shenon (1938, p. 43) noted:
The deposits at the Gold Back and Gray Eagle mines, although 2 miles apart, are essentially similar and presumably on the same lode. . .

The lowest tunnel of the Gray Eagle is a crosscut 700 feet long from which drifts have been driven about 400 feet northwest and about the same distance southeast along the lode. Several other shorter tunnels expose the lode at higher altitudes.

This mine was visited by Earl Bennett on July 17, 1996. No video was made of the property, but it is indexed on the Prichard-Eagle Creek videotape (Tape 2, index 00:52:45).

The property is at the end of a very poor road and trail. It is about 1 mile up Oregon Gulch, which flows into the East Fork of Eagle Creek. The dry adit (about 400 feet long with an
additional 600 feet of drifts, according to Hosterman, 1956) is sloughed at the portal, caved further in, and inaccessible (Figure 3.23-2). A waste dump at the adit measures about 20 feet by 20 feet and is 4 feet deep. The dump impinges on the stream and has been greatly eroded by recent flooding (Figure 3.23-3). Several pieces of iron pipe and track rail were noted near the adit, but the flood tore some of these away and washed them down the creek. Someone has built a hunting shack (black plastic walls) about 20 feet above the caved adit (Figure 3.23-4). There is some garbage scattered about the cabin site.

3.23.4.2 Sample Locations

3.23.4.2.1 Soil Samples
No soil or rock samples were collected at this site.

3.23.4.2.2 Water Samples
No water samples were collected at this site. The water in Oregon Gulch by the mine has a pH of 5.9 and a conductivity of 30.

3.23.5 Structures
A hunting shack with black plastic walls was built about 20 feet above the caved adit.

3.23.6 Safety
No significant hazards were noted at this site.
Figure 3.23-1. Topographic map of the Currency Mine, Shoshone County, Idaho (U.S. Geological Survey Murray 7.5-minute topographic map).
Figure 3.23-2. Looking towards the adit from the dump at the Currency Mine in Oregon Gulch (Roll 558550, frame #4).

Figure 3.23-3. Old rails in the creek at the Currency Mine (Roll 558550, frame #5).
Figure 3.23-4. Hunting camp above the adit at the Currency Mine (Roll 558550, frame #8).
3.24 ST. JAMES PROSPECT (Site No. WL-167)

3.24.1 Site Location and Access (Figure 2.1-1)

The St. James Prospect (Figure 3.24-1) is located on the Burke 7.5-minute quadrangle in T. 49 N., R. 58 E., Sec. 28. It is on the west fork of Granite Gulch, which is not named on the topographic map, and is on BLM land.

3.24.2 Geologic Features (Figure 2.2-1)

The St. James is in granitic rocks near the contact between the Burke and Prichard formations (Hosterman, 1956).

3.24.3 Site History

There is little known about this property. The St. James Mining Co., Ltd., owned two patented claims on which there was a tunnel and a shaft, with total development of about 150 feet. In the 1950s, the claims were owned by the National Uranium Corp. Hosterman (1956) noted that the St. James and other mines in the area were partly or completely inaccessible.

3.24.4 Environmental Condition

3.24.4.1 Site Features

This site was visited by John Kauffman on August 15, 1996. The property was not videotaped, but it is indexed on the Prichard-Eagle Creek videotape (Tape 2, index 00:53:15).

The St. James Mine (Figure 3.23-2) has two adits, one on the east side of the drainage (Adit No. 1) and the other on the southwest side (Adit No. 2). Adit No. 1 (Figure 3.23-3) is caved and appears to have a bearing of S. 25° E. Water is issuing from the adit as a spring, and there is no upstream water. The waste dump occupies about one acre and has bluebells, brush, and small conifers growing on most of it (Figure 3.23-4). One or two trees are 4-5 inches in diameter. Several collapsed structures were built on the flat part of the dump. One had a concrete foundation at one end measuring about 2 feet wide and 10 feet long. There is a considerable amount of debris on the dump, including wooden beams and timbers, scrap metal, pipes, an ore car and wheels, sheet metal, wire, and other junk. One large structure is collapsed into a depression on the dump. I could not tell if this was a caved shaft, but I suspect it is not. The dump was built in stages and fans out into 5 or 6 fingers. Overall, it is about 100 feet wide by 130 feet long.

Adit No. 2 is also collapsed and is about 100 yards west of Adit No. 1. The dump is very overgrown (Figure 3.24-5). There is water flowing from the adit (about 5-8 gpm), but there is no water above (upstream) from the adit. This adit has a bearing of S. 85° W. The adit water cuts
through the west edge of the waste dump. A sizeable spring also issues from beneath a collapsed structure about 150 feet east of the adit and flows around the toe of the dump. This dump also consists of several fingers, and there is some roofing sheet metal, pipe, and other scrap metal present.

3.24.4.2 Sample Locations

3.24.4.2.1 Soil Samples
No soil or rock samples were taken from this site.

3.24.4.2.2 Water Samples
Water sample K8159605 was taken from Adit No. 1, and sample K8159606 was taken from Adit No. 2. The pH and conductivity of the stream were checked about 260 feet below where the spring comes from under the building at Adit No. 2.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature</th>
<th>pH</th>
<th>Flow (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(no sample)</td>
<td>stream 260 feet</td>
<td>30 μs/cm</td>
<td>44° F.</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>below Adit No. 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K8159605</td>
<td>Adit No. 1</td>
<td>41 μs/cm</td>
<td>40° F.</td>
<td>7.7</td>
<td>3 gpm</td>
</tr>
<tr>
<td>K8159606</td>
<td>Adit No. 2</td>
<td>34 μs/cm</td>
<td>40° F.</td>
<td>7.6</td>
<td>8 gpm</td>
</tr>
</tbody>
</table>

3.24.4.2.3 Analytical Results
Water sample K8159605 (unfiltered; Table 2.5-2) from the St. James Adit No. 1 contains a trace of arsenic, and exceeds the Aquatic Life, Chronic, standards for cadmium and mercury. The filtered split of sample K8159605 (Table 2.5-1) exceeds or may exceed (depending on hardness) all standards for cadmium. Sample K8159606 (unfiltered; Table 2.5-2), from the St. James Adit No. 2, exceeds the Secondary MCL value for iron but is below thresholds for all other metals. The filtered split of sample K8159606 (Table 2.5-1) exceeds or may exceed (depending on hardness) all standards for cadmium and may exceed the Aquatic Life, Chronic, standard for copper, depending on the hardness of the water.

3.24.5 Structures
All the structures at this site have collapsed.

3.24.6 Safety
No significant safety hazards were noted at this site, but the scrap metal and other junk could be removed.
Figure 3.24-1. Topographic map of the St. James Prospect, Shoshone County, Idaho (U.S. Geological Survey Burke 7.5-minute topographic map). Samples K8159605 and K8159606 were collected at the mine (see Section 3.24.4.2.2 for the descriptions of the locations). Site WL-171 is discussed in Volume IV of this report.
Figure 3.24-2a. Sketch map of the St. James Prospect, Adit No. 1, showing surface features.

Figure 3.24-2b. Sketch map of the St. James Prospect, Adit No. 2, showing surface features.

Figure 3.24-2. Sketch maps of the St. James Mine, showing surface features.
Figure 3.24-3. Looking southeast at the caved portal of the No. 1 adit at the St. James Prospect. A spring is coming from the mouth of the adit (Roll 559694, frame #14).

Figure 3.24-4. Looking northwest across the dump from the portal of the No. 1 adit at the St. James Prospect (Roll 559694, frame #15).
Figure 3.24-5. Looking east across the longest finger of the dump at the No. 2 adit at the St. James Mine (Roll 559694, frame #18).
3.25 PILOT MINE (Site No. WL-58)

3.25.1 Site Location and Access (Figure 2.1-1)

The Pilot Mine (Figure 3.25-1) is about 0.4 miles up Gold Run Creek. The creek has washed out the road about halfway to the mine. The property is on the Murray 7.5-minute quadrangle in T. 21 N., R. 5 E., Sec. 5, and is on land administered by the U.S. Bureau of Land Management, just south of U.S. Forest Service land.

3.25.2 Geologic Features (Figure 2.2-1)

The Pilot Mine is in the Prichard Formation and is near the Murray Peak fault.

3.25.3 Site History

In 1906, the Pilot Mine produced some of the richest ore ever seen in the Summit district. The property was developed by a tunnel; at the tunnel's face, a raise was started to cut the rich ore shoot that outcropped near the surface. Small quantities of rich gold ore were mined from the Pilot in 1908, and a little exceedingly rich gold ore was shipped to Bradley for smelting in 1928.

Hecla Mining Company apparently owned the property for a time in the 1940s. Pilot Silver-Lead Mines, Inc., had the property in the early 1950s, but sold it to Abot Mining Company in 1957. Abot obtained an Office of Minerals Exploration (OME) contract to explore the property in 1959, but no significant mineralization was found. There has been little activity since that time.

3.25.4 Environmental Condition

3.25.4.1 Site Features

According to Shenon (1938, p. 39):

The Pilot mine lies about half a mile above the mouth of Gold Run Gulch. The principal working is a tunnel about 700 feet long. Little is known about the property, although, according to Mr. Wylie [Wylie, William, personal communication to P.J. Shenon], some exceedingly rich ore was mined in the early days. The Bureau of Mines records for 1928 a production of 1 ton of ore which yielded 15.45 ounces of gold and 19 ounces of silver.

The Pilot tunnel follows a shear zone in the Prichard formation for about 400 feet. The shear zone trends N. 25° W. and dips about 70° N.E. At 400 feet from the portal there is a small stope about 70 feet long from which a bedding quartz vein was mined. Both beds and vein are folded so that the stope, which starts on a steep dip, flattens as it goes upward. Beyond the stope the tunnel follows a shear zone for about 250 feet. At the breast of the tunnel, the zone, which is about 4
feet wide, strikes N. 45° W. and dips 70° N.E., whereas the strike of the bedding
is N. 15° W. and the dip 17° N.E. Some quartz, generally only 1 or 2 inches wide,
follows the shearing.

The mine was visited by Earl Bennett on August 27, 1996. A video segment of this property is on
the Prichard-Eagle Creek videotape (Tape 2, index 00:53:39-00:58:36)

The workings (Figure 3.25-2) consist of two open adits and accompanying dumps. The upper
adit is dry, and the lower adit is wet and has a large dump. The main Gold Run Gulch road at
creek level goes past the main lower dump and adit. A trail to the upper adit (Figure 3.25-3)
branches off from this road near its end. The upper dump is overgrown (Figure 3.25-4) and the
adit is posted with a "No Trespassing" notice. The lower, open adit (Figure 3.25-5) had a
wooden gate on it, which has been torn off. A large dump parallels Gold Run Creek and goes
south along the creek from the adit, which is at the north end of the dump. This dump measures
about 100 feet long, 30 feet wide, and 15 feet deep (Figure 3.25-6). A slump at the south end of
the dump near the road has eroded part of the waste dump into the creek (Figure 3.25-7). There
are no structures at the site.

3.25.4.2 Sample Locations

3.25.4.2.1 Soil Samples
No soil or rock samples were collected from this site.

3.25.4.2.2 Water Samples
No water samples were collected from this site.

3.25.5 Structures
There are no structures at the site.

3.25.6 Safety
The open adits are a safety hazard.
Figure 3.25-1. Topographic map of the Pilot Mine, Shoshone County, Idaho (U.S. Geological Survey Murray 7.5-minute topographic map). Sites WL-44, WL-45, WL-51, WL-56, and B8279603 are discussed in Volume IV of this report.
Figure 3.25-2. Sketch map of the Pilot Mine, showing surface features.
Figure 3.25-3. Upper, open, and dry adit on the east side of Gold Run Gulch at the Pilot Mine (Roll 214578, frame #6).

Figure 3.25-4. Overgrown dump at the upper adit at the Pilot Mine (Roll 214578, frame #7).
Figure 3.25-5. Lower adit at the Pilot Mine (Roll 214578, frame #8).

Figure 3.25-6. Dump at the lower adit of the Pilot Mine, looking south (Roll 214578, frame #9).
Figure 3.25-7. Slump into Gold Run Creek at the south end of the lower dump of the Pilot Mine (Roll 214578, frame #10).
3.26 VENDETTA MINE (Site Nos. WL-124 and K8279601)
Alternate name—Vendetta Chief Mine

3.26.1 Site Location and Access (Figure 2.1-1)

The Vendetta Mine (Figure 3.26-1) is located about 1¼ miles up the West Fork of Granite Gulch on the Burke 7.5-minute quadrangle in T. 49 N., R. 5 E., Sec. 15. It is close to the common corner of Sections 15, 16, 21, and 22. The workings are on U.S. Forest Service land.

3.26.2 Geologic Features (Figure 2.2-1)

The mine is in rocks of the Prichard Formation (Hosterman, 1956).

3.26.3 Site History

The property was acquired by the Vendetta Chief Mining Co. in 1924, but the company did little more than assessment work. The property had two tunnels and approximately 700 feet of workings (IGS mineral property files).

3.26.4 Environmental Condition

3.26.4.1 Site Features

What is believed to be the Vendetta Chief Mine was visited by John Kauffman and Bill Rember on August 27, 1996. A video segment of this property is on the Prichard-Eagle Creek videotape (Tape 2, index 00:58:36-01:05:25).

An open but dry adit (labeled K8279601) is located about ¼ mile upstream from the Lucky Four Prospect in the West Fork of Granite Gulch. This adit is at the base of a small cliff and near a waterfall. It has a small, thickly overgrown dump that has been partially removed by the stream. What is believed to be another adit of the Vendetta Chief is about 100 yards upstream from K8279601 at an elevation of 3,640 feet. This adit trends 280 degrees and is open and dry. There are two ore carts (one inside the portal on tracks) at this adit, and there is also an old forge (Figure 3.26-2). The West Fork has flushed out most of the waste dump from this adit. A small area measuring about five feet by five feet by three feet thick is all that remains.

3.26.4.2 Sample Locations

3.26.4.2.1 Soil Samples
No soil or rock samples were collected from this site.

3.26.4.2.2 Water Samples
No water samples were collected from this site.
3.26.5 Structures
  There are no structures left at this site.

3.26.6 Safety
  The open adits are safety hazards.
Figure 3.26-1. Topographic map of the Vendetta Mine, Shoshone County, Idaho (U.S. Geological Survey Burke 7.5-minute topographic map). B8019605 and B8019606 are background water samples. Sites WL-122, WL-127, WL-129, B8159608, and K8279601 are discussed in Volume IV of this report.
Figure 3.26-2. Looking into the portal of an open adit at the Vendetta Mine (Roll #K3, frame #5).
3.27 GOLDEN CHEST MINE (Site No. WL-75)
Alternate names—Paymaster, Katie Burnett, Dora, Katie-Dora, Idaho, Klondike

3.27.1 Site Location and Access (Figure 2.1-1)

Shenon described the Golden Chest Mine (Figure 3.27-1) as follows (1938, p. 26):
The Golden Chest, the principal gold mine in the Murray district, is in Reeder Gulch, about 1-1/2 miles southeast of Murray [Burke 7.5-minute quadrangle; T. 49 N., R. 5 E., Sec. 5]. The property is opened by many tunnels, only parts of which are now accessible. Old maps show over 13,000 feet of drifts and crosscuts, in addition to many hundreds of feet of raises and winzes. In addition to the two main stopes, each about 250 feet long, there are numerous smaller stopes. The principal level in the mine, known as the Idaho No. 3 tunnel (fig. 11 [omitted]), is more than 3,000 feet long, and, including drifts and crosscuts, is nearly 4,000 feet. The Intermediate level, 85 feet vertically above the Idaho No. 3 level, has been run on the Klondike ore shoot for about 200 feet. The level next above the Intermediate, known as the Pettit tunnel, was run from the surface, but in 1935 could only be reached from the Idaho No. 3 or from the Martin level above it. A total length of about 2,500 feet of drifts and crosscuts has been driven on the Pettit level. The highest accessible level is known as the Martin tunnel; in 1935, only 450 feet of a total of about 2,600 feet was accessible. Except for about 100 feet of the Idaho No. 1 tunnel, all the other workings are inaccessible.

The mine is easily reached from the old Thompson Pass Road that connects to the east end of the main street in Murray. This road eventually joins the new Thompson Pass Road. The main adit to the mine is just off this road about 100 feet, and the water flowing from the adit reaches the road. Another road goes from the old Thompson Pass Road up Reeder Gulch to the upper workings of the Golden Chest. The entire property is private and is on patented mining claims.

3.27.2 Geologic Features (Figure 2.2-1)

According to Shenon (1938, p. 27):
The rocks at the Golden Chest mine consist largely of dark gray argillite interbedded with white and gray quartzite and belong to the Prichard formation. Near the portal of the Idaho No. 3 tunnel these rocks are cut by a diabase dike. Workings of the Golden Chest explore two types of ore deposits - (1) quartz veins approximately parallel to the bedding of the argillite, and (2) fine-grained vein quartz, which, with ankerite, sericite, pyrite, and small amounts of gold, cements and replaces fractured quartzite.
3.27.3 Site History

Shenon (1938) notes the following history (p. 26-27):

The Golden Chest group is a consolidation of numerous claims located by several individuals. The group includes the first quartz claim recorded in the Murray district, the Paymaster, which with the Golden Chest and Katie Burnett claims were located in the fall of 1883 [White, Rush J., private report]. In May, 1884, the Golden Chest Mining Company was incorporated. It was the first company incorporated to operate in the Coeur d'Alene district. Although reorganized several times, this company operated for many years. About 1916 Samuel Green acquired the property, and in 1935 it was owned by his heirs, although it was at that time leased to the Golden Chest Leasing Company.

In 1923, a lessee sold a little bullion from the Golden Chest Mine, which had been a large producer of gold in the past. In 1934, 2,500 tons of gold ore from the Golden Chest was treated in a 25-ton flotation plant; a little rich gold ore from the mine was amalgamated. The next year, the output of the mine increased appreciably. In 1937, most of the metal output of the Summit district was gold from the Golden Chest Mine. The output of gold from the Golden Chest increased again in 1938. The ore from the mine was treated in a 100-ton flotation plant owned by Idaho Mother Lode Gold Mines, Inc. The Golden Chest mine was operated by Consolidated Gold Mines, Inc. Output increased to 12,190 tons of ore in 1939. The Golden Chest continued to be the most important producer in the district in 1940, but its output of gold ore declined to about 8,500 tons. Operations were suspended in April 1941, after about 3,000 tons of gold ore had been concentrated.

Following the war in 1947, about 25,000 tons of old tailings from the Golden Chest dump were treated by cyanidation; this material yielded 136 fine ounces of gold and 82 fine ounces of silver. Also during the year, 19 tons of high-grade gold ore was shipped. The following year, 55 tons of high-grade gold ore and 80 tons of lead ore were shipped; in addition, 29 fine ounces of gold and 10 fine ounces of silver were recovered from sluicing 330 cubic yards of gravel. In 1949, 100 tons of gold ore was mined from the Golden Chest.

In 1982, Trans-Atlantic Pacific, Inc. (TAP Resources), negotiated a 25-year mine management contract with Golden Chest, Inc. Investors included the Vikings Investment Corporation, a group of players from the Minnesota Vikings football team. The property consisted of 33 patented lode and placer claims and 9 unpatented claims. The following year Cominco entered into an exploration joint venture with TAP on the 33 patented claims, and a placer operation ran the next year.

In 1987, TAP optioned 111 claims near Murray and controlled over 3,600 acres in the vicinity of the Golden Chest by mid-year. The company signed an agreement with Newmont Mining Corporation in August. Newmont planned to drill three holes on the property to look for a low-grade, bulk-minable gold deposit. Cominco American, Inc., also drilled a hole just north of the Golden Chest Mine.


In 1989, the Viking Investment Corporation increased its ownership in Golden Chest, Inc., by 120,000 shares. Viking’s 500-acre lease on the Golden Chest Mine was part of a 6,000 acre joint venture project with Newmont Exploration, Ltd. In June, Newmont applied for permits to construct 2,000 feet of road and drill a maximum of 8 reverse circulation holes on the Golden Chest property. Preliminary drilling results indicate reserves of 4.8 million tons averaging 0.043 ounces of gold per ton. Newmont returned the property to Golden Chest in 1990 because the resource was too small for the company’s needs. Viking was also trying to start a placer operation near the Golden Chest that was not subject to the agreement with Newmont.

In 1992, Golden Chest Mining did confirmation drilling on the Golden Chest claims. Golden Chest was looking at opening a small (approximately 40 tons per day) underground mine. In 1995, Butte Mining LLC installed placer equipment at the Golden Chest Mine. The placer operation was expected to yield some 250,000 ounces of gold over a 5-year period.

### 3.27.4 Environmental Condition

#### 3.27.4.1 Site Features

The Golden Chest Mine was visited by Falma Moye on July 18, 1996, and by Earl Bennett on July 26, 1996. A video segment of the property is on the Prichard-Eagle Creek videotape (Tape 2, index 01:05:25-01:07:30).

This property is entirely on patented ground and is surrounded by other private land or public lands administered by the Bureau of Land Management. A strong flow of water from the main adit spills out across the old Murray-Thompson Pass road (Figure 3.27-2). There are a number of open adits in Reeder Gulch, but no major water problems were noted. The property has been heavily logged (Figure 3.27-3). As the owner lives on the site, we consider the mine active and no further study was attempted.

#### 3.27.4.2 Sample Locations

##### 3.27.4.2.1 Soil Samples

No soil or rock samples were taken from this site.
3.27.4.2.2 Water Samples

Sample B7269601 from the Golden Chest adit was collected from the road near the east end of Murray.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature</th>
<th>pH</th>
<th>Flow (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7269601</td>
<td>Adit water sample</td>
<td>40 μs/cm(^1)</td>
<td></td>
<td>7.1</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)This reading was taken by Falma Moye on July 18, 1996.

3.27.4.2.3 Analytical Results

Water sample B7269601 (filtered–Table 2.5-1–and unfiltered–Table 2.5-2) exceeds both Aquatic Life standards for zinc and the filtered sample exceeds the Aquatic Life, Chronic, and Secondary MCL standards for aluminum. The low metal content of this water was somewhat surprising as the water is iron stained. This is reflected in the unfiltered sample, which exceeds the EPA water standards for this element.

3.27.5 Structures

The owner has a home on the site.

3.27.6 Safety

The safety hazards at this site, if any, are not known.
Figure 3.27-1. Topographic map of the Golden Chest Mine, Shoshone County, Idaho (U.S. Geological Survey Burke 7.5-minute topographic map). Sample B7269601 was collected from the mine (see Section 3.27.4.2.2 for the description of the location). Sites WL-70, WL-77, and WL-111 are discussed in Volume IV of this report.
Figure 3.27-2. Drainage from Golden Chest Mine (Roll 095-640, frame #14).
Figure 3.27-3. The heavily logged area in the upper center of the picture is the patented claim group of the Golden Chest Mine. Butte Gulch is to the right of the logged area (Roll 559693, frame #22).
3.28 FOUR SQUARE MINE (Site No. WL-72)
Alternate names—Golden Winnie, Crown Point, Flagstaff, Lucky Winnie, Friday, Achievement

3.28.1 Site Location and Access (Figure 2.1-1)

The Four Square property (Figure 3.28-1) is located about 2 miles west of Murray on Prichard Creek and consists of 24 claims that formerly included the Golden Winnie, Crown Point, and Flagstaff groups. The mine is on the Prichard 7.5-minute quadrangle (T. 49 N., R. 4 E., Sec. 1) across from Accident Gulch. A private road goes across a bridge spanning Prichard Creek to the mine and mill on the west bank of the creek. Part of this property is on private land, but some is probably on Forest Service-administered land.

3.28.2 Geologic Features (Figure 2.2-1)

Shenon (1938, p. 33) noted that:
Three veins, known as Nos. 1, 2, and 3, are exposed in the Four Square workings. No. 1 has been developed for about 70 feet, No. 2 for about 800 feet, and No. 3 for about 100 feet. No. 1 vein strikes about N. 60° W. and dips 55° N. The strike of No. 2 vein ranges from N. 63° W. near the face of the west drift, to N. 80° W. in the east drift, and it dips about 40° to 60° N. but averages about 50° N.

3.28.3 Site History

History and production

According to Shenon (1938, p. 33):
Most of the veins at the Four Square mine were located by E. M. Smith in 1884, the year following the discovery of placer gold near Murray [Hall, Julius P., personal communication to P.J. Shenon]. In November, 1931, the property was acquired by the Four Square Gold Company, which began development work in September, 1933.

According to Mr. Hall, the production up to 1931 was between $170,000 and $200,000, and came largely from the Achievement level on the No. 2 vein. This ore was treated in an arrastre and in a 10-stamp mill. In 1891, $3,600 was recovered at the old Wallace Sampler from 27 sacks of ore mined from the Smith tunnel. During 1914-15, several tons of scheelite concentrates were produced. From February 18 to November 19, 1934, 7,340 tons of ore treated in the Four Square mill yielded 1,129.71 ounces of gold. Therefore, on the basis of the above figures, the total production up to November 19, 1934, appears to have been between $225,000 and $250,000.
3.28.4 Environmental Condition

3.28.4.1 Site Features

Shenon (1938, p. 32-33):

The Four Square mill [Figure 3.28-2], camp, and underground workings are on the south side of Prichard Creek. In 1935, most of the underground workings were on three levels: the Achievement, Main crosscut, and Intermediate levels [Figure 3.28-3]. The mouth of the Main crosscut [Figure 3.28-4] is about 60 feet vertically higher than the camp, and in 1935 was about 1,000 feet long (pl. 4 [Figure 3.28-3]). At 230 feet it cut the No. 1 vein, and from it a drift was turned that followed the vein westward about 40 feet. At 600 feet from the portal the crosscut intersected the No. 2 vein, and drifts 440 and 410 feet long were driven along the vein to the east and west respectively. At 880 feet from the portal the Main crosscut intersected the No. 3 vein, and drifts were run 80 feet eastward and 70 feet westward. The Achievement tunnel lies 40 feet lower than the Main crosscut level and is driven from the surface westward along the No. 2 vein for 620 feet. In 1935, about 120 feet of this level were closed by caves. The Intermediate level is about 175 feet vertically higher than the Main crosscut level and is connected with it by a two-compartment inclined raise. On the Intermediate level a crosscut 340 feet long runs from the surface to the No. 2 vein. At 190 feet from the portal the crosscut branches, and at 150 feet farther the branch also cuts the vein. On the Intermediate level there are about 400 feet of drifts east and 390 feet west on the No. 2 vein.

The property was visited by Falma Moye on July 18, 1996, at which time the property was gated and posted. The placer claims on the creek adjacent to the property appeared to be active (Figure 3.28-5). The property was also visited by Earl Bennett on August 1, 1996. The property was not videotaped, but it is indexed on the Prichard-Eagle Creek videotape (Tape 2, index 01:07:30). As the property is active, no further work was attempted.

3.28.4.2 Sample Locations

3.28.4.2.1 Soil Samples

No soil or rock samples were collected from this site.

3.28.4.2.2 Water Samples

No water samples were collected from this site.

3.28.5 Structures

A mill (Figure 3.28-6), other buildings, and a wooden trestle from the adit to the mill (Figure 3.28-7) are standing. There is a lot of mining equipment and machinery at this site.
3.28.6 Safety

The safety hazards at this site, if any, are not known.
Figure 3.28-1. Topographic map of the Four Square Mine, Shoshone County, Idaho (U.S. Geological Survey Prichard 7.5-minute topographic map). Site WL-55 is discussed in Volume IV of this report.
Figure 3.28.2. Historical black-and-white picture of the Four Square mill (Idaho Geological Survey files)
Figure 3.28-3. Underground map of the Four Square Mine (Plate 4 from Shenon, 1938).
Figure 3.28-4. Adit just east of the mill at the Four Square Mine (Roll 559692, frame #10).

Figure 3.28-5. Placer workings near the Four Square Mine (Roll 559692, frame #15).
Figure 3.28-6. East side of the Four Square mill (Roll 559692, frame #18).

Figure 3.28-7. Tracks from the main adit to the mill at the Four Square Mine (Roll 559692, frame #11).
3.29 KING MINE (Site No. WL-65)

3.29.1 Site Location and Access (Figure 2.1-1)

The King Mine (Figure 3.29-1) is located just south of Accident Gulch on the Prichard 7.5-minute quadrangle in T. 49 N., R. 4 E., Sec. 1. According to the Panhandle National Forest map, it appears that the mine is on private property.

3.29.2 Geologic Features (Figure 2.2-1)

According to Shenon (1938, p. 35-36):

The King property lies north of Prichard Creek, about opposite the Four Square mine. Several short crosscuts, some small slopes, and a shaft, possibly aggregating about 1,000 feet, have been opened on two veins known as the Skookum and Small Hopes. Also, there is a drift about 100 feet long, known as the Grouse tunnel, that is believed to explore the shear zone that contains the Crown Point vein, described below. Most of the workings are now inaccessible.

Little was learned about the history of the King property, but the veins are known to have been located at about the same time as those on the Four Square property. A 10-stamp mill in Accident Gulch was operated for several years, and the old stamps are still standing. The property is owned by the William W. Drummond estate of Kentucky. Adam Aulbach, who bought most of the gold from the King property, has estimated that it yielded about $200,000 worth of gold [Hall, Julius P., personal communication to P.J. Shenon].

The two principal veins on the King property are poorly exposed, owing to caved workings and to the fact that much of the vein near the surface has been mined. As shown by open stopes, the Skookum and Small Hopes veins strike from N. 75° W. to east and west, and dip from 45° to 55° N.W. (fig. 17 [Figure 3.29-2]). The Small Hopes vein is overlain by about 15 feet of thin-bedded argillite, which in turn is overlain by nearly black massive argillaceous quartzite with poorly defined layering. Underneath the vein there is about 200 feet of faintly layered nearly black massive argillaceous quartzite. Below this lies 70 feet of thin-bedded argillite that encloses the Skookum vein, about 15 feet above the base. Below the thin-bedded argillite lies 18 feet of massive white quartzite, which is underlain by 30 feet of faintly layered, nearly black, massive argillaceous quartzite. Below this quartzite there is a 6-foot band of massive white quartzite, and below this band above the road there lies another 6 feet of massive white quartzite, but there are no outcrops below the road...
RELATIONSHIP BETWEEN THE FOUR SQUARE AND KING VEINS

It is generally believed that the Small Hopes and Skookum veins of the King are faulted segments of the Nos. 1 and 2 veins of the Four Square. The fault that is shown offsetting the Small Hopes vein in figure 17 [Figure 3.29-2] has a horizontal displacement of about 200 feet. An additional offset of about 70 feet in the same direction would bring the Skookum vein of the King mine into juxtaposition with the No. 2 vein of the Four Square mine. If it exists, this fault cannot be seen because of overburden, but it will be present below Prichard Creek.

3.29.3 Site History

Beyond the information in Shenon (1938), little is known about this site.

3.29.4 Environmental Condition

3.29.4.1 Site Features

The King Mine was visited by Falma Moye on July 18, 1996. The property was not videotaped, but it is indexed on the Prichard-Eagle Creek videotape (Tape 2, index 01:09:10). Tape 2 ends at index 01:10:35.

This site is a dog hole on a dry hillside (Figure 3.29-3).

3.29.4.2 Sample Locations

3.29.4.2.1 Soil Samples
No soil or rock samples were taken from this site.

3.29.4.2.2 Water Samples
No water samples were taken from this site.

3.29.5 Structures
There are no structures at this site.

3.29.6 Safety
No significant safety hazards were identified at this site.
Figure 3.29-1. Topographic map of the King Mine, Shoshone County, Idaho (U.S. Geological Survey Prichard 7.5-minute topographic map). Site WL-55 is discussed in Volume IV of this report.
Figure 3.29-2. Map showing relationships between the veins at the King Mine and those at the adjoining Four Square Mine (Figure 17 from Shenon, 1938).
Figure 3.29-3. Waste dump (upper center of photograph) at the King Mine (Roll 095-640, frame #12).
BIBLIOGRAPHY


Appendix A
Field Questionnaire
PART A
(To be completed for all identified sites)

LOCATION AND IDENTIFICATION

ID# ______________ Site Name(s) ___________________
FS Tract # ______________ FS Watershed Code _______________
Forest __________________ District ___________________
Location based on: GPS ___ Field Map ___ Existing Info ___ Other ___
Lat _______ Long _______ xutm ______ yutm ______ zutm ______
Quad Name ______________ Principal Meridian _____________
Township ______________ Range _______ Section _____ 1/4 _____ 1/4 _____ 1/4
State _____ County ___________ Mining District ____________

Ownership of all disturbances:
   _____ National Forest (NF)
   _____ Mixed private and National Forest (or unknown)
   _____ Private.
   If private only, impacts from the site on National Forest Resources are
   _____ Visually apparent _____ Likely to be significant _____ Unlikely or minimal

If all disturbances are private and Impacts to National Forest Resources are unlikely or minimal
- STOP

PART B
(To be completed for all sites on or likely effecting National Forest lands)

SCREENING CRITERIA

Yes  No

_____ 1. Mill site or Tailings present
_____ 2. Adits with discharge or evidence of a discharge
_____ 3. Evidence of or strong likelihood for metal leaching, or AMD (water stains,
    stressed or lack of vegetation, waste below water table, etc.)
_____ 4. Mine waste in floodplain or shows signs of water erosion
_____ 5. Residences, high public use area, or environmentally sensitive area (as listed in
    HRS) within 200 feet of disturbance
_____ 6. Hazardous wastes/materials (chemical containers, explosives, etc)
_____ 7. Open edits/shafts, highwalls, or hazardous structures/debris
_____ 8. Site visit (If yes, take picture of site), Film number(s)
   If yes, provide name of person who visited site and date of visit
   Name: __________________ Date: __________
   If no, list source(s) of information (If based on personal knowledge,
   provide name of person interviewed and date):

If the answers to questions 1 through 6 are all No - STOP

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PART C
(To be completed for all sites not screened out in Parts A or B)

Investigator __________________________ Date __________
Weather ________________________________

1. GENERAL SITE INFORMATION

Take panoramic picture(s) of site, Film Number(s) ________________
Size of disturbed area(s) _____ acres Average Elevation _____ feet
Access: ___ No trail ___ Trail ___ 4wd only ___ Improved road
___ Paved road
Name of nearest town (by road): ________________________________
Site/Local Terrain: ___ Rolling or flat ___ Foothills ___ Mesa ___ Mountains
___ Steep/narrow canyon
Local undisturbed vegetation (Check all that apply): ___ Barren or sparsely vegetated
___ weeds/grasses ___ Brush ___ Riparian/marsh
___ Deciduous trees ___ Pine/spruce/fir
Nearest wetland/bog: ___ On site, ___ 0-200 feet, ___ 200 feet-2 miles, ___ > 2 miles
Acid Producers or Indicator Minerals: ___ Arsenopyrite, ___ Chalcopyrite, ___ Galena,
___ Iron Oxide, ___ Limonite, ___ Marcasite, ___ Pyrite, ___
Pyrrhotite, ___ Sphalerite, ___ Other Sulfide
Neutralizing Host Rock: ___ Dolomite, ___ Limestone, ___ Marble, ___ Other Carbonate

2. OPERATIONAL HISTORY

Dates of significant mining activity __________________________

<table>
<thead>
<tr>
<th>MINE PRODUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commodity(s)</td>
</tr>
<tr>
<td>Production</td>
</tr>
<tr>
<td>(ounces)</td>
</tr>
</tbody>
</table>

Years that Mill Operated __________________________
Mill Process: ___ Amalgamation, ___ Arrastre, ___ CIP (Carbon-in-Pulp), ___ Crusher only,
___ Cyanidation, ___ Flotation, ___ Gravity, ___ Heap Leach, ___ Jig Plant, ___ Leach,
___ Retort, ___ Stamp, ___ No Mill, ___ Unknown

<table>
<thead>
<tr>
<th>MILL PRODUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commodity(s)</td>
</tr>
<tr>
<td>Production</td>
</tr>
<tr>
<td>(ounces)</td>
</tr>
</tbody>
</table>
3. HYDROLOGY

Name of nearest Stream ____________________ which flows into ____________
Springs (in and around mine site): _______Numerous _______Several ______ None
Depth to Groundwater _____ ft, Measured at: ___ shaft/pit/hole ___ well ___ wetland
Any waste(s) in contact with active stream _____ Yes _____ No

4. TARGETS. (Answer the following based on general observations only)

Surface Water
Nearest surface water intake _____ miles, Probable use ________________
Describe number and uses of surface water intakes observed for 15 miles downstream of site:

__________________________________________________________________________

Wells
Nearest well _____ miles, Probable use __________________________
Describe number and use of wells observed within 4 miles of site:

__________________________________________________________________________

Population
Nearest dwelling _____ miles, Number of months/year occupied _______ months
Estimate number of houses within 2 miles of the site (Provide estimates for 0-200ft, 200ft-1mile, 1-2miles, if possible)

__________________________________________________________________________

Recreational Usage
Recreational use on site: _____ High (Visitors observed or evidence such as tire tracks, trash, graffiti, fire rings, etc.; and good access to site), _____ Moderate (Some evidence of visitors and site is accessible from a poor road or trail), _____ Low (Little, if any, evidence of visitors and site is not easily accessible)
Nearest recreational area _____ miles, Name or type of area: __________________________

5. SAFETY RISKS

_____ Open adit/shaft, _____ Highwall or unstable slopes, _____ Unstable structures,
_____ Chemicals, _____ Solid waste including sharp rusted items, _____ Explosives
6. MINE OPENINGS

Include in the following chart all mine openings located on or partially on National Forest lands. Also, include mine openings located entirely on private land if a point discharge from the opening crosses onto National Forest land. In this case, enter data for the point at which the discharge flows onto National Forest land; you do not need to enter information about the opening itself.

**TABLE 1 - ADITS, SHAFTS, PITS, AND OTHER OPENINGS**

<table>
<thead>
<tr>
<th>Opening Number</th>
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</thead>
<tbody>
<tr>
<td>Type of Opening</td>
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</tr>
<tr>
<td>Ownership</td>
<td></td>
</tr>
<tr>
<td>Opening Length (ft)</td>
<td></td>
</tr>
<tr>
<td>Opening Width (ft)</td>
<td></td>
</tr>
<tr>
<td>Latitude (GPS)</td>
<td></td>
</tr>
<tr>
<td>Longitude (GPS)</td>
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</tr>
<tr>
<td>Condition</td>
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</tr>
<tr>
<td>Ground water</td>
<td></td>
</tr>
<tr>
<td>Water Sample #</td>
<td></td>
</tr>
<tr>
<td>Photo Number</td>
<td></td>
</tr>
</tbody>
</table>

Comments (When commenting on a specific mine opening, reference opening number used in Table 1):

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

**Codes Applicable for all entries:** NA= Not applicable, UNK=Unknown, OTHER=Explain in comments, NO=NO or none  
**Type of opening:** ADIT=Adit, SHAFT=Shaft, Pit=Open Pit/Trench' HOLE=Prospect Hole, WELL=Well  
**Ownership:** NF=National Forest, MIX=National Forest and Private (Also, for unknown), PRV=Private  
**Condition (Enter all that apply):** INTACT=Intact, PART=Partially collapsed or filled, COLP=Filled or collapsed, SEAL=Adit plug, GATE=Gated barrier,  
**Ground water (Water or evidence of water discharging from opening):** NO=No water or indicators of water, FLOW=Water flowing, INTER=Indicators of intermittent flow, STAND=Standing water only (In this case, enter an estimate of depth below grade)
7. MINE/MILL WASTE

Include in the following chart all mine/mill wastes located on or partially on National Forest lands. Also, include mine/mill wastes located entirely on private land if it is visibly effecting or is very likely to be effecting National Forest resources. In this case enter data for the point at which a discharge from the waste flows onto National Forest land, or where wastes have migrated onto National Forest land; only enter as much information about the waste as relevant and practicable.

**TABLE 2 - DUMPS, TAILINGS, AND SPOIL PILES**

<table>
<thead>
<tr>
<th>Waste Number</th>
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<tbody>
<tr>
<td>Waste Type</td>
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<tr>
<td>Ownership</td>
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<tr>
<td>Area (acres)</td>
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</tr>
<tr>
<td>Volume (cu yds)</td>
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</tr>
<tr>
<td>Size of Material</td>
<td></td>
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</tr>
<tr>
<td>Wind Erosion</td>
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</tr>
<tr>
<td>Vegetation</td>
<td></td>
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</tr>
<tr>
<td>Surface Drainage</td>
<td></td>
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<tr>
<td>Indicators of Metals</td>
<td></td>
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<tr>
<td>Stability</td>
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<tr>
<td>Location with respect to Floodplain</td>
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<tr>
<td>Distance to Stream</td>
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</tr>
</tbody>
</table>

**Codes Applicable for all entries:** NA= Not applicable, UNK=Unknown, OTHER= Explain in comments, NO=NO or none

**Waste Type:** WASTE=Waste rock dump, MILL=Mill tailings SPOIL=Overburden or spoil pile, HIGH=Highwall, PLACER=Placer or hydraulic deposit, POND=Settling pond or lagoon, ORE=Ore Stockpile, HEAP=Heap Leach

**Ownership:** NF=National Forest, MIX=National Forest and Private (Also, for unknown), PRV=Private

**Size of material** (If composed of different size fractions, enter the sizes that are present in significant amounts): FINE=Finer than sand, SAND=sand, GRAVEL>=sand and <2", COBBLE=2"-6", BOULD>=6"

**Wind Erosion** Potential for: HIGH=Fine, dry material that could easily become airborne, airborne dust, or windblown deposits, MOD=Moderate, Some fine material, or fine material that is usually wet or partially cemented, LOW=Little it any fines, or fines that are wet year-round or well cemented.

**Vegetation** (density on waste): DENSE=Ground cover > 75%, MOD=Ground cover 25% - 75%, SPARSE=Ground cover < 25%, BARREN=Barren

**Surface Drainage** (Include all that apply): RILL-Surface flow channels mostly < 1' deep, GULLY=Flow channels >1' deep, SEEP=Intermittent or continuous discharge from waste deposit, POND=Seasonal or permanent ponds on feature, BREACH=Breached, NO=No indicators of surface flow observe

**Indicators of Metals** (Enter as many as exist): NO=None, VEG=Absence of or stressed vegetation, STAIN=yellow, orange, or red precipitate, SALT=Salt deposits, SULF=Sulfides present

**Stability:** EMER=Imminent mass failure, LIKE=Potential for mass failure, LOW=Mass failure unlikely

**Location with respect to Stream:** IN=In contact with normal stream, NEAR=In riparian zone or floodplain, OUT=Out of floodplain

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8. SAMPLES

Take samples only on National Forest lands.

<table>
<thead>
<tr>
<th>TABLE 3 - WATER SAMPLES FROM MINE SITE DISCHARGES</th>
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<tbody>
<tr>
<td>Sample Number</td>
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<td>Distance to stream (ft)</td>
</tr>
<tr>
<td>Sample Latitude</td>
</tr>
<tr>
<td>Sample Longitude</td>
</tr>
<tr>
<td>Field pH</td>
</tr>
<tr>
<td>Field SC</td>
</tr>
<tr>
<td>Flow (gpm)</td>
</tr>
<tr>
<td>Method of measurement</td>
</tr>
<tr>
<td>Photo Number</td>
</tr>
</tbody>
</table>

Comments: (When commenting on a specific water sample, reference sample number used in Table 3):

Codes Applicable for all entries: NA= Not applicable, UNK=Unknown, OTHER=Explain in comments, NO=NO or none
Discharging From: ADIT=Adit, SHAFT=Shaft, PIT=Pit/Trench, HOLE=Prospect Hole, WASTE=Waste rock dump, MILL=Mill tailings, SPOIL=Overburden or spoil pile, HIGH=Highwall, PLACER=Placer or hydraulic deposit, POND=Settling pond or lagoon, WELL=Well
Feature Number: Corresponding number from Table 1 or Table 2 (Opening Number or Waste Number)
Indicators of Metal Release (Enter as many as exist): NO=None, YEG=Absence of, or stressed vegetation/organisms in and along drainage path, STAIN=yellow, orange, or red precipitate, SALT=Salt deposits, SUU=Sulfides present, TURB=Discolored or turbid discharge
Indicators of Sedimentation (enter as many as exist): NO=None, SLIGHT=Some sedimentation in channel, banks and channel largely intact, MOD=Sediment deposits in channel, affecting flow patterns, banks largely intact, SIGN=Sediment deposits in channel and/or along stream banks extending to nearest stream
Method of Measurement: EST=Estimate, BUCK=Bucket and time, METER=Flow meter

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<table>
<thead>
<tr>
<th>Location relative to mine site/features</th>
<th>Upstream (Background)</th>
<th>Downstream</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date sample taken</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sampler (Initials)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stream Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicators of Metal Release</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicators of Sedimentation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Latitude</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Longitude</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field pH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field SC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow (gpm)/Method of measurement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Method of measurement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photo Number</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments: *(When commenting on a specific water sample, reference sample number used in Table 4):*

Codes Applicable for all entries: NA= Not applicable, UNK=Unknown, OTHER=Explain in comments, NO=NO or none

Indicators of Metal Release *(Enter as many as exist)*: NO= None, VEG= Absence of, or stressed streamside vegetation/organisms in and along drainage path, STAIN= yellow, orange, or red precipitate, SALT= Salt deposits, SULF= Sulfides present, TURB= Discolored or turbid discharge

Indicators of Sedimentation *(Enter as many as exist)*: NO= None, SLIGHT= Some sedimentation in channel, natural banks and channel largely intact, MOD= Sediment deposits in channel, affecting stream flow patterns, natural banks largely intact, SIGN= Sediment deposits in channel and/or along stream banks extending 1/2 a mile or more downstream

Method of Measurement: EST= Estimate, BUCK= Bucket and time, METER= Flow meter
**TABLE 5 - WASTE SAMPLES**

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Date of sample</th>
<th>Sampler (Initials)</th>
<th>Sample Type</th>
<th>Waste Type</th>
<th>Feature Number</th>
<th>Sample Latitude</th>
<th>Sample Longitude</th>
<th>Photo Number</th>
</tr>
</thead>
</table>

Comments: *(When commenting on a specific waste or soil sample, reference sample number used in Table 5):*

**Codes Applicable for all entries:** NA=Not applicable, UNK=Unknown, OTHER=Explain in comments, NO=NO or none  
**Sample Type:** SING=Single sample, COMP=Composite sample (enter length)  
**Waste Type:** WASTE=Waste rock dump, MIL=MILL=Mill tailings, SPOIL=Overburden or spoil pile, HIGH=Highwall, PLACER=Placer or hydraulic deposit, POND=Settling pond or lagoon sludge, ORE=Ore Stockpile, HEAP=Heap Leach  
**Feature Number:** Corresponding number from Table 2 *(Waste Number)*
<table>
<thead>
<tr>
<th>Sample Number</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of sample</td>
<td></td>
</tr>
<tr>
<td>Sampler (Initials)</td>
<td></td>
</tr>
<tr>
<td>Sample Type</td>
<td></td>
</tr>
<tr>
<td>Sample Latitude</td>
<td></td>
</tr>
<tr>
<td>Sample Longitude</td>
<td></td>
</tr>
<tr>
<td>Likely Source of Contamination</td>
<td></td>
</tr>
<tr>
<td>Feature Number</td>
<td></td>
</tr>
<tr>
<td>Indicators of Contamination</td>
<td></td>
</tr>
<tr>
<td>Photo Number</td>
<td></td>
</tr>
</tbody>
</table>

**Comments:** *(When commenting on a specific waste or soil sample, reference sample number used in Table 6):*

**Codes Applicable for all entries:** NA= Not applicable, UNK= Unknown, OTHER= Explain in comments, NO= NO or none  
**Sample Type:** SING= Single sample, COMP= Composite sample (enter length)  
**Likely Source of Contamination:** ADIT= Adit, SHAFT= Shaft, PIT= Open Pit, HOLE= Prospect Hole, WASTE= Waste rock dump, MILL= Mill tailings, SPOIL= Overburden or spoil pile, PLACER= Placer or hydraulic deposit, POND= Settling pond or lagoon, ORE= Ore Stockpile, HEAP= Heap Leach  
**Feature Number:** Corresponding number from Table 1 or 2 (Opening or Waste Number)  
**Indicators of Contamination** *(Enter as many as exist):* NO= None, VEG= Absence of vegetation, PATH= Visible sediment path, COLOR= Different color of soil than surrounding soil, SALT= Salt crystals
9. HAZARDOUS WASTES/MATERIALS

<table>
<thead>
<tr>
<th>TABLE 7 - HAZARDOUS WASTES/MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Number</td>
</tr>
<tr>
<td>Type of Containment</td>
</tr>
<tr>
<td>Condition of Containment</td>
</tr>
<tr>
<td>Contents</td>
</tr>
<tr>
<td>Estimated Quantity of Waste</td>
</tr>
</tbody>
</table>

Comments: *(When commenting on a specific hazardous waste or site condition, reference waste number used in Table 7):*

---

**Codes Applicable for all entries:** NA = Not applicable, UNK = Unknown, OTHER = Explain in comments, NO = NO or none

**Type of Containment:** NO = None, LID = drum/barrel/vat with lid, AIR = drum/barrel/vat without lid, CAN = cans/jars, LINE = lined impoundment, EARTH = unlined impoundment

**Condition of Containment:** GOOD = Container in good condition, leaks unlikely, FAIR = Container has some signs of rust, cracks, damage but looks sound, leaks possible, POOR = Container has visible holes, cracks or damage, leaks likely, BAD = Pieces of containers on site, could not contain waste

**Contents:** from label if available, or guess the type of waste, e.g., petroleum product, solvent, processing chemical.

**Estimated Quantity of Waste:** Quantity still contained and quantity released
10. STRUCTURES

For structures on or partially on National forest lands.

<table>
<thead>
<tr>
<th>Type</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photo Number</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

Codes Applicable for all entries: NA=Not applicable, UNK=Unknown, OTHER=Explain in comments, NO=NO or none
Type: CABIN=Cabin or community service (store, church, etc.), MILL=mill building, MINE=building related to mine operation, STOR=storage shed, FLUME=Ore Chute/flume or tracks for ore transport
Number: Number of particular type of structure all in similar condition or length in feet
Condition: GOOD=all components of structure intact and appears stable, FAIR=most components present but signs of deterioration, POOR= major component (roof, wall, etc) of structure has collapsed or is on the verge of collapsing, BAD=more than half of the structure has collapsed

11. MISCELLANEOUS

Are any of the following present? (Check all that apply): ____ Acrid Odor, ____ Drums, ____ Pipe, ____ Poles, ____ Scrap Metal, ____ Overhead wires, ____ Overhead cables, ____ Headframes, ____ Wooden Structures, ____ Towers, ____ Power Substations, ____ Antennae, ____ Trestles, ____ Powerlines, ____ Transformers, ____ Tramways, ____ Flumes, ____ Tram Buckets, ____ Fences, ____ Machinery, ____ Garbage

Describe any obvious removal actions that are needed at this site:

__________________________

General Comments/Observations (not otherwise covered)

__________________________
12. SITE MAP

Prepare a sketch of the site. Indicate all pertinent features of the site and nearby environment. Include all significant mine and surface water features, access roads, structures, etc. Number each important feature at the mine site and use these number throughout this form when referring to a particular feature (Tables 1 and 2). Sketch the drainage routes off the site into the nearest stream.
13. RECORDED INFORMATION

Owner(s) of patented land
Name: __________________________________________
Address: _______________________________________
Telephone Number: ______________________________

Claimant(s)
Name: _________________________________________
Address: _______________________________________
Telephone Number: ______________________________

Surface Water (From water rights)
Number of Surface Water Intakes within 15 miles downstream of site used for:
   ____ Domestic, ____ Municipal, ____ Irrigation, ____ Stock,
   ____ Commercial/Industrial, ____ Fish Pond, ____ Mining,
   ____ Recreation, ____ Other

Wells (From well logs)
Nearest well ______ miles
Number of wells within ______ 0-1/4 miles ______ 1/4-1/2 miles, ______ 1/2-1 mile
   ____ 1-2 miles ______ 2-3 miles ______ 3-4 miles of site

Sensitive Environments
List any sensitive environments (as listed in the HRS) within 2 miles of the site or along receiving stream
for 15 miles downstream of site (wetlands, wilderness, national/state park, wildlife refuge, wild and
scenic river, T&E or T&E habitat, etc):
________________________________________________________________________

Population (From census data)
Population within ______ 0-1/4 miles ______ 1/4-1/2 miles ______ 1/2-1 mile
   ____ 1-2 miles ______ 2-3 miles ______ 3-4 miles of site

Public Interest
Level of Public Interest: ____ Low, ____ Medium, ____ High
Is the site under regulatory or legal action? ____ Yes, ____ No

Other sources of information (MILs #, MRDS #, other sampling data, etc):
________________________________________________________________________
Appendix B
Database Fields
NEWLOC, WA, 1
ORANGENUM, 451
MAPLOC, 1
DEPOSIT, Eagle Creek Mine
MRDSREC
MILSREF, 0160790528
PERIODPROD

ORE
COMMOD, Au

LATITUDE, 474325
LONGITUDE, 1154916
HARDFILE, N
MLA
NAME, EAGLE CREEK MINE
SEC, 33
SUBSEC, NESE
TWN, 051 N
RNG, 005 E
DDMMSS, 474325
DDDMMS, 1154904
OPTYP, SURFAC
STATUS, PAST PRO
COMMO1, GOLD
COMMO2
COMMO3
COMMO4
COMMO5
MAPNAME, BURKE
QUAD, WALLACE
POP, 1KM
TOE, M
YFC
MPF
SITENAME
DISTRICT
COUNTY
SEXQUAD
SECCQUADSCL
UTMNORTH
UTMEAST
UTMZONE
COMMODIT
LAT
LON
TOWN
SECTION
RANGE

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Appendix C
Geochemical Data
GEOCHEMICAL DATA

ACCURACY OF GEOCHEMICAL DATA

The following information was received on the subject of the accuracy and the detection limits for the geochemical data presented in this report:

Date: Fri, 24 Oct 1997 10:48:23 PST8PDT
From: Kim Anderson <kanderson@asl.fs.uidaho.edu>
To: Ruth E Vance <rvance@uidaho.edu>
Subject: Re: detection limit accuracy

That is something I put together some years ago for another client. Also Greg Moller [Technical Director, Analytical Sciences Laboratory] had input. Other than that, the refs are included in the discussions I sent [discussion titled “Practical Quantitation Limits”; see next page].

Good Luck
Kim,

Kim A. Anderson, Ph.D.
Asst. Prof. / Food Science and Toxicology Dept.
Chief Chemist / Analytical Sciences Laboratory
University of Idaho
Moscow, Idaho 83844-2201
208-885-7900/FAX 209-885-8937

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Practical Quantitation Limits

Sensitivity of an analytical method is often based on its ability to reproducibly detect target analytes above the method noise level. Several similar definitions of this Minimum Detection Level or Limit (MDL) or Limit of Detection (LOD) are currently used. According to the American Chemical Society (ACS) (Principles of Environmental Analysis, p 9):

**Limit of detection (LOD)** "is defined as the lowest concentration level that can be determined as statistically different from the blank".

**Instrument detection limit (IDL)** "is the smallest signal above background noise that an instrument can detect reliably and is often equivalent to the LOD".

**Method detection limit (MDL)** "is the lowest concentration of analyte that can that a method can detect reliably in either a sample or a blank".

ACS recommends the value of LOD to be $3\sigma$ for a 99% confidence level, where $\sigma$ is the standard deviation of the measurement.

**Limit of Quantitation (LOQ)** "is defined as the level above which quantitative results may be obtained with a specified degree of confidence".

ACS recommends an LOQ of $10\sigma$ and this imparts a quantitative measurement uncertainty of $+/−30\%$ in the measured value at this 99% confidence level. ACS contends "quantitative interpretation, decision-making and regulatory actions should be limited to data at or above the limit of quantitation". In particular, ACS states: "Analytical chemists must always emphasize to the public that the single most important characteristic of any result obtained from one or more analytical measurements is an adequate statement of its uncertainty level. Lawyers usually attempt to dispense with uncertainty and try to obtain unequivocal statements; therefore, an uncertainty interval must be clearly defined in cases involving litigation and/or enforcement proceedings. Otherwise, a value of 1.001 without a specified uncertainty, for example, may be viewed as legally exceeding a permissible level of 1."

EPA Methods used for regulatory enforcement use the same definition of MDL. "The method detection limit is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero". Since performance of analytical methodology and therefore detection limits vary significantly with non-controllable laboratory to laboratory variables such as the exact type of analytical instrumentation, EPA promulgates the concept of Practical Quantitation Limits (PQL). A PQL is equal to the MDL multiplied by a factor of ten or greater and are published as a general guide to laboratory method performance. The factors can range from ten to ten thousand depending on sample matrix and are intended to allow the laboratory the flexibility to determine the relative performance of an analytical method in a more complex sample matrix. In confirmation of laboratory variability, EPA methods as well as other published analytical methods often estimate detection limits and quantitation limits using a bench-level expert, performance estimate.

Recognition of the 'average performance' nature of the PQL guidelines, EPA states that PQL's "are the lowest concentrations of analytes in (samples) that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQL's listed are generally stated to one significant figure. CAUTION: The PQL values in many cases are based only on a general estimate for the method and not on a determination for the individual compounds; PQL's are not a part of the regulation (40 CFR Part 264 Appendix IX, Footnote 6)."

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SEE

FOLDER:

Geochem_data

For data

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Appendix D
Field Forms for Properties in the Study Area
SEE

FOLDER:

Field_forms

For data

Page 281