Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Forest Service Lands (Region 1), Idaho Panhandle National Forest: Volume VIII: Bonners Ferry Ranger District, Boundary County, Idaho

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Field Inspection conducted by Earl Bennett
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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 that could impact U.S. 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 volume presents work that was done in the Bonners Ferry district. Appendix E contains a list of all reports prepared for this project. 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, field examination of properties in the Gold Creek drainage (Lakeview mining district) in Bonner County, and preparation of reports discussing the ownership and operational history of selected mines. Field work in the summer of 1997 covered properties in the Coeur d'Alene River basin surrounding the Coeur d'Alene mining district that had not been examined the previous summer. Properties north and south of the Coeur d'Alene River drainage were examined during the 1998 field season.

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

1. Systematically identify all mine sites with possible human health, environmental, and/or safety related problems that either are on or affecting 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 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 include 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 the 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 (FeS$_2$) and pyrrhotite (Fe$_{1-x}$S). Other sulfides play a minor role in acid generation. Oxidation of iron sulfides forms sulfuric acid (H$_2$SO$_4$), sulfate ions (SO$_4^{2-}$), and reduced iron (Fe$^{2+}$). 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 ferrooxidans). The oxidized iron produced by biological activity promotes further oxidation and dissolution of pyrite, pyrrhotite, and marcasite (FeS$_2$, 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, CuFeS$_2$; galena, PbS; tetrahedrite, (CuFe)$_{12}$Sb$_4$S$_{13}$, 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 \([\text{Fe(OH)}_3]\) 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 \([\text{KAl}_3(\text{SO}_4)_2(\text{OH})_6]\) and jarosite \([\text{KFe}_3(\text{SO}_4)_2(\text{OH})_6]\) will precipitate at a pH of less than 4, depending on \(\text{SO}_4^{2-}\) and \(\text{K}^+\) 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 desorb 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, \(\text{H}_2\text{AsO}_4^\text{-}\). 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 \([\text{Cd}_4(\text{PO}_4)_2]\). Octavite is the dominant control on the solubility of cadmium in soils. In water, at low partial pressures of \(\text{H}_2\text{S}\), \(\text{CdCO}_3\) is easily reduced to \(\text{CdS}\).

**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 \(\text{CO}_3^{2-}\) 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 chalcopryite \([\text{CuFeS}_2]\), bornite \([\text{Cu}_2\text{FeS}_4]\), chalcolite \([\text{Cu}_2\text{S}]\), and tetrahedrite \([\text{Cu}_{12}\text{Sb}_2\text{S}_{13}]\).
**Mercury** readily vaporizes under atmospheric conditions and thus is most often found in concentrations well below the 25 μg/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 [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. Franklinitie 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 acid mine drainage may ultimately control the 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. 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 IGS 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>1.</td>
<td>Mill site or tailings present.</td>
</tr>
<tr>
<td>2.</td>
<td>Adits with discharge or evidence of discharge.</td>
</tr>
<tr>
<td>3.</td>
<td>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>4.</td>
<td>Mine waste in floodplain or shows signs of water erosion.</td>
</tr>
<tr>
<td>5.</td>
<td>Residences, high public use area, or environmentally sensitive area (as listed in HRS) within 200 feet of the disturbance.</td>
</tr>
<tr>
<td>6.</td>
<td>Hazardous wastes/materials (chemical containers, explosives, etc.)</td>
</tr>
<tr>
<td>7.</td>
<td>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.

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 surface 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. 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 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, Stream Sediment, and Mine Waste Sampling Procedures

At sites identified as having a potential problem, the geologist collected soil, rock, stream sediment, 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, stream sediment, 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 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. Two 125-ml samples were collected.
One sample was left raw and the other was acidified with 0.1N nitric acid. Both samples were stored in a secured ice box. The samples remained under constant refrigeration and security until submitted for analysis.

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, reference water-quality data at a particular mine site was restricted to upstream surface water samples. However, in some drainages reference samples were collected at sites with no visible contamination and no known mining activity upstream from the sampling location. Reference 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 200.9), Lead (EPA Test 200.9), and Mercury (EPA Test 245.1).
Water Samples (raw and filtered 0.45 micron filter)—Dissolved Metal Screen (EPA Test 200.7).
Soil and Waste Material—Element Screen (EPA Test 3050/6010), Leachable Metals (TCLP for Metals) Screen (EPA Test 1311/6010).

1.5.5 Standards

EPA and various state agencies have developed human health and environmental standards for various metals. In an attempt 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 Cathall (1980). They analyzed both rock samples from the parent formation and soil samples from above the parent material. The median results from these analyses are presented in Tables 1.5-3 and 1.5-4, which show data for the Prichard, 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 are 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).

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
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>Pricard 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>0.01</td>
<td>0.007</td>
<td>0.006</td>
<td>0.007</td>
<td>0.009</td>
</tr>
<tr>
<td>Mercury (ppm)</td>
<td>0.03</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>
<tr>
<td>Element</td>
<td>Prichard Formation</td>
<td>Burke Formation</td>
<td>Revett Formation</td>
<td>St. Regis Formation</td>
<td>Wallace Formation</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------------</td>
<td>-----------------</td>
<td>------------------</td>
<td>--------------------</td>
<td>-------------------</td>
</tr>
<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>
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 database compatible with other studies under way by the U.S. Forest Service.

1.5.7 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 identifying the person who took the sample (usually the first letter of the last name); 2) one or two digits for the month (some sample numbers contain a leading zero); 3) two digits for the day on which the sample was taken; 4) the last two digits in the year in which the sample was taken (i.e., “98,” if the samples was taken in 1998); 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 BONNERS FERRY RANGER DISTRICT, BOUNDARY COUNTY, IDAHO

2.1 INTRODUCTION

This report describes thirty-one properties in the Bonners Ferry Ranger District of the Kaniksu National Forest, which includes the mining area north and east of Priest Lake in Boundary County, Idaho. Seven properties discussed in this volume reported production, and three of these had over 1,000 tons of total output. The study area extends from the district boundary and Priest Lake State Forest on the west to the Idaho state line on the east. The northern edge of the study area is the Canadian border. The southern boundary of the district is roughly parallel to the Boundary-Bonner county line. Access to the area is by paved and unpaved roads from the U.S. Highway 95, which traverses the area in a north-south direction, and U.S. Highway 2, which splits from U.S. 95 and heads east into Montana through Moyie Springs. Most of the secondary drainages have dirt roads, especially those with past mining activity.

The study area is in the Bonners Ferry District of the Kaniksu National Forest, and most of the land is administered by the U.S. Forest Service (USFS). There are enclaves of private land, mostly on patented mining claims.

The thirty-one mines and prospects described in this report are located on thirteen 7.5-minute topographic maps (U.S. Geological Survey). The locations of these properties are shown in Figure 2.1-1. Elevations in the study area range from about 1,746 feet on the Kootenai River at the Canadian border to 7,352 feet at Gunsight Peak near the western border of the study area. The area is heavily forested with dense brush and conifers, and the topography is generally very steep.

2.1.1 Summary of the Bonners Ferry Study Area

There were thirty-one mining properties (Table 2.1.1-1) examined in the Bonners Ferry Ranger District. Of these mines, six have the potential to have an environmental impact on or near USFS lands. Two of these properties have water discharges that exceed one or more water quality standards, and four properties have both water quality concerns and waste rock impinging on an active waterway. In addition, mill tailings were found at three of these sites. Of the thirty-one sites discussed in this report, fourteen have open adits or shafts. Six of these properties have multiple open workings. Several of these openings pose significant safety hazards.

2.2 GEOLOGY

The most recent general reference showing the geology of the Priest Lake area is Aadland and Bennett (1979). The geology and ore deposits of the area are discussed in Kirkham and Ellis (1926), Close and others (1975), Miller (1973), Le Moine (1959), and a number of unpublished reports on individual deposits. Gott and Cathrall (1980) discuss the geochemistry of the Coeur d'Alene district, which is underlain by many of the same rock units as the Priest Lake area. A brief description of the geologic framework of the area follows.
Table 2.1-1. List of properties visited in the Bonners Ferry District. The properties are arranged according to site number. All sites were visited in 1998.

**Explanation:**

**Site Number:** Idaho Geological Survey file number, or field designation number.

**Surface Owner:** FS = Forest Service; BLM = Bureau of Land Management; S = State; P = Private or Patented claims.

**Water/Solid Sample:** numbers indicate the number of samples collected.

**Environmental Concerns:** W = water; D = waste dump; SS = stream sediment; T = tailings. Environmental concerns are noted as follows: W - samples of adit water or seeps from waste dumps that exceed one or more water quality standards in the Dissolved Metals Screen, the Total Recoverable Metals Screen, or the arsenic, lead or mercury tests; D or T - dump or tailings samples that exceed background or environmental standards for one or more elements in the Element Screen, and/or dump or tailings samples that show significant leaching of one or more metals in the TCLP for Metals Screen.

**Physical Conditions:** AO = open adit; AC = caved or otherwise closed adit; AG(O) = gated adit with open gate; SO = open shaft; SC = caved shaft; StO = open stope; T = trench or bulldozer cut; P = prospect pit; OP = open pit. Numbers indicate how many of each are at the site, queried when type or condition of workings is uncertain or unknown.

<table>
<thead>
<tr>
<th>Site Number</th>
<th>Mine Name</th>
<th>Surface Owner</th>
<th>Water Sample</th>
<th>Solid Sample</th>
<th>Environmental Concerns</th>
<th>Physical Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA-1</td>
<td>Golden Scepter Mine</td>
<td>P</td>
<td>1</td>
<td></td>
<td></td>
<td>1AO, 1AC, 1SO</td>
</tr>
<tr>
<td>SA-5</td>
<td>Scheller Prospect</td>
<td>FS, P</td>
<td></td>
<td></td>
<td></td>
<td>several P or T</td>
</tr>
<tr>
<td>SA-2</td>
<td>Hall Mountain No. 1 Prospect;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SA-3</td>
<td>Barringer Prospect;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SA-4</td>
<td>Northwest Prospect. &amp; Develop.;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SA-6</td>
<td>Lucky Betsy Prospect)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SA-8</td>
<td>Montgomery Mine</td>
<td>FS, P</td>
<td>1</td>
<td></td>
<td></td>
<td>3AC, 1AO (also 2AC?, 1AO? not visited)</td>
</tr>
<tr>
<td>SA-9</td>
<td>Miller Brothers Mine</td>
<td>FS, P</td>
<td></td>
<td></td>
<td></td>
<td>1AC, 2P</td>
</tr>
<tr>
<td>SA-14</td>
<td>Copper Falls Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AO</td>
</tr>
<tr>
<td>SA-17</td>
<td>Idaho Continental Mine</td>
<td>P</td>
<td>6</td>
<td>4</td>
<td>W, D, T, SS</td>
<td>2AO, 1StO, 1OP</td>
</tr>
<tr>
<td>SA-20</td>
<td>Parker Mine</td>
<td>S</td>
<td>1</td>
<td></td>
<td></td>
<td>1AC</td>
</tr>
<tr>
<td>SA-44, SA-43</td>
<td>American Girl Mine</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AO, 2SO</td>
</tr>
<tr>
<td>Site Number</td>
<td>Mine Name</td>
<td>Surface Owner</td>
<td>Water Sample</td>
<td>Solid Sample</td>
<td>Environmental Concerns</td>
<td>Physical Conditions</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------</td>
<td>---------------</td>
<td>--------------</td>
<td>--------------</td>
<td>---------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>SA-47</td>
<td>Bethlehem Mine</td>
<td>FS</td>
<td>2</td>
<td>W</td>
<td>1AO, 2AC, 1AG(O), 1SO, P</td>
<td></td>
</tr>
<tr>
<td>SA-49</td>
<td>Tungsten Hill Mine</td>
<td>FS</td>
<td></td>
<td></td>
<td>1AO, 4AC</td>
<td></td>
</tr>
<tr>
<td>SA-51</td>
<td>Queen Mine</td>
<td>FS</td>
<td>2</td>
<td></td>
<td>2AC, several P</td>
<td></td>
</tr>
<tr>
<td>SA-52</td>
<td>Tilley Mine</td>
<td>FS</td>
<td>2</td>
<td>W, D</td>
<td>4AO, 1AC</td>
<td></td>
</tr>
<tr>
<td>SA-54</td>
<td>Klondike Mine</td>
<td>FS</td>
<td></td>
<td>T, P, 1A?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SA-55</td>
<td>Regal Mine</td>
<td>FS</td>
<td>1</td>
<td>1</td>
<td>W, T</td>
<td>1AG</td>
</tr>
<tr>
<td>SA-57</td>
<td>Damon Group</td>
<td>FS</td>
<td></td>
<td></td>
<td>1AC, 2T, several P</td>
<td></td>
</tr>
<tr>
<td>SA-58</td>
<td>Buckhorn Mine</td>
<td>FS</td>
<td>1</td>
<td>2, W,D,T</td>
<td>1AO, 4AC</td>
<td></td>
</tr>
<tr>
<td>SA-72</td>
<td>Jane (Two Tail) Mine</td>
<td>BLM</td>
<td>1</td>
<td></td>
<td>1AO</td>
<td></td>
</tr>
<tr>
<td>SA-75</td>
<td>Homestake Mine</td>
<td>FS, P</td>
<td></td>
<td></td>
<td>1AO</td>
<td></td>
</tr>
<tr>
<td>SA-78</td>
<td>Eureka Prospect</td>
<td>P</td>
<td></td>
<td></td>
<td>1P, 1T</td>
<td></td>
</tr>
<tr>
<td>SA-80</td>
<td>Golden Triplet Group</td>
<td>FS</td>
<td>1</td>
<td>W</td>
<td>2AO, 1AC, 1AG(O)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(SA-87, SA-88, SA-89)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SA-85</td>
<td>Idamont Placer Mine</td>
<td>FS</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SA-91</td>
<td>Boulder Mine</td>
<td>FS</td>
<td>1</td>
<td></td>
<td>1AC, 1P</td>
<td></td>
</tr>
<tr>
<td>B7299801</td>
<td>Ruby Ridge Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td>1T, several P</td>
<td></td>
</tr>
<tr>
<td>B8139802</td>
<td>McGinty Claim</td>
<td>P</td>
<td></td>
<td></td>
<td>1AO, 1P</td>
<td></td>
</tr>
</tbody>
</table>
Most of the mines and prospects in the study area are hosted by metasedimentary rocks of the Belt Supergroup of Precambrian age (Figure 2.2-1), usually the Prichard Formation, or in Precambrian diabase dikes that have intruded the Prichard (Kiiilsgaard, 1951). The characteristics of the various units comprising the supergroup are shown in Table 2.2-1. Key references to the Prichard are Cressman (1982) and Cressman (1989).

In some areas, mineral deposits are also associated with granitic rocks of Cretaceous or early Tertiary age. These plutons intrude the Belt Supergroup throughout most of the area (Aadland and Bennett, 1979). A large mass of these granitic rocks (the Selkirk igneous complex) intrudes the western half of the study area (Miller, 1982; Aadland and Bennett, 1979).

A number of regional north-northwest-trending faults cross the study area (Kirkham and Ellis, 1926; Aadland and Bennett, 1979). Displacement on several of these faults is believed to be large (Kirkham and Ellis, 1926). The Purcell trench, which marks the location of a regional thrust fault, cuts through the area from north to south. The course of the Kootenai River follows the Purcell trench from Bonners Ferry to Porthill (Miller, 1982; Kirkham and Ellis, 1926).

2.3 ECONOMIC GEOLOGY

2.3.1 General Characteristics of the Ore

The metal mines in the district are hosted by metasedimentary rocks of the Belt Supergroup of Precambrian age, by altered diabase and diorite of the Precambrian Purcell sills, or by Cretaceous granitic rocks (Figure 2.2-1). Most of the mines are lead-zinc-silver deposits, sometimes containing copper and gold. Many of the deposits in the Prichard Formation are associated with dioritic or diabasic dikes or sills. One major mine, the Idaho Continental, is in the Wallace Formation (Mitchell, 1999). Several thorium deposits also are in the Prichard Formation near Precambrian sills (Le Moine, 1959; LeMoine, 1960). Many of the prospects in this report were worked in the early 1900s, and much of the available geological information was written long after the mines were closed. Quartz veins, fissure fillings, mineralized shear zones, and replacement deposits have been described. By far the largest mine in the area was the Idaho Continental, a lead-zinc-silver replacement or remobilized stratiform deposit (Mitchell, 1999). A number of the gold deposits in the area occur along shear zones or in quartz veins in basic sills (Kirkham and Ellis, 1926). Molybdenum and tungsten were found at a few properties (Kirkham and Ellis, 1926), and fissure veins in the Hall Mountain area were explored for thorite in the late 1950s (Newton and others, 1960). Production was recorded from seven mines in the study area, and three of these produced over 1,000 tons of ore.

2.3.2 Summary of Mill Development

The location and history of ore processing mills in the study area 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 contaminate waterways, and fine sediment, which could increase loading of the streams or provide a source of wind-blown material. At one
Figure 2.2.1. Geology of the Bonners Ferry Ranger District, Idaho (Aadland and Bennett, 1979). pCm = Precambrian rocks of uncertain age; pCp = Middle Proterozoic Prichard Formation; pCrv = Middle Proterozoic Ravalli Group, undifferentiated; pCb = Middle Proterozoic Barke Formation; pCw = Middle Proterozoic Wallace Formation; pCs = Middle Proterozoic Striped Peak Formation; pCmg = Middle Proterozoic metadiorite, diabase, and quartz diorite dikes and sills; pCg = Middle Proterozoic greenstone; pCsc = Middle Proterozoic Shadow Conglomerate; Qtq, Kga, Kc, Kkt, Kkh, Khm, Kws, Ktm, Kgd, Khq = Cretaceous granitic rocks; Tsp, Tsq = Tertiary granitic rocks; Qag = Quaternary glacial, fluvioglacial, alluvial, and terrace deposits; Qg = Quaternary glacial deposits; Qls = Quaternary landslide debris; Qal = Quaternary stream alluvium.
Table 2.2-1. Generalized section of the Belt Supergroup (Hobbs and others, 1965, p. 14).

<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 areneceous 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></td>
<td>Wallace</td>
<td>Mostly medium- to greenish-gray finely laminated argillite. Some areneceous 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>Formation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upper part</td>
<td></td>
<td></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></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upper part</td>
<td>Light greenish-yellow to light green-gray argillite; thinly laminated. Some carbonate-bearing beds.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower part</td>
<td>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>1,400-2,000</td>
</tr>
<tr>
<td></td>
<td>Revett 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></td>
<td>Burke 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></td>
<td>Prichard</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></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>
time or another, mills were present at the following properties in the study area (ranked by decreasing quantity of mill tailings noted at the site):

Idaho Continental Mine — jig and flotation tailings
Regal Mine — flotation tailings
Buckhorn Mine — tailings from amalgamation and cyanide plants
Jane Mine — stamp mill tailings
Boulder Mine
Parker Mine
Golden Scepter

The first 200 ton-per-day (tpd) gravity mill was built at the Idaho Continental in 1914. Over the years, numerous changes were made in the mill design and equipment. A 50-tpd flotation plant was built in 1937 and was subsequently expanded to 100 tpd. Most of the 500,000+ tons of ore produced from the mine was milled on the property. The last production was reported in 1979 and 1980. In addition to the ore, about 60,000 tons of old jig tailings were reprocessed through the flotation mill and/or by heavy media separation. Most of the tailings were impounded near Blue Joe Creek, which flows through the property. The tailings dam at the mine was breached in the early 1940s, releasing a substantial amount of mill waste into the creek. In 1987, the National Guard recontoured the tailings piles, but sedimentation and metal loadings in Blue Joe Creek from the Idaho Continental tailings remain a serious concern.

A 50-tpd flotation mill was built at the Regal Mine in 1943 and probably operated until the mine closed in 1950. There was apparently no impoundment at the property, and the tailings are spread out over the wooded area west of the mine.

By 1917, the Buckhorn Mine had a five-stamp mill and an arrastra. This was later expanded, probably to a 100-tpd cyanide plant. It is not known how much ore was actually processed, and the only tailings at the site are near the old mill foundation.

A 50-tpd mill (probably a stamp mill) was installed at the Jane Mine in 1913. The mill processed 22 tons of ore in August 1914 and then closed. Later operations at the mine do not appear to have included any milling.

Around 1920, a small testing plant (sold to the owners as a 10-tpd mill) was installed at the Boulder Mine. It is doubtful that much ore was ever run through this plant.

During 1936, a mill was built at the Parker Mine. After testing in December 1937, the mill shut down.

A 25-tpd mill was built at the Golden Scepter in either 1940 or 1941. The company suspended operations before processing any ore.
2.4 HYDROLOGY AND HYDROGEOLOGY

The study area covers the drainage of the north-flowing Kootenai River and its tributaries in Idaho (Figure 2.1-1). The Kootenai River enters Idaho from Montana near Leonia, flows west-northwest past Bonners Ferry, then turns northward until it crosses the Canadian border at Porthill. All tributary drainages in the study area flow into the Kootenai River.

As noted, a number of the lead-zinc mines in the study area are hosted by rocks of the Prichard Formation. 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 taken in the Coeur d'Alene mining district) shows that rocks in the Prichard Formation contain 60 ppm zinc, 34 ppm lead, 3 percent iron, 22 ppm copper, and 0.5 ppm cadmium, and soils developed on the Prichard reflect this metal content (Table 1.5-4, based on 1,705 samples) with 140 ppm zinc, 54 ppm lead, 3.1 percent iron, 21 ppm copper, 1.3 ppm cadmium, and 10 ppm arsenic. Tables 1.5-3 and 1.5-4 show similar data for the other formations in the Belt Supergroup in the Coeur d'Alene mining district.

To test whether the high metal content from the Belt Supergroup, especially the Prichard Formation, was impacting stream waters, two reference water samples were collected. The chemical analyses for these sample are shown in Tables 2.4-1 and 2.4-2, along with water quality standards suggested by the Environmental Protection Agency (EPA). The following reference water samples were collected:

- B8069804 — Grass Creek
- B8139801 — Boulder Creek

These samples are below all EPA standards for all elements.

2.5 SUMMARY OF THE BONNERS FERRY RANGER DISTRICT

2.5.1 Summary of Environmental Observations

Most of the samples from properties with water discharge exceeded EPA water standards for one or more elements (Tables 2.5-1 and 2.5-2). Water quality variances include significant amounts of manganese from the Tilley Mine; lead and zinc from the Regal and Idaho Continental Mines; lead, zinc, and manganese from the Golden Triplet Mine; and lead, zinc, manganese, and aluminum from the Buckhorn Mine. Cadmium in excess of one or more water quality standards is the most prevalent water quality variance in the Priest Lake area. At eight out of the ten properties sampled, cadmium exceeds one or more standards. Usually, one or more other elements also exceed at least one standard in these samples. The elements detected in the water samples are also found in the rock units underlying the drainages.
Table 2.4-1. Dissolved metals in reference water sample from the Bonners Ferry Ranger District. Numbers in bold-face type exceed one or more water quality standards.

<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>B8069804</td>
<td>Grass Creek</td>
<td>—</td>
<td>0.0016</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<td>—</td>
<td>0.0024</td>
<td></td>
</tr>
<tr>
<td>B8139801</td>
<td>Boulder Creek</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</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>0.050</td>
<td>0.002</td>
<td>0.100</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Secondary MCL</td>
<td>0.03-0.2</td>
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<td>1.000</td>
<td>0.300</td>
<td>0.05</td>
<td>5.000</td>
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</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>0.0024</td>
<td>1.4-2.5</td>
<td>0.12-0.21</td>
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</tr>
<tr>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
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<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></td>
<td></td>
<td>0.000012</td>
<td>0.16-0.28</td>
<td>0.11-0.19</td>
<td></td>
</tr>
<tr>
<td>Estimated Detection Level (33% confidence)</td>
<td>0.015</td>
<td>0.0005</td>
<td>0.0004</td>
<td>0.0020</td>
<td>0.0060</td>
<td>0.0028</td>
<td>0.0015</td>
<td>0.0049</td>
<td>0.0007</td>
<td>0.0005</td>
<td>0.010</td>
<td>0.0011</td>
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</table>
Table 2.4-2. Total recoverable metals in reference water sample from Bonners Ferry Ranger District. Numbers in bold-face type exceed one or more water quality standards.

<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>38069804</td>
<td>Grass Creek</td>
<td>--</td>
<td>0.005</td>
<td>--</td>
<td>--</td>
<td>0.100</td>
<td>--</td>
<td>0.0047</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>38139801</td>
<td>Boulder Creek</td>
<td>--</td>
<td>0.003</td>
<td>0.0070</td>
<td>--</td>
<td>0.240</td>
<td>--</td>
<td>0.0024</td>
<td>--</td>
<td>--</td>
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<td>0.0075</td>
</tr>
</tbody>
</table>

**EXPLANATION**

Blank space equals no analysis  
Below Detection Limit is --

**WATER QUALITY STANDARDS**

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<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>2.0000</td>
<td>0.005</td>
<td>0.100</td>
<td>0.050</td>
<td>0.002</td>
<td>0.10</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Secondary MCL</td>
<td>0.05-0.2</td>
<td>1.000</td>
<td>0.004-0.009</td>
<td>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>
<td>0.16-0.28</td>
<td>0.11-0.19</td>
</tr>
<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.3600</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>
<td>0.16-0.28</td>
<td>0.11-0.19</td>
</tr>
<tr>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.1900</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>0.0005</td>
<td>0.012</td>
<td>0.0028</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated Detection Level (33% confidence)</td>
<td>0.0005</td>
<td>0.001</td>
<td>0.002</td>
<td>0.0047</td>
<td>0.150</td>
<td>0.019</td>
<td>0.0049</td>
<td>0.0006</td>
<td>0.012</td>
<td>0.0028</td>
<td></td>
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</tr>
</tbody>
</table>
2.5.2 Mine Waste Samples

Samples were collected from most of the properties where the mine waste dump impinged on an active waterway (Tables 2.5-3 and 2.5-4). As expected, many of these samples contain metal loadings, including arsenic, copper, lead, and zinc, which exceed the Clark Fork Superfund Background Levels. Samples of mill tailings were collected from four of the mines examined in this volume. As expected, these samples also contain high metal loadings, particularly of copper, lead, zinc, and in some samples, arsenic.
Table 2.5-1. Dissolved metals in water samples from the properties in the Bonners Ferry Ranger District. Numbers in bold-face type exceed one or more water quality standards.

<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>B7099801</td>
<td>Bethlehem Mine (SA-47), Adit #3</td>
<td>0.046</td>
<td>0.0020</td>
<td>0.0039</td>
<td>---</td>
<td>0.0180</td>
<td>0.0430</td>
<td>0.0015</td>
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<td>---</td>
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<td>---</td>
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<tr>
<td>B7099802</td>
<td>Bethlehem Mine (SA-47), main adit</td>
<td>0.036</td>
<td>0.0021</td>
<td>0.0052</td>
<td>0.0096</td>
<td>0.0210</td>
<td>---</td>
<td>0.0017</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>B7109801</td>
<td>Tiley Mine (SA-52), Adit 3</td>
<td>0.051</td>
<td>0.0100</td>
<td>0.0059</td>
<td>0.0079</td>
<td>0.0200</td>
<td>---</td>
<td>0.0230</td>
<td>---</td>
<td>0.015</td>
<td>0.0018</td>
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</tr>
<tr>
<td>B7109802</td>
<td>Tiley Mine (SA-52), upper adit</td>
<td>0.041</td>
<td>0.0067</td>
<td>0.0068</td>
<td>---</td>
<td>0.0240</td>
<td>0.1800</td>
<td>1.5000</td>
<td>---</td>
<td>0.028</td>
<td>0.0730</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>B7109803</td>
<td>Queen Mine (SA-51), well water</td>
<td>0.030</td>
<td>0.0020</td>
<td>0.0047</td>
<td>0.0082</td>
<td>0.0190</td>
<td>---</td>
<td>0.0021</td>
<td>---</td>
<td>0.022</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>B7109804</td>
<td>Queen Mine (SA-51), adit</td>
<td>0.048</td>
<td>0.0019</td>
<td>0.0070</td>
<td>0.0087</td>
<td>0.0220</td>
<td>---</td>
<td>0.0023</td>
<td>---</td>
<td>0.021</td>
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<td>---</td>
<td>---</td>
</tr>
<tr>
<td>B7159801</td>
<td>Regal Mine, Adit 1</td>
<td>0.074</td>
<td>0.0090</td>
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<td>0.0028</td>
<td>0.0460</td>
<td>0.093</td>
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<td>0.3700</td>
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</tr>
<tr>
<td>B7159803</td>
<td>Golden Triplet Mine (SA-80), Adit 3</td>
<td>0.028</td>
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<tr>
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<td>0.0010</td>
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<td>0.0030</td>
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<tr>
<td>B7299802</td>
<td>Buckhorn Mine, Adit 1</td>
<td>0.270</td>
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<td>---</td>
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<tr>
<td>B7309801</td>
<td>Idaho-Continental Mine (SA-17), Adit 5</td>
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<td>0.0048</td>
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<td>0.4800</td>
<td>---</td>
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</tr>
<tr>
<td>B7309802</td>
<td>Idaho-Continental Mine (SA-17), upstream from tailings</td>
<td>---</td>
<td>0.0006</td>
<td>0.0068</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0041</td>
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<td>0.0064</td>
<td>---</td>
<td>---</td>
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</tr>
<tr>
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<td>0.0720</td>
<td>---</td>
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<td>0.0026</td>
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<td>---</td>
<td>---</td>
</tr>
<tr>
<td>B8069802</td>
<td>Idaho-Continental Mine (SA-17), Blue Joe Creek, near tailings dam</td>
<td>---</td>
<td>0.0082</td>
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<td>---</td>
<td>0.0057</td>
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<td>0.0300</td>
<td>---</td>
<td>0.3700</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
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<td>Idaho-Continental Mine (SA-17), seep</td>
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<td>0.0033</td>
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<td>---</td>
<td>0.0930</td>
<td>---</td>
<td>---</td>
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</tr>
</tbody>
</table>

**EXPLANATION**

Blank space equals no analysis

Below Detection Limit is ---

**WATER QUALITY STANDARDS**

| Al (mg/L) | As (mg/L) | Ba (mg/L) | Cd (mg/L) | Cr (mg/L) | Cu (mg/L) | Fe (mg/L) | Pb (mg/L) | Mn (mg/L) | Hg (mg/L) | Ni (mg/L) | Zn (mg/L) |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Primary MCL | 0.050 | 2.000 | 0.005 | 0.100 | --- | 0.050 | 0.002 | 0.100 |
| Secondary MCL | 0.05-0.2 | --- | 0.004-0.009 | 1.7-3.1 | 0.018-0.034 | 1.000 | 0.082-0.2 | 0.0024 | 1.4-2.5 |
| Aquatic Life, Acute | 0.750 | 0.360 | --- | --- | --- | --- | --- | --- | 0.12-0.21 |
| Aquatic Life, Chronic | 0.087 | 0.190 | --- | --- | --- | --- | --- | --- | 0.11-0.19 |
| Estimated Detection Level (33% confidence) | 0.015 | 0.0005 | 0.0004 | 0.0020 | 0.0060 | 0.0028 | 0.0015 | 0.0049 | 0.0007 | 0.0005 | 0.010 | 0.0011 |

mg/L = ppm
Table 2.5-2. Total recoverable metals in water samples from the properties in the Bonners Ferry Ranger District. Numbers in bold-face type exceed one or more water quality standards.

<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>B7099801</td>
<td>Bethlehem Mine (SA-47), Adit #3</td>
<td>--</td>
<td>0.002</td>
<td>--</td>
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<td>0.0019</td>
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<td>0.012</td>
<td>0.0030</td>
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<td>B7099802</td>
<td>Bethlehem Mine (SA-47), main adit</td>
<td>0.0013</td>
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<td>0.0025</td>
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<td>0.0230</td>
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<td>--</td>
<td>0.0044</td>
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</tr>
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<td>B7109802</td>
<td>Tilley Mine (SA-52), upper adit</td>
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<td>--</td>
<td>--</td>
<td>--</td>
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<td>--</td>
<td>1.6000</td>
<td>0.016</td>
<td>0.0740</td>
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</tr>
<tr>
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<td>Queen Mine (SA-51), well water</td>
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<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
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<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>B7109804</td>
<td>Queen Mine (SA-51), adit</td>
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<td>--</td>
<td>0.0089</td>
<td>--</td>
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<td>0.0052</td>
<td></td>
</tr>
<tr>
<td>B7159801</td>
<td>Regal Mine, Adit 1</td>
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<td>0.007</td>
<td>0.006</td>
<td>--</td>
<td>--</td>
<td>0.022</td>
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<tr>
<td>B7159803</td>
<td>Golden Triplet Mine (SA-80), Adit 3</td>
<td>0.0180</td>
<td>0.010</td>
<td>0.010</td>
<td>--</td>
<td>--</td>
<td>0.590</td>
<td>--</td>
<td>0.016</td>
<td>0.1100</td>
<td>0.000660</td>
<td>--</td>
<td>0.7400</td>
</tr>
<tr>
<td>B7169801</td>
<td>Golden Scooter Mine (SA-1), Adit 1</td>
<td>0.0035</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.0006</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>B7299802</td>
<td>Backhorn Mine, Adit 1</td>
<td>0.0024</td>
<td>0.004</td>
<td>0.008</td>
<td>0.0067</td>
<td>--</td>
<td>0.160</td>
<td>--</td>
<td>0.089</td>
<td>0.1700</td>
<td>--</td>
<td>--</td>
<td>0.8800</td>
</tr>
<tr>
<td>B7309801</td>
<td>Idaho-Continental Mine (SA-17), Adit 5</td>
<td>--</td>
<td>0.008</td>
<td>0.008</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.200</td>
<td>0.0038</td>
<td>--</td>
<td>--</td>
<td>0.5000</td>
<td></td>
</tr>
<tr>
<td>B7309802</td>
<td>Idaho-Continental Mine (SA-17), upstream from tailings</td>
<td>--</td>
<td>0.003</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.047</td>
<td>0.021</td>
<td>0.0034</td>
<td>--</td>
<td>--</td>
<td>0.0044</td>
<td></td>
</tr>
<tr>
<td>B7309803</td>
<td>Idaho-Continental Mine (SA-17), downstream</td>
<td>--</td>
<td>0.005</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.140</td>
<td>0.120</td>
<td>0.0026</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>B7319802</td>
<td>Boulder Mine (SA-91), Adit 1</td>
<td>0.016</td>
<td>0.003</td>
<td>0.003</td>
<td>--</td>
<td>--</td>
<td>0.050</td>
<td>--</td>
<td>0.0082</td>
<td>--</td>
<td>--</td>
<td>0.0760</td>
<td></td>
</tr>
<tr>
<td>B8059801</td>
<td>Parker Mine (SA-20), adit</td>
<td>0.009</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.077</td>
<td>--</td>
<td>0.0080</td>
<td>--</td>
<td>0.014</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>B8069802</td>
<td>Idaho-Continental Mine (SA-17), Blue Joe Creek near tailings dam</td>
<td>--</td>
<td>0.011</td>
<td>0.011</td>
<td>--</td>
<td>--</td>
<td>0.027</td>
<td>0.6400</td>
<td>0.0340</td>
<td>--</td>
<td>--</td>
<td>0.4600</td>
<td></td>
</tr>
<tr>
<td>B8069803</td>
<td>Idaho-Continental Mine (SA-17), seep</td>
<td>0.010</td>
<td>0.003</td>
<td>0.003</td>
<td>--</td>
<td>--</td>
<td>0.081</td>
<td>0.3500</td>
<td>0.0044</td>
<td>--</td>
<td>0.013</td>
<td>0.1700</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>0.0500</td>
<td>2.0000</td>
<td>0.005</td>
<td>0.100</td>
<td>1.000</td>
<td>0.050</td>
<td>0.002</td>
<td>0.100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary MCL</td>
<td>0.05-0.2</td>
<td>0.3600</td>
<td>0.004</td>
<td>0.009</td>
<td>1.7-3.1</td>
<td>0.018</td>
<td>0.034</td>
<td>1.000</td>
<td>0.082</td>
<td>0.2</td>
<td>0.0024</td>
<td>5.000</td>
</tr>
<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.3600</td>
<td>0.004-0.009</td>
<td>0.21-0.37</td>
<td>0.012-0.21</td>
<td>0.003-0.008</td>
<td>0.000012</td>
<td>0.016-0.28</td>
<td>0.11-0.19</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.1900</td>
<td>0.001-0.002</td>
<td>0.0047</td>
<td>0.150</td>
<td>0.019</td>
<td>0.0049</td>
<td>0.0006</td>
<td>0.0005</td>
<td>0.012</td>
<td>0.0028</td>
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</tr>
</tbody>
</table>

Estimated Detection Level (33% confidence)
Table 2.5-3. Element screen for dump, tailings, and stream sediment samples for properties in the Bonners Ferry Ranger District.

<table>
<thead>
<tr>
<th>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><strong>dumps</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B7169802</td>
<td>Montgomery Mine, upper adit, waste dump</td>
<td>NA</td>
<td>150.0</td>
<td>9.6</td>
<td>8.70</td>
<td>210.0</td>
<td>1.00</td>
<td>20,000</td>
<td>85</td>
<td>230</td>
<td>NA</td>
<td>140.0</td>
<td>45.0</td>
</tr>
<tr>
<td>B7299803</td>
<td>Buckhorn Mine, Adit 1, dump</td>
<td>NA</td>
<td>400.0</td>
<td>74.0</td>
<td>3.90</td>
<td>11.0</td>
<td>66</td>
<td>58,000</td>
<td>3,400</td>
<td>99</td>
<td>NA</td>
<td>14.0</td>
<td>190.0</td>
</tr>
<tr>
<td><strong>tailings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B7159802</td>
<td>Regal Mine, tailings</td>
<td>NA</td>
<td>110.0</td>
<td>86.0</td>
<td>3.10</td>
<td>14.0</td>
<td>32</td>
<td>28,000</td>
<td>59</td>
<td>280</td>
<td>NA</td>
<td>15.0</td>
<td>88.0</td>
</tr>
<tr>
<td>B7309803</td>
<td>Idaho-Continental Mine (SA-17), flotation tailings</td>
<td>NA</td>
<td>—</td>
<td>35.0</td>
<td>4.30</td>
<td>5.5</td>
<td>180</td>
<td>18,000</td>
<td>26,000</td>
<td>35</td>
<td>NA</td>
<td>10.0</td>
<td>370.0</td>
</tr>
<tr>
<td>B7309804</td>
<td>Idaho-Continental Mine (SA-17), iig tailings</td>
<td>NA</td>
<td>—</td>
<td>82.0</td>
<td>4.60</td>
<td>9.4</td>
<td>370</td>
<td>13,000</td>
<td>18,000</td>
<td>310</td>
<td>NA</td>
<td>13.0</td>
<td>530.0</td>
</tr>
<tr>
<td>B8049801</td>
<td>Jane Mine (SA-72), tailings</td>
<td>NA</td>
<td>—</td>
<td>18.0</td>
<td>4.90</td>
<td>8.4</td>
<td>1,300</td>
<td>85,000</td>
<td>27,000</td>
<td>130</td>
<td>NA</td>
<td>18.0</td>
<td>56.0</td>
</tr>
<tr>
<td>B8069801</td>
<td>Idaho-Continental Mine (SA-17), flotation tailings</td>
<td>NA</td>
<td>—</td>
<td>7.8</td>
<td>19.00</td>
<td>10.0</td>
<td>760</td>
<td>17,000</td>
<td>17,000</td>
<td>630</td>
<td>NA</td>
<td>13.0</td>
<td>170.0</td>
</tr>
<tr>
<td>B8129801</td>
<td>Buckhorn Mine, tailings</td>
<td>NA</td>
<td>890.0</td>
<td>180.0</td>
<td>2.60</td>
<td>27.0</td>
<td>39</td>
<td>39,000</td>
<td>790</td>
<td>360</td>
<td>NA</td>
<td>33.0</td>
<td>120.0</td>
</tr>
<tr>
<td><strong>stream sediments</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B8059802</td>
<td>Idaho-Continental Mine (SA-17), stream sediment (reworked iig tailings)</td>
<td>NA</td>
<td>—</td>
<td>36.0</td>
<td>11.00</td>
<td>11.0</td>
<td>580</td>
<td>18,000</td>
<td>11,000</td>
<td>450</td>
<td>NA</td>
<td>13.0</td>
<td>970.0</td>
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</table>

Clark Fork Superfund Background Levels (mg/Kg) = ppm

<table>
<thead>
<tr>
<th></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>
</tr>
<tr>
<td>Missoula Lake Bed Sediments</td>
<td>NA</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>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 for dump, tailings, and stream sediment samples from properties in the Bonners Ferry Ranger District.

<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>
<th>Ba (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>dumps</td>
<td>Montgomery Mine, upper adit, waste dump</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.160</td>
</tr>
<tr>
<td></td>
<td>Buckhorn Mine, Adit 1, dump</td>
<td></td>
<td></td>
<td></td>
<td>34.00</td>
<td></td>
<td></td>
<td></td>
<td>0.330</td>
</tr>
<tr>
<td>tailings</td>
<td>Regal Mine, tailings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.100</td>
</tr>
<tr>
<td></td>
<td>Idaho-Continental Mine (SA-17), flotation tailings</td>
<td></td>
<td></td>
<td></td>
<td>200.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Idaho-Continental Mine (SA-17), jig tailings</td>
<td></td>
<td></td>
<td>0.031</td>
<td>220.00</td>
<td></td>
<td></td>
<td></td>
<td>0.410</td>
</tr>
<tr>
<td></td>
<td>June Mine (SA-72), tailings</td>
<td></td>
<td></td>
<td></td>
<td>260.00</td>
<td></td>
<td></td>
<td></td>
<td>0.081</td>
</tr>
<tr>
<td></td>
<td>Idaho-Continental Mine (SA-17), flotation tailings</td>
<td></td>
<td>0.160</td>
<td>0.082</td>
<td>520.00</td>
<td>0.0026</td>
<td></td>
<td></td>
<td>0.320</td>
</tr>
<tr>
<td></td>
<td>Buckhorn Mine, tailings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.360</td>
</tr>
<tr>
<td>stream sediments</td>
<td>Idaho-Continental Mine (SA-17), stream sediment (reworked jig tailings)</td>
<td></td>
<td></td>
<td></td>
<td>0.021</td>
<td>100.00</td>
<td></td>
<td></td>
<td>0.280</td>
</tr>
</tbody>
</table>

EXPLANATION
Blank space equals no analysis
Below Detection Limit is ---

<table>
<thead>
<tr>
<th>WATER QUALITY STANDARDS</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>
<th>Ba (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary MCL</td>
<td>0.050</td>
<td>0.005</td>
<td>0.100</td>
<td>0.050</td>
<td>0.002</td>
<td>0.050</td>
<td>2.000</td>
<td></td>
</tr>
<tr>
<td>Secondary MCL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.100</td>
<td></td>
</tr>
<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>0.002</td>
<td></td>
<td>0.0041 - 0.0134</td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Chronic</td>
<td>0.190</td>
<td>0.001 - 0.002</td>
<td>0.21 - 0.37</td>
<td>0.003 - 0.008</td>
<td>0.000012</td>
<td></td>
<td>0.00012</td>
<td></td>
</tr>
<tr>
<td>Estimated Detection Level (33% confidence)</td>
<td>0.49</td>
<td>0.02</td>
<td>0.03</td>
<td>0.500</td>
<td>0.0017</td>
<td>0.650</td>
<td>0.270</td>
<td>0.050</td>
</tr>
</tbody>
</table>
3.0 BONNERS FERRY DISTRICT PROPERTY DESCRIPTIONS

3.1 TUNGSTEN HILL MINE (Site No. SA-49)
Alternate names—Chief Joseph; M and F; Blanche; Bull Moose Group; M. & F. Mine.

3.1.1 Site Location and Access (Figure 2.1-1)

The Tungsten Hill Mine is just north of the center of section 13, T. 64 N., R. 1 E., on the Hall Mountain 7.5-minute quadrangle (Figure 3.1-1). Access from U.S. Highway 95 is from the road to the Brush Lake Campground (Forest Service Road 1004), which heads south from Highway 95 about 1.3 miles north of the junction between State Highways 1 and 95. About ¼ mile up the Brush Lake Road is the junction between Road 1004 and FS Road 397, and one mile up Road 397 is the junction with FS Road 2485. Continuing on Road 397, FS Road/Trail 23, which goes north to the Tungsten Hill Mine, is about 5 miles southeast. This road was traveled by motorcycle to the lower, or main, dump of the mine. The mine is on land administered by the U.S. Forest Service.

3.1.2 Geologic Features (Figure 2.2-1)

This property is in one of the Purcell sills, which are altered diabase and gabbro of Precambrian age. Rocks near the mine include the Precambrian Prichard Formation and Cretaceous granodiorite, which are cut by a nearby northwest-trending fault (Aadland and Bennett, 1979). Brackebusch (1969, p. 68-69) described the property as follows:

The Tungsten Hill mine in sec. 13, T. 64 N., R. 1 E. has been described by Livingston (1919, p. 11-15), and Kirkham and Ellis (1926, p. 61). The mineralized structure is a quartz vein in sill B about six feet in width that strikes N. 80° W. and dips steeply to the north. Livingston [1919, p. 12] describes the occurrence of scheelite:

The quartz contains many limonite-filled cavities and some scheelite, which occurs usually associated with the limonite. Sometimes the scheelite is in coarse crystals or masses but most of it is finely divided in the vein as can be shown either by panning or by analysis of apparently barren material.

Kirkham and Ellis (1926, p. 61) observed, besides quartz and scheelite, small amounts of galena, pyrite, pyrrhotite, and copper stain. During their study, the assemblage magnetite-chalcopyrite-scheelite was observed. This assemblage probably oxidizes to form the limonite-filled cavities noted by Livingston.

The production of the Tungsten Hill mine has probably been about one ton of scheelite which was separated from the gangue by hand sorting. Livingston (1919, p. 13) sampled the vein and found it to contain 1.09 percent WO₃ over a width of 5.5 feet. Although Livingston indicated that most of the scheelite was not amenable to recovery by hand sorting, apparently no mill has ever been constructed at the mine.
Workings at the Tungsten Hill mine include an open cut on the vein (now mostly caved), dozer trenches, and a crosscut tunnel driven about 150 feet below the outcrop. At the time of the visit by Kirkham and Ellis in 1925 this lower crosscut tunnel had intersected the vein west of the outcrop, but it showed only sugar quartz and calcite (1926, p. 61). This tunnel was inaccessible during this study, and it is not known how much drifting has been done on the vein at this level. The dump contains quartz, calcite, garnet, magnetite, chalcopyrite, scheelite, pyrite and epidote.

The same conclusion regarding the Tungsten Hill mine as made by Kirkham and Ellis, and Livingston is made in this study: the property merits additional prospecting. The reasons for this conclusion are:

1) An indication of ore grade of about one percent WO₃ over a six foot width (gross value $40 per ton),
2) Presence of scheelite over a vertical distance of at least 150 feet on the vein,
3) The association magnetite-chalcopyrite-scheelite.

3.1.3 Site History

This property was located sometime before 1918, apparently as the Bull Moose Group (Livingston, 1919). The Tungsten Hill Mining Company was incorporated in 1918. When Livingston visited the mine in the summer of 1918, the workings consisted of a 60-foot open cut on the main vein, several smaller open cuts, a 20-foot shaft on the west end of the large open cut, and a 130-foot crosscut tunnel (Livingston, 1919). The mine was reported to have shipped between 1,000 and 1,500 pounds of 68 percent tungsten concentrate from the open cut during World War I (Hobbs, 1942). By 1920, there were twenty claims and 350 feet of workings. Operations were discontinued in 1922 (Kirkham and Ellis, 1926), and Tungsten Hill forfeited its corporate charter in 1923.

By the mid-1920s, the mine was known as the M. & F. Kirkham and Ellis (1926, p. 61) described it as follows:

The ore is chiefly scheelite though accompanying it in a heavy massive quartz are also specks of galena, pyrite, pyrrhotite, and copper stains. Scheelite, calcium tungstate, was in demand during the World War. At that time it could be profitably mined even in small quantities, but a lowering of the price has necessitated development looking toward mining on a larger scale.

The main vein has been opened up by one long surface cut and is again exposed by a short cross-cut which encounters it a few feet below the surface cut. A still longer tunnel has been driven which encounters the vein at considerable depth but is west of the ore shoot. The face of the lower tunnel shows "sugar" quartz and
calcite. Drifting to the east should open up ore found above. The vein strikes S. 84° E. and dips 70° N. It is six feet wide where encountered in the upper tunnel. In all, 500 feet of development work has been done.

Open cuts expose another vein on the Blanche No. 1 and No. 2 claims. These cuts are probably 1500 feet northwest from the lower tunnel on the other vein just described. The Blanche vein strikes N. 4° E. and dips 60° E. The exact width of the vein was not determined, but it is probably about two or three feet wide.

The M. & F. property includes 19 claims. The equipment consists of a blacksmith shop, hand mining tools, mine car, and light rail, together with several camp buildings. Active development operations were discontinued in 1922. Since that time assessment work, including road building and general repair, has been performed. There has been little production to date.

By 1942, when the property was examined by the U.S. Geological Survey as a potential source of tungsten, the mine had four adits, a 75-foot-long open cut, and a number of pits and small trenches. Two of the adits were caved and inaccessible. Of the other two adits, the lower had 385 feet of workings and the upper had 130 feet of crosscuts and drifts (Hobbs, 1942).

In 1948, the Tungsten Hill was held by Howard Wickersham and his partner, Sam Hash (Kilsgaard, 1951). At that time, the mine was described as follows (Kilsgaard, 1951, p. 30):

All workings in this property are now caved and inaccessible; however, they originally explored a tungsten-bearing quartz vein that cuts a large diorite sill. The mine has been idle since the termination of World War I.

Chief Joseph Mines, Inc. (incorporated in 1951), obtained a Defense Minerals Exploration Administration (DMEA) loan (Contract Idm-E 297; Docket No. DMEA 1499X) in 1952 to locate ore shoots on extensions of the vein. However, most of the bulldozing done under this contract was in areas that had been explored by the old workings and no new ore was discovered (Erickson and Fryklund, 1953). In 1952, the development on the property was as follows (Erickson and Fryklund, 1953, p. 2-3):

Mine workings consist of a 270-foot lower adit crosscut to the vein and 125 feet of drift on the vein from this adit. There are also four short adits, a shallow shaft, 60 feet of drift off the adit near the shaft, and a raise to the surface from the 60-foot shaft (see accompanying map [Figure 3.1-2]). The shaft is open and the 270-foot crosscut can be made accessible by removing the small earthen dam at the portal. The drift off the lower adit is about 150 feet below the outcrop. The 60-foot drift is about 40 feet below the surface.

Chief Joseph forfeited its corporate charter in 1955.
3.1.4 Environmental Conditions

3.1.4.1 Site Features

The Tungsten Hill Mine was visited by Earl H. Bennett on July 9, 1998. A video segment describing the property is on the Bonners Ferry District Videotape (Tape 1, index 00:10:45-00:20:55). Documenting photographs are Roll B1-98, frames 9-12, 16, and 20, and Roll B2-98, frame 1.

Five adit symbols are shown on the topographic map (Figure 3.1-1). These symbols correspond to the locations of the workings reported at the mine (Figure 3.1-2). However, the middle three adits were small and little evidence remains for them. The uppermost adit symbol shown on the topographic map (labeled #5 on Figure 3.1-1) is a trench about 100 feet long and 10 feet deep with a hole in the bottom (Figure 3.1-3). Timbers in the bottom of the trench could have anchored a hoist cable or may be part of a portal (Figure 3.1-4). A dump just west of the No. 5 trench measures about 30 feet in diameter and 25 feet thick on the nose (Figure 3.1-5). Some bull quartz on this dump contains scheelite, the main tungsten mineral of interest. A USFS abandoned mine warning sign is posted by the trench (Figure 3.1-6).

Just below the No. 5 is another trench, which is about 75 feet long and ends in a pit (or possibly a caved adit). A dump at the end of this trench is about 30 feet in diameter and 25 feet thick on the nose.

The lowest adit shown on the topographic map (near the spring) is the main (No. 1) tunnel. It is open and was wet, probably from rain the previous night. The adit is marked with a USFS abandoned mine warning sign (Figure 3.1-7). A trench has been dug to drain the adit, and a patch of alders covers the entrance. A sample of the seep was not collected, but water measurements were made. The dump is 80 feet long, 25 feet wide, and 75 feet thick on the nose (Figure 3.1-8). There is a fair amount of calcite on the dump. Below and west of the No. 1 dump, near the spring, is a collapsed, overgrown building (Figure 3.1-9) and a rusted steel barrel.

3.1.4.2 Sample Locations

No samples were collected at this site, but water measurements were made on the seep from the main adit.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (μS)</th>
<th>Temperature (° F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No sample collected</td>
<td>Main (No. 1) Adit</td>
<td>35</td>
<td>---</td>
<td>6.5</td>
<td>Seep</td>
<td>No</td>
</tr>
</tbody>
</table>

33
3.1.5 Structures

The only structure is a collapsed cabin.

3.1.6 Safety

The open main adit is a potential safety hazard, and the workings associated with the No. 5 trench could also be hazardous. Warning signs are posted at both of these workings.
Figure 3.1-1. Location of the Tungsten Hill Mine, Boundary County, Idaho (U.S. Geological Survey Hall Mountain 7.5-minute topographic map).
Figure 3.1-2. Map of the Chief Joseph (Tungsten Hill) Mine, showing the workings and the location of the quartz vein (Erickson and Fryklund, 1953).
Figure 3.1-3. The uppermost (No. 5) trench at the Tungsten Hill Mine (Roll B1-98, frame #9).

Figure 3.1-4. Timbers and hole in the bottom of the No. 5 trench at the Tungsten Hill Mine (Roll B1-98, frame #10).
Figure 3.1-5. The dump at the upper level (No. 5 trench) of the Tungsten Hill Mine (Roll B1-98, frame #12).

Figure 3.1-6. USFS warning sign at the No. 5 trench at the Tungsten Hill Mine (Roll B1-98, frame #11).
Figure 3.1-7. Main adit at the Tungsten Hill Mine, showing the drainage ditch and the USFS sign (Roll B1-98, frame #16).
Figure 3.1-8. Looking east, toward the dump for the main adit at the Tungsten Hill Mine (Roll B1-98, frame #20).

Figure 3.1-9. Collapsed building west of and below the main adit at the Tungsten Hill Mine (Roll B2-98, frame #1).
3.2 BETHLEHEM MINE (Site No. SA-47)
Alternate names—Dora Tunnel Prospect; Brush Lake Mines; Mable Tunnel.

3.2.1 Site Location and Access (Figure 2.1-1)

The Bethlehem Mine is in the SW¼ of section 14, T. 64 N., R. 1 E., on the Hall Mountain 7.5-minute quadrangle (Figure 3.2-1). Access from U.S. Highway 95 is from the Brush Lake Road (FS Road 1004), which turns off from Highway 95 about 1.3 miles north of its junction with State Highway 1. About ¼ mile up the Brush Lake Road is the junction with FS Road 397, and one mile up Road 397 is the junction with FS Road 2485. Continuing on Road 397, the access road to the Bethlehem Mine is about 3.5 miles southeast of the junction. The mine is on Forest Service-administered land.

3.2.2 Geologic Features (Figure 2.2-1)

The Bethlehem Mine is in Cretaceous granodiorite and the workings cut one of the Purcell sills, which are altered diabase and gabbro of Precambrian age. Rocks near the mine also include the Precambrian Prichard Formation (Aadland and Bennett, 1979). Kilsgaard (1951, p. 26) described the property:

Practically all of the 350 feet of development work has been concentrated on the lower, main level of this mine. At the portal of the main adit, the vein strikes N. 61° E. and dips 70° SE. It is a massive quartz vein, occurring in a fault plane, and ranging in thickness from a few inches to two feet. Near the portal the vein is in granite, but when followed inward for 160 feet it passes into a basic sill where it pinches to a small stringer 2 or 3 inches wide, finally disappearing into the wall. At a point 225 feet from the portal, the adit intersects a small quartz vein that follows the contact of a metamorphosed basic sill and fresh unaltered granite. The vein strikes N. 50° W and dips 43° to 53° SW. It has been drifted on to the northwest and to the southeast but no ore bodies have been exposed. As the drift continues to the southeast it leaves the vein and re-enters the basic sill where it crosscuts several small quartz-filled joint planes. (See Plate 8 [Figure 3.2-2]).

Other development work consists of a caved shaft a few feet south of the main adit portal, some open cuts, and 2 short adits about 700 feet up the hillside above the main adit portal. These upper adits explore small quartz-filled joint planes in the basic sill.

Selected ore samples taken from the adit dumps contain pyrite, arsene-pyrite, galena, and sphalerite, in a quartz and siderite gangue. There are no records of mine production, but judging from the mine development work, little, if any, ore has been produced.

The mine has been idle for several years.
Brackebusch (1969, p. 62) noted:
The main structure is a quartz vein less than three feet in width that contains pyrite, arsenopyrite, galena, sphalerite, and chalcopyrite. The vein strikes N. 60° E. and dips 60-70° SE. The vein cuts both the Kaniksu batholith and sill B. The Kaniksu batholith cuts sill B at the Bethlehem mine (Pl. 1 [omitted]). Kiilsgaard (1951, Pl. 8 [Figure 3.2-2]) mapped the geology of the "lower adit", however he did not map the lowest adit which was driven on the vein about 75 feet lower in elevation. The lowest adit is about 400 feet in length and follows the vein along strike - N. 60° E. At the portal the lowest adit is in sill B which contains disseminated pyrrhotite and magnetite. Two hundred forty feet from the portal the Kaniksu batholith-sill B contact strikes N. 45° W. and dips 30° NE. The face of the adit is quartz monzonite. At 340 feet from the portal the vein is about two feet in width in the quartz monzonite, and a zone approximately 30 feet in length along strike contains some pyrite, galena and chalcopyrite.

William Tilley was doing assessment work in the lowest adit during June 1968. He stated that the property is claimed by the Bethlehem Mining Company and that selected samples from the mineralized part of the vein in the lowest adit contains up to $90 per ton in gold but that the average value over a mineable width in the mineralized zone is only $5-10 per ton in all metals.

The Bethlehem vein had a strike similar to the veins near the American Girl mine and is probably related to the Bethlehem fault. There are minor quartz veins in sill B uphill from the Bethlehem mine.

3.2.3 Site History

Bethlehem Gold Mines, Ltd., was incorporated in 1917, and the mine shipped a small amount of gold ore during the year. By 1919, development included 400 feet of trenching and 375 feet of workings in three tunnels. In addition, the property had two cabins, a bunkhouse, a boarding house and kitchen, an office and quarters for the manager, a compressor building and blacksmith shop, a powder house, and an assay building. By the following year, a shaft had been started and additional buildings, including a stable and a second bunkhouse, were built. Bethlehem forfeited its corporate charter in 1921, probably after the property was foreclosed due to a labor lien of $733.65.

Brush Lake Mines Co. (incorporated in 1921) purchased the mine from the Sheriff's office and announced that the new company would pay the outstanding debts of Bethlehem Gold Mines. The new company continued to develop the property for the next few years, although the reported lengths of the tunnels are not consistent from one year to the next. In 1926, the mine had four tunnels (Dora #1, 650 feet; Dora #2, 50 feet; Mable, 200 feet; and Lower, 300 feet) and one 50-foot vertical shaft. That year, the surface plant and all but one building were destroyed by a forest fire. The company did only assessment work after that. Brush Lake forfeited its
corporate charter in 1931. Brackebusch (1969) noted that assessment work was being done on the lower tunnel in 1968, but no information is available on the reported owner (Bethlehem Mining Company).

3.2.4 Environmental Conditions

3.2.4.1 Site Features

The Bethlehem Mine (Figure 3.2-3) was visited by Earl H. Bennett on July 9, 1998. A video segment describing the property is on the Bonners Ferry District Videotape (Tape 1, index 00:21:00-00:31:43). Documenting photographs are Roll B2-98, frames 2-12.

The access road to the property ends at a cabin. The side of the cabin is painted with the words, "Bethlehem Mine Claim, April 1984, Albert and Fred Brackebusch" (Figure 3.2-4). According to Fred Brackebusch, he no longer owns these claims. At the cabin are footings and a concrete slab for a larger structure (perhaps a mill or possibly one of the buildings that burned in the 1926 forest fire). No tailings are present. Just north of the cabin is a large pit or hole (Figure 3.2-5) about 40 feet in diameter and 30 feet deep.

Just north of the pit is Adit #3 (Figure 3.2-6), which follows a quartz vein. The adit is gated with a wooden door, but the door is open. About ½ gallon per minute (Sample B7099801) of water flows from this adit and collects in a small rock-dammed catch pool. Above the adit is a trench that was possibly caused by partial caving of the adit. The trench extends about 200 feet up the hill and ends at a shaft or open stope. This shaft connects to Adit #3, and light from it can be seen in the adit. The shaft (Figure 3.2-7) is not fenced, but is marked with a USFS warning sign. The dump from the adit parallels the access road and measures 20 feet wide, 150 feet long, and 15 feet thick (Figure 3.2-8).

About 100 feet above Adit #3 are two short adits labeled #1 and #2. Adit #2 (Figure 3.2-9) is caved and dry. It has a very small dump and probably only about 15 feet of workings. This adit is just above the shaft that connects to Adit #3. Adit #1 is also caved and dry. It has a dump about 15 feet wide, 5 feet long, and 20 feet deep (Figure 3.2-10). There are several small pits above this short adit.

Across the road, southwest of the cabin and the access road, is the main adit (Figure 3.2-11, #12). This open adit is the largest on the property. About 1.5-2 gallons per minute flows from the adit and disappears into the waste dump. The dump measures 80 feet long, 60 feet across, and 12 feet deep. It has bull quartz on the surface (Figure 3.2-12).

3.2.4.2 Sample Locations

3.2.4.2.1 Solid Samples

No soil or rock samples were collected at this site.
3.2.4.2.2 Water Samples

Sample B7099801 was collected from the water flowing from Adit #3, and sample B7099802 was taken from the main adit, southwest of the cabin and road.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (µS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7099801</td>
<td>Adit #3</td>
<td>47</td>
<td>50</td>
<td>6.6</td>
<td>2</td>
<td>Yes</td>
</tr>
<tr>
<td>B7099802</td>
<td>Main adit, southwest of cabin and road</td>
<td>76</td>
<td>50</td>
<td>6.7</td>
<td>2</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.2.4.2.3 Analytical Results

Water Samples (Tables 2.5-1 and 2.5-2)

In the dissolved metals screen, sample B7099801 exceeds the EPA Aquatic Life Chronic standard for cadmium and sample B7099802 exceeds all standards for cadmium. In addition, both samples exceed the Aquatic Life Chronic standard and are within the range of the Aquatic Life Acute standard for copper.

3.2.5 Structures

At the site is an old cabin (in fairly good condition) and footings for a mill or other structure that was larger than the existing cabin.

3.2.6 Safety

The shaft which connects to Adit #3 is extremely dangerous. Two caved adits are above this shaft. Adit #3 and the main adit (below the road) are open.
Figure 3.2-1. Location of the Bethlehem Mine, Boundary County, Idaho (U.S. Geological Survey Hall Mountain 7.5-minute topographic map).
Figure 3.2-2. Geologic map of the lower adit of the Bethlehem Mine (Killggaard, 1951, Plate 8).
Figure 3.2-3. Sketch of the Bethlehem Mine.
Figure 3.2-4. Cabin and old mill (?) footings at the Bethlehem Mine (Roll B2-98, frame #5).

Figure 3.2-5. Pit just north of the cabin at the Bethlehem Mine. The cabin site is in the background of the picture (Roll B2-98, frame #7).
Figure 3.2-6. Open, wet Adit #3 at the Bethlehem Mine, which is just north of the pit shown in Figure 3.2-5. This adit is on the same level as the cabin (Roll B2-98, frame #8).

Figure 3.2-7. Open and unfenced raise from Adit #3 to the surface at the Bethlehem Mine. A USFS sign notes that this is very dangerous (Roll B2-98, frame #4).
Figure 3.2-8. Dump at Adit #3 of the Bethlehem Mine, looking north (Roll B2-98, frame #9).

Figure 3.2-9. Caved Adit #2 at the Bethlehem Mine (Roll B2-98, frame #3).
Figure 3.2-10. Caved Adit #1 at the Bethlehem Mine (Roll B2-98, frame #2).

Figure 3.2-11. Open wet main adit below the road and west of the cabin at the Bethlehem Mine (Roll B2-98, frame #12).
Figure 3.2-12. Dump at the main adit of the Bethlehem Mine. Note the pile of quartz in foreground (Roll B2-98, frame #11).
3.3 AMERICAN GIRL MINE (Site Nos. SA-44 and SA-43)  
Alternate name—Big Pay Day Prospect.

3.3.1 Site Location and Access (Figure 2.1-1)

The main workings of the American Girl Mine are on the eastern edge of the NE¼ of the NE¼ of section 9 and in the NW¼ of the NW¼ of section 10, T. 64 N., R. 1 E., on the Hall Mountain 7.5-minute quadrangle (Figure 3.3-1). Access is from the Brush Lake Road (FS Road 1004), which leaves U.S. Highway 95 about 1.3 miles north of the junction between Highway 95 and State Highway 1. About ¼ mile up the Brush Lake Road is the junction between Road 1004 and FS Road 397, and one mile up Road 397 is the junction with FS Road 2485. About 1.3 miles southeast on Road 397 past the junction with 2485, the first good spur road to the east is the access road to the American Girl Mine.

A shaft (Site No. SA-43) belonging to the American Girl property is about ¼ miles northwest of the main American Girl adit (Site No. SA-44). It can be reached via a short logging road that splits from FS Road 2485 about ¼ miles north and east of the junction between Roads 397 and 2485. It is in the NW¼ of the SE¼ of section 4, T. 64 N., R. 1 E., on the Hall Mountain 7.5-minute quadrangle. Both sites are on Forest Service land.

3.3.2 Geologic Features (Figure 2.2-1)

The American Girl Mine is along a northwest-trending fault that cuts the Precambrian Prichard Formation and one of the Purcell sills in this area. The Purcell sills are altered diabase and gabbro of Precambrian age. Cretaceous granodiorite is also found near the mine (Aadland and Bennett, 1979). Kiilsgaard (1951, p. 23-26) stated:
This property is developed by 2200 feet of tunnel, crosscuts and drifts, all on the same level. The tunnel is located near the mine cabin. It intersects the vein 920 feet from the portal. At this point the vein strikes N. 42° E. and dips 69° to the east. It is a quartz vein containing minor amounts of ore minerals and its most notable feature is the abundance of siderite in the gangue. The vein varies in width from 4 inches to 1 foot, although in one particular area it swells to 8 feet in width, maintaining this width for about 20 feet along the strike. Where examined, the vein follows a minor fault in the quartzitic country rock. (See Plate 7 [Figure 3.2-2]).

Although the property has been quite thoroughly explored, it has never produced enough ore either for shipment or for milling purposes.

During the recent summer [1948] a cross cut was being advanced, by hand drilling, to intersect the southern extension of the vein.

Brackebusch (1969, p. 59-61) added:
The American Girl tunnel was mapped and described by Kiilsgaard (1951, p. 23 and Plate 7 [Figure 3.3-2]). The main tunnel is located in the NW 1/4, sec. 10,
T. 64 N., R.1 E. and cuts two significant geologic structures. The tunnel cuts the Bethlehem fault which is a broad shear zone that strikes N. 40° W., dips about 45° SW and is about 100 feet in width. A second structure is a narrow vein that strikes at a right angle to the Bethlehem fault and is exposed only on the northeast side of the Bethlehem fault. The vein dips steeply to the southeast and contains quartz, siderite, pyrite, and small amounts of galena, chalcopyrite and sphalerite. At one point the vein widens to eight feet to form a lens of base metal-bearing siderite. One feature not indicated by Kilsgaard is the gradual change in attitude of the Prichard Formation in the American Girl tunnel from the portal to the underground intersection with the Bethlehem fault, a distance of about 700 feet in a southeasterly direction. The attitude at the portal is N. 5° W., 24° E., and the strike rotates gradually over the distance in a clockwise direction to N. 85° E. with the dip flattening to 10° to the south. This deformation is probably associated with the Bethlehem fault.

About 500 feet south of the American Girl tunnel portal is a water-filled shaft which has been sunk on a narrow, vertical vein. The vein strikes N. 55° E. and contains siderite. No sulfides were observed but the shaft dump had been removed by recent logging operations. This vein has a similar strike to the quartz-siderite vein exposed underground in the American Girl mine. About 800 feet S. 70° E. from the American Girl portal is another water-filled shaft. The shaft is completely timbered to the water level and the dump has been removed by subsequent dozer trenching in the area. The shaft is in the correct geographic position to be on the quartz-siderite vein that is exposed underground in the American Girl mine. Dozer trenches surrounding this shaft contain sheared, bleached and iron-stained Prichard Formation, which indicates that the Bethlehem fault outcrops near this shaft. There are several other prospects in the vicinity of the American Girl tunnel, two of which explore minor quartz veins in Purcell Sills.

Three thousand feet N. 32° W. from the American Girl portal is a water-filled prospect shaft which has been sunk on a small vertical vein. This vein strikes N. 57° E., which is about the same strike as the two veins at the American Girl mine. The vein contains quartz and pyrite with rare chalcopyrite and pyrrhotite. The country rock is feldspathic quartzite of the Prichard Formation.

3.3.3 Site History

The American Girl was located before 1925, when Kirkham and Ellis (1926) noted that the open cuts on the property had caved. The American Girl Mining Company (Sven A. Anderson, president) was incorporated in 1932. By 1934, the property had 429 feet of development, including a 74-foot vertical shaft and a 274-foot tunnel. The company started a second shaft the following year, with the total development on the property reaching 1,159 feet. The company forfeited its charter in 1937.
In 1948, John Anderson of Bonners Ferry held thirteen unpatented claims that covered the American Girl Mine (Küllsgaard, 1951). Big Pay Day Mining Company (Sven Anderson, president) was incorporated in 1952. This company's claim block seems to have been close to, or possibly overlapping, the location of the older American Girl claims. Workings on the Big Pay Day property in 1953 totaled 1,184 feet, including one 1,000-foot tunnel and two shafts. The principal vertical shaft was 111 feet deep. The company did 700 feet of diamond drilling the next year. In 1955, work included 116 feet of crosscutting, as well as opening and retimbering 200 feet of the old tunnel. Another shaft was started on the north end of the property in 1956. The company appears to have done only assessment work for the next few years. Big Pay Day forfeited its corporate charter in 1964.

3.3.4 Environmental Conditions

3.3.4.1 Site Features

The American Girl Mine was visited by Earl Bennett on July 9, 1998, and the shaft at Site No. SA-43 was visited on August 11, 1998 (Figure 3.3-3). A video segment describing the property is on the Bonners Ferry District Videotape (Tape 1, index 00:20:48-00:24:57). Documenting photographs are Roll B2-98, frames 13-18, and Roll B10-98, frame 13.

The open and dry main adit (Figure 3.3-4), which has a timbered portal in good condition, is southeast of the access road. There is a pile of timbers on the left side of the portal. Across the road from the adit is a large dump (Figure 3.3-5). It measures 194 feet from the road to the nose and is 108 feet wide along the nose, but is only about 6 feet thick. Just past the dump are a cabin in fair condition and a collapsed building (Figures 3.3-6 and 3.3-7).

An open, water-filled shaft (labeled as B7099803) was found on an overgrown spur road east of the main adit (Figure 3.3-8). This is the shaft noted by Brackebusch that lies 500 feet south of the American Girl portal. There is a poorly constructed fence around this opening.

The water-filled shaft (SA-43) described by Brackebusch as being northwest of the American Girl adit is still there (Figure 3.3-9). Mine timbers are near the shaft. A trench leads to the shaft, and another trench is south of it. The area has been logged recently. The shaft is just off a logging road and is not far from U.S. Highway 95.

3.3.4.2 Sample Locations

3.3.4.2.1 Solid Samples
No waste dump samples were collected at this site.

3.3.4.2.2 Water Samples
No water samples were collected at this site.

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3.3.5 Structures

The standing cabin and the collapsed building near the main adit are the only structures.

3.3.6 Safety

The two shafts are hazardous, as is the open adit. The fence around the open shaft on the spur road is in poor condition. Although water-filled, the shaft in section 4 also constitutes a safety hazard.
Figure 3.3-1. Location of the American Girl Mine, Boundary County, Idaho (U.S. Geological Survey Hall Mountain 7.5-minute topographic map).
Figure 3.3-2. Geologic map of the underground workings of the American Girl Mine (Kiilsgaard, 1951, Plate 7).
Figure 3.3-3. Sketch of the American Girl Mine.
Figure 3.3-4. Open main adit at the American Girl Mine (Roll B2-98, frame #13).

Figure 3.3-5. Dump at the American Girl Mine, looking west (Roll B2-98, frame #14).
Figure 3.3-6. Cabin at the American Girl Mine (Roll B2-98, frame #15).

Figure 3.3-7. Collapsed building at the American Girl Mine (Roll B2-98, frame #16).
Figure 3.3-8. Water-filled shaft 500 feet south of the main American Girl adit. Note the collapsed wire fence (Roll B2-98, frame #18).

Figure 3.3-9. Timbered, water-filled shaft (SA-43) northwest of the American Girl adit (Roll B10-98, frame #13).
3.4 TILLEY MINE (Site No. SA-52)
Alternate name—Tilly Mine.

3.4.1 Site Location and Access (Figure 2.1-1)

The Tilley Mine is a series of adits and dumps in the NE¼ of the SW¼ and in the NW¼ of the SE¼ of section 9, T. 64 N., R. 2 E., on the Eastport 7.5-minute quadrangle (Figure 3.4-1). Access from U.S. Highway 95 is via the turnoff to the Brush Lake Campground (FS Road 1004), which is about 1.3 miles north of the junction between Highway 95 and State Highway 1. About ¼ mile up the Brush Lake Road is the junction between Road 1004 and FS Road 397, and one mile up Road 397 is the junction with FS Road 2485. Follow Road 2485 until it becomes difficult to travel (about where the dashed road starts on the USFS version of the Eastport quadrangle). Continue up the dashed jeep road to FS Trail 32 (Queen Mountain Trail), which becomes FS Trail 34 (Hellroaring Ridge Trail) when it turns north. Trail 34 goes to the Queen Mine as well as the Tilley. After crossing the saddle on Hell Roaring Ridge, an unmarked road goes east from Trail 34 to the Tilley Mine. Travel to the mine over this stretch was by motorcycle. The last ¼ mile of the road to the lowest (main or #3) adit is impassable due to fallen trees. The mine is on Forest Service land.

3.4.2 Geologic Features (Figure 2.2-1)

Brackebusch (1969, p. 66-67) described the property as follows:
Mineralization at the Tilley mine is contained in and near a broad shear zone parallel to bedding in the Prichard Formation. The bedding and shear zone strike north-south and dip about 45° to the east. Where the structure crops out at about 5600 feet elevation it contains iron-stained, vuggy quartz in a zone several feet in width. The area at the Tilley mine is a steep east-facing slope, therefore, the vein has been explored by driving adits to crosscut the vein at successively lower elevations. The first adit which is about 100 feet in length and 100 feet below the outcrop, is caved but the dump contains iron-stained, vuggy quartz with no sulfides observed. The second adit is about 600 feet in length and at an elevation of about 5320 feet. It was also caved, but the dump contains unoxidized vein material. Minerals in this material include pyrite, galena, sphalerite, (tetrahedrite?), in a quartz and siderite gangue. The third and lowest adit is about 1500 feet in length at elevation 4950 feet. It was driven in a N. 80° W. direction parallel to the upper adits. The lowest adit intersects several barren quartz veins and a broad shear zone, but almost no base metal sulfides are present. The shear zone in the lowest tunnel is about 1200 feet from the portal and is approximately 100 feet in width. The most significant detail of the Tilley mine is the hydrothermal alteration of the Prichard Formation in the shear zone and west of the shear zone in the lowest tunnel. The tunnel branches at the shear zone, and each branch was driven over 100 feet west of the shear zone, but the zone of hydrothermal alteration was not completely penetrated. The hydrothermal alteration is characterized by intense sericitization and some pyritization.

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Over 2000 feet of tunnels have been driven at the Tilley mine, but almost all of this effort involved crosscutting to the structure with little drifting along the strike of the structure. The upper two adits are ordinary sized prospect tunnels, but the lowest tunnel was driven for production purposes. It has a cross section size of 6 x 8 feet, and a uniform grade. All three adits were driven by use of manual drilling and mucking methods. Tilley states that gas was encountered while driving the two lowest adits. He says the gas was colorless and odorless, but that it extinguished his carbide lamp and matches would not light. This description fits carbon dioxide. The gas could have been derived by exsolution from ground water as it flowed into the mine opening. Because of the gas, Tilley installed a ventilation tube in the lowest adit. Water flowing from the adit drives a waterwheel which in turn drives a fan that forces air into the tunnel.

Due to the extensive hydrothermal alteration, a broad shear zone, and base metal sulfides and silver in the ore, additional exploration of the Tilley mine area is warranted. There is a need of a systematic survey and detailed geologic study in this mine.

3.4.3 Site History

The twenty unpatented claims of the Tilley Mine were located in 1947 by William Tilley (or Tilly; Close and others, 1975). The prospect was worked for about 10 years (Brackebusch, 1969). The property has about 3,500 feet of workings (Close and others, 1975).

3.4.4 Environmental Conditions

3.4.4.1 Site Features

The Tilley Mine was visited by Earl Bennett on July 10, 1998. A video segment describing the property is on the Bonners Ferry District Videotape (Tape 1, index 00:25:04-00:38:54). Documenting photographs are Roll B2-98, frames 19-25, and Roll B3-98, frames 1-13.

The relative locations of these workings are shown in Close and others (1975; Figure 3.4-2). The mine contains nine adits that extend down the east side of Helroaring Ridge. The lowest adit is #3 (elevation 4,980 feet), which was the main tunnel (Figure 3.4-3 and Figure 3.4-4). There is a large dump (Figure 3.4-5) and a cabin (Figure 3.4-6) at this 3-acre site. The adit is caved, but has a substantial flow of water (50+ gallons per minute) that has breached the dump and cut it into two parts (Figure 3.4-7). The dump is 80 feet long, 100 feet wide at the nose, and 50-60 feet deep. An iron water wheel or fan and other scrap (including an old boiler) are on the dump. There is also a collapsed, unrecognizable wooden structure on the dump. The cabin is in good condition and looks as if it is privately maintained. An old mucking machine(?) is beside the cabin. The adit, dump, and cabin cover about 1.5 acres.
Adit #2 (following the numbering system of Close and others, 1975) is at an elevation of 5,450 feet. This is the uphill cabin and adit (Figure 3.4-8 and Figure 3.4-9) shown on the topographic map (Figure 3.4-1). A short access road (50 yards long) leads to this adit from the main road to the Tilley #3. The partially caved adit has a water flow of 15-20 gallons per minute, and the rocks in the short watercourse from the adit to the dump are iron stained (Figure 3.4-10). The top of the dump is about 30 feet in diameter, but with the steep topography, the nose is over 100 feet thick. This indicates substantial workings. There is a pipe that goes into the adit but no rails. Other pieces of pipe are scattered around the site. The small, collapsed cabin is on the south end of the dump (Figure 3.4-11). The disturbed area covers about 0.5 acres and is about 100 feet south of the main Tilley Mine road.

Continuing up the hill on the access road, Adit #5 is about 50 feet below the road and difficult to see (Figure 3.4-12). This is an open, dry adit in the Prichard Formation. The dump has two sections, each measuring about 20 feet across and about 100 feet thick down the nose on a steep hillside (Figure 3.4-13). There is a small pile of mineralized rock on the dump.

East of and downhill from Adit #5 is the small and open Adit #7 (Figure 3.4-14). The dump for this adit measures 15 feet in diameter and is 50 feet thick on the nose. A 10-foot-long, open, dry adit (designated #8; Figure 3.4-15) lies east of and below Adit #7.

### 3.4.4.2 Sample Locations

#### 3.4.4.2.1 Solid Samples

No soil or rock samples were collected at this site.

#### 3.4.4.2.2 Water Samples

Sample B7109801 was collected from Adit #3, and sample B7109802 was collected at Adit #2.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (μS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7109801</td>
<td>Tilley Mine, Adit #3</td>
<td>---</td>
<td>50</td>
<td>---</td>
<td>50</td>
<td>Yes</td>
</tr>
<tr>
<td>B7109802</td>
<td>Tilley Mine, Adit #2</td>
<td>250</td>
<td>40</td>
<td>---</td>
<td>15-20</td>
<td>Yes</td>
</tr>
</tbody>
</table>

#### 3.4.4.2.3 Analytical Results

Water Samples (Tables 2.5-1 and 2.5-2)

In the dissolved metals screen, sample B7109801 exceeds all standards for cadmium. It is also within the ranges of both Aquatic Life standards for copper and of the Secondary MCL for aluminum. In the dissolved metals screen, sample B7109802 exceeds all standards for cadmium
and the Aquatic Life Chronic standard for copper, and is within the range of the Aquatic Life Acute standard for copper. Sample B7109802 exceeds the Secondary MCL for manganese in both the dissolved metal and total recoverable metals screens.

3.4.5 Structures

The only structures are the cabins at Adit #3, which is in good shape, and at Adit #2, which has collapsed.

3.4.6 Safety

All of the open adits could pose a hazard. Adit #2 is probably the most significant hazard because of its length and because it is more accessible than Adit #5 (the other long, open adit at this site). The reported presence of gas in some of the workings is also a cause for concern.
Figure 3.4-1. Location of the Tilley Mine, Boundary County, Idaho (U.S. Geological Survey Eastport 7.5-minute topographic map).
Figure 3.4.2. Map of the Tilley Mine, showing the locations of the workings (Close and others, 1975, Figure 4).
Figure 3.4-3. Sketch of Adit #3 at the Tilley Mine.
Figure 3.4-4a. Picture 1 of a two-picture panorama at the main level (Adit #3) of the Tilley Mine. This photograph was taken from near the cabin, looking west. Figure 3.4-4b overlaps the right edge of this picture (Roll B2-98, frame #19).

Figure 3.4-4b. Picture 2 of a two-picture panorama at the main level (Adit #3) of the Tilley Mine. The view is to the west, looking toward the collapsed main adit (Adit #3) in the bushes (Roll B2-98, frame #21).
Figure 3.4-5. Tilley Mine dump, showing the waterway from the collapsed main adit. The old water wheel was used to drive a blower for mine ventilation (Roll B2-98, frame #24).

Figure 3.4-6. Well-maintained cabin at the main level (Adit #3) of the Tilley Mine (Roll B3-98, frame #3).
Figure 3.4-7. Collapsed and very wet main adit (#3) at the Tilley Mine. Note the water wheel in the water course (Roll B2-98, frame #25).
Figure 3.4-8. Sketch of Adit #2 at the Tilley Mine.
Figure 3.4-9. Open #2 adit at the Tilley Mine (Roll B3-98, frame #6).

Figure 3.4-10. Collapsed cabin and watercourse from the open Adit #2 at the Tilley Mine (Roll B3-98, frame #5).
Figure 3.4-11. Collapsed cabin at the #2 level of the Tilley Mine (Roll B3-98, frame #7).

Figure 3.4-12. Open Adit #5 at the Tilley Mine (Roll B3-98, frame #8).
Figure 3.4-13. Dump for Adit #5 at the Tilley Mine, as seen from the mouth of the tunnel (Roll B3-98, frame #9).

Figure 3.4-14. Open and dry Adit #7 at the Tilley Mine (Roll B3-98, frame #12).
Figure 3.4-15. Open and dry Adit #8 at the Tilley Mine (Roll B3-98, frame #13).
3.5 QUEEN MINE (Site No. SA-51)
Alternate name—Moyie Gold Copper Mining and Milling Co.

3.5.1 Site Location and Access (Figure 2.1-1)

The Queen Mine is in the adjacent corners of sections 8 and 17, T. 64 N., R. 2 E., on the Eastport 7.5-minute quadrangle (Figure 3.5-1). Access from U.S. Highway 95 is via the turnoff to the Brush Lake Campground (FS Road 1004), which is about 1.3 miles north of the junction between Highway 95 and State Highway 1. About ¼ mile up the Brush Lake Road is the junction between Road 1004 and FS Road 397, and one mile up Road 397 is the junction with FS Road 2485. Follow Road 2485 until it becomes difficult to travel (about where the dashed road starts on the USFS version of the Eastport quadrangle). Continue up the dashed jeep road to FS Trail 32 (Queen Mountain Trail), which becomes FS Trail 34 (Hellowroaring Ridge Trail) when it turns north. Trail 34 goes to the Queen Mine. Travel over the last stretch up Hellow Roaring Ridge to the mine was by motorcycle. The approximately 5-acre mine site is on Forest Service land.

3.5.2 Geologic Features (Figure 2.2-1)

The Queen Mine is in an area where the Precambrian Prichard Formation is intruded by one of the Purcell sills (Aadland and Bennett, 1979). Brackebusch (1969, p. 64) noted the following about the geology of the mine:

The Queen mine has been described by Kirkham and Ellis (1926, p. 65-66) and Kjilsgaard (1951, p. 16-17, and Pl. 3 [Figure 3.5-2]). It is located near the common corners of secs. 8, 9, 16, and 17, T. 64 N., R. 2 E. At least three veins are along concordant shear zones in a wedge of quartzite confined between two Purcell Sills (Pl. 1 [omitted]). One of the veins is at the lower contact of the upper sill and the other two veins are wholly in quartzite. All three veins are less than five feet in width and contain mineralization typical of prospects associated with the Bethlehem fault. The veins are chiefly quartz and pyrite with some siderite, galena, sphalerite and chalcopyrite. There is also a minor quartz vein in the upper sill.

Development workings include two crosscuts, about 300 feet in length each, which explore the shear veins; an adit 160 feet in length and 70 feet of winze which explore the quartz vein in the upper sill; a shallow inclined shaft on one of the shear veins; and numerous dozer trenches and prospect pits. Most of the effort involved in underground exploration of the shear veins was spent in crosscutting to the structures rather than crosscutting to the structure and then drifting along them which would have been a more effective use of effort. The Queen mine is idle at the present time.

Kjilsgaard (1951, p. 16-18) described the veins in detail:

Three separate veins occur on this property. They range in size from quartz stringers a few inches wide to a broad silicified zone 15 or more feet in width.
They have been explored by 5 crosscut tunnels and one inclined shaft; most of these workings are now caved and inaccessible. Two of these are base-metal veins which occur in shear zones parallel to the attitude of the quartzitic country rock. The third, a quartz-filled joint plane in a basic sill, yields some gold values.

Of the two base-metal veins, the westernmost or lower vein is a broad silicified zone that strikes N. 8° W. and dips 80° E. It is cut by the crosscut tunnel immediately west of the mine cabin and again by a more northern crosscut tunnel. (See Plate 3 [Figure 3.5-2]). The zone may be traced several hundred feet to the north where, due to its resistance to erosion and the presence of a small resistant basic sill on its footwall side, it forms a small but prominent ridge. At the surface the zone is partially oxidized and iron-stained; the adjacent wall rocks have been bleached and altered by hydrothermal alteration. Good ore samples are unobtainable at the outcrop, but ore taken from the tunnels contain galena, tetrahedrite, sphalerite, chalcopyrite and pyrite that yield an average assay of 0.14 oz. of gold and 3.4 oz. of silver. The lead and zinc assays [assays] are not known.

The eastern vein (shaft vein) parallels the trend of the larger, western silicified zone, occurring 110 feet to the east. The vein varies from 3 to 5 feet in width and contains good exposures of galena, tetrahedrite, sphalerite, chalcopyrite and pyrite, in a quartz and siderite gangue. Although assays on this vein are not known, judging from the character of the galena, the lead assays should be high. The vein is explored by the same crosscut tunnels which intersect the previously described silicified zone. Unfortunately, only the southern tunnel was accessible during the investigation and underground examinations had to be confined to that area.

The third vein, the gold vein, occurs in a large dioritic sill located about 400 feet northeast of the mine cabin. It has been explored by 160 feet of adit and 70 feet of inclined winze. Where exposed, the vein varies from 3 to 6 inches in width, and is predominantly quartz but with some disseminated pyrite crystals. No gold is visible in the polished sections. The vein is a quartz-filled joint, striking N. 76° E. and dipping 38° to 44° S.

3.5.3 Site History

The Moyie Gold Copper Mining & Milling Company, Ltd., was incorporated in 1911 and purchased two groups of claims from the original owners. These claims were the Queen Group and the Damon Group, which was about 7 miles southeast of the Queen Group. By 1914, the company was developing both groups, with development totaling 600 feet of tunnels and 25 feet of shaft. Work at the Queen Group was concentrated on the Copper King Claim. In 1917, the company noted that it did only assessment work, much of which was done on the roads. All work was done by hand. By 1920, the Queen Group had a 35-foot shaft sunk on the ore and a 345-foot crosscut tunnel that tapped the ore 123 feet below the surface. The company's report to the Idaho Inspector of Mines for 1919 (dated March 1920) noted:
On the Queen group we have a well defined vein about four feet wide with around two feet of concentrating ore with a value into lead silver and Copper of about $30.00 per ton in vein No.2 at approximately 115 feet vertical depth: in vein No.4 we have two ft. of vein with six inches of high grade ore and the same formation and same Iron Carbonate gangue as in No.2 we plan to run a cross cut and tap this vein at depth, where we expect to get the same increase in size of vein and value of ore as we did in vein No.2.

The company stated that hand-picked samples contained over 60 ounces of silver and 70 percent lead. By the following year, the development on the Queen property consisted of: a 35-foot shaft, a 355-foot crosscut tunnel, and 40 feet of drifts on the No. 1 vein; and two tunnels (40 feet and 65 feet long) on vein No. 2. In 1925, Livingston and Ellis (1926) estimated that the property had about 330 feet of development. Only assessment work appears to have been done after that, and Moyie Gold Copper forfeited its corporate charter in 1932. Sometime after this, the claims were apparently restaked under new names.

In June 1948, after the property had been idle for several years, an exploration and drilling program was conducted on the property. However, no effort was made to handle the drill core properly, and the program was suspended soon after the diamond-drill hole was completed (Kiilsgaard, 1951). The Queen Hill Mining Company was incorporated in 1949. The holdings of this company apparently included part or all of the old Queen Mine. Despite plans for large-scale operations at the property, the company appears to have done little more than exploration. Much of the minimal work that was done during the next decade appears to have been by lessees. Queen Hill forfeited its corporate charter in 1961.

3.5.4 Environmental Conditions

3.5.4.1 Site Features

The Queen Mine was visited by Earl Bennett on July 10, 1998. A video segment describing the property is on the Bonners Ferry District Videotape (Tape 1, index 00:39:10-00:44:44). Documenting photographs are Roll B3-98, frames 15-21.

The property consists of 2 cabins, 1 outhouse, 2 completely caved adits, and several pits and bulldozer cuts (Figure 3.5-3). The main adit (Figure 3.5-4) is on an old road that is south of cabin #1 (Figure 3.5-5), which is still standing on the east side of the access road. This cabin is in good condition and is shown on the topographic map (Figure 3.5-1). A seep (1-2 gallons per minute) from the adit was sampled. Across from cabin #1, an old road or pathway goes to cabin #2, this one with a caved-in roof (Figure 3.5-6), and an outhouse that are on the west side of the road and just north of cabin #1. Beyond cabin #2 are some prospect pits and numerous bulldozer cuts. There also are several prospect pits near the collapsed cabin and on an old road. Further north is a wetland with a well or water-filled shaft that is covered by a yellow-painted 55-gallon barrel (Figure 3.5-7 and Figure 3.5-8). A small creek leads across the wetland from the well.
Several prospect pits (Figure 3.5-9) are located on the east side of the wetland in a sheer rock face.

3.5.4.2 Sample Locations

3.5.4.2.1 Solid Samples

No soil or rock samples were collected at this site.

3.5.4.2.2 Water Samples

Sample B7109803 was collected from the well or water-filled shaft beneath the yellow barrel, and sample B7109804 was taken from the main adit.

<table>
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<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (µS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7109803</td>
<td>Queen Mine, well beneath yellow barrel</td>
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<td>50</td>
<td>---</td>
<td>---</td>
<td>Yes</td>
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<tr>
<td>B7109804</td>
<td>Main adit, south of cabin</td>
<td>---</td>
<td>50</td>
<td>---</td>
<td>Seep</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.5.4.2.3 Analytical Results

Water Samples (Tables 2.5-1 and 2.5-2)

In the dissolved metals screen, water samples B7109803 and B7109804 exceed the Aquatic Life Chronic standards and are within the ranges of the Aquatic Life Acute standards for copper and cadmium. In addition, sample B7109804 exceeds the Primary MCL for cadmium.

3.5.5 Structures

Two cabins and an outhouse were found on the property.

3.5.6 Safety

There are no major safety issues at this site.
Figure 3.5-1. Location of the Queen Mine, Boundary County, Idaho (U.S. Geological Survey Eastport 7.5-minute topographic map).
Figure 3.5-2. Geologic sketch map of the Queen Mine, showing the location of the workings and vein outcrops (Kilsgaard, 1951, Plate 3).
Figure 3.5-3. Sketch of the Queen Mine.
Figure 3.5-4. Collapsed main adit and seep at the Queen Mine. This adit is just south and west of the cabin that is in good condition (Roll B3-98, frame #21).

Figure 3.5-5. Cabin #1 (in good condition) near the main adit at the Queen Mine (Roll B3-98, frame #19).
Figure 3.5-6. Collapsed cabin #2, west of the road at the Queen Mine (Roll B3-98, frame #20).

Figure 3.5-7. Yellow barrel over the well, which is north of cabin #1 and near the south side of the wetland at the Queen Mine (Roll B3-98, frame #16).
Figure 3.5-8. Looking downward into the well beneath the cover of the yellow barrel (Roll B3-98, frame #18).

Figure 3.5-9. Open, dry prospect pit in solid rock northeast of cabin #1 at the Queen Mine (Roll B3-98, frame #15).
3.6 REGAL MINE (Site No. SA-55)
Alternate name—Silver Crescent.

3.6.1 Site Location and Access (Figure 2.1-1)

The Regal Mine is in the S½ of section 31, T. 64 N., R. 2 E., on the Ritz 7.5-minute quadrangle (Figure 3.6-1). Access is via FS Road 397 (Camp Nine Road), which leaves U.S. Highway 95 about 4 miles north of the junction of Highway 95 and U.S. Highway 2 and heads north. The mine is at the end of a spur road (FS Road 2499) that splits from Road 397. Road 2499 can be driven to the workings. The 5-acre mine site is on Forest Service land.

3.6.2 Geologic Features (Figure 2.2-1)

Brackebusch (1969, p. 65-66) described the geology of the mine:

The Regal mine, the only one in the study area which has produced a significant amount of metals, is located in sec. 31, T. 64 N., R. 2 E. It has been described by Featherstone (1944), Anderson and Wagner (1945), and Green (1958). The sulfides occur in two parallel veins, the North and South veins, which strike N. 60-70° E. and dip 50-60° SE. The veins are in the Kaniksu batholith. Anderson and Wagner (1945, p. 7) state that the ore bodies are localized along the flattest portions of the veins and interpret this to mean that open spaces, which were amenable to ore deposition by fissure filling, developed along the flat portions of the veins due to reverse movement along the fault-veins. They also state (p. 8):

In each vein the ore is confined to well defined shoots ranging from 50 to 190 feet long and up to 6 feet wide, each shoot apparently plunging about 65° SW. The ore bodies tend to be somewhat lenticular and pinch on the dip as well as on the strike.

The ore contains pyrite, galena, sphalerite, and arsenopyrite in a quartz and siderite gangue. Featherstone (1944, p. 1) stated that the tenor of the mill heads was 0.2 ounces per ton gold, 2.5 ounces per ton silver, 3 percent lead, and 3 percent zinc; and that indicated ore reserves were 15,000 tons, of which all has apparently been mined. The mine is idle at the present except for assessment work.

The attitude of the Regal veins is similar to that of the Bethlehem, American Girl and Klondike veins. The mineralogy of the ores is also similar except for more abundant arsenopyrite which is auriferous. The Regal veins are slightly south of the southern limit of the Bethlehem fault as mapped during this study (Pl. 1 [omitted]). However, the similarities of mineralogy and structure to the other veins associated with the Bethlehem fault indicate that the Regal veins have the same genesis.

Close and others (1975, p. 47-48) observed:

Two adits totaling over 1,000 feet of underground workings follow two well-defined, nearly parallel, fissure veins in quartz diorite. No. 1 vein striking
N 65° E and dipping 60° to the SE is 0.5 to 6 feet thick, averaging 2 feet in thickness. It has been exposed for 320 feet by underground workings.

No. 2 vein strikes N 62° E, dips 55° SE, averages 2 feet in thickness and is exposed for 500 feet by underground workings.

Ore shoots and lenses in the veins, consists of abundant pyrite with lesser amounts of galena and sphalerite in quartz and siderite. Ore reserves have apparently been mined out but additional ore shoots may occur in unexplored extensions of the vein.

3.6.3 Site History

Close and others (1975, p. 47) described the history of the property:

The mine was discovered in 1936 and was intermittently developed until 1942, when the Silver Crescent Mining Co. [incorporated in 1936] constructed a 50 ton per day flotation mill on the property. The Silver Crescent Co. mined and milled 19,990 tons of ore that contained 1,789 ounces of gold, 23,870 ounces of silver, 21,170 pounds of copper, 615,740 pounds of lead, and 578,210 pounds of zinc, from 1943 until 1945. The operation was profitable due to wartime subsidies and was abandoned when subsidies ended. Reserves of about 15,000 tons containing 3 percent lead, 3 percent zinc, 0.2 troy ounce gold per ton, and 2.5 troy ounces of silver per ton were estimated to remain in the deposit when the Silver Crescent operations ceased. In 1950, the Regal mine was leased by Northwest Leasing Co. That company mined, 4,300 tons of ore that contained 5.5 troy ounces gold, 773 troy ounces silver, 600 pounds copper, 21,800 pounds lead, and 20,100 pounds zinc. In 1946, the property had about 4,300 feet of development, including 300 feet of shafts and 4,000 feet of tunnels, crosscuts, and drifts. The mine had two tunnels (700 and 300 feet long), and two shafts (a 128-foot vertical shaft and a 172-foot inclined shaft that gained a vertical depth of 145 feet). Idora Silver Mines, Inc. (incorporated in 1969) is apparently the most recent owner of the property.

3.6.4 Environmental Conditions

3.6.4.1 Site Features

The Regal Mine was visited by Earl Bennett on July 15, 1998 (Figure 3.6-2). A video segment describing the property is on the Bonners Ferry District Videotape (Tape 1, index 00:44:48-00:52:28). Documenting photographs are Roll B4-98, frames 1-8.

The property was one of the largest producing mines in the area. This site contains the main adit, an old millsite, and a large dump. The main adit (Figure 3.6-3) has a wooden gate that is chained
shut. A sign at the portal reads, "Idora Silver Mines, Inc." Water is flowing from the adit at a rate of about 10-15 gallons per minute. The water stream from the adit passes around the south side of the dump in a ditch and disappears into the waste dump and the woods, forming a small wetland to the west. The bank is sloughed behind the portal, but the timbers are relatively new, so the adit is probably open. The dump measures 131 feet long, 182 feet wide, and is about 25 feet thick. There is a lean-to shed at the end of the access road near the edge of the dump (Figure 3.6-4). Just southwest of the dump are two partial buildings and the foundation for a third structure that comprise the mill (Figures 3.6-5 and 3.6-6). There are tailings and ore near and within these buildings (Figure 3.6-7). A sample of tailings was collected in the woods about 150 feet west of the mill. There apparently was no impoundment, and the tailings were spread out over the wooded area west of the mine. The total extent of the tailings is unknown, but most of this area is now heavily overgrown.

3.6.4.2 Sample Locations

3.6.4.2.1 Solid Samples

Sample B7159802 was collected from the mill tailings, 150 feet west of the mill.

<table>
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<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
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<tbody>
<tr>
<td>B7159802</td>
<td>Regal Mine, mill tailings</td>
<td>Yes</td>
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</tbody>
</table>

3.6.4.2.2 Water Samples

Sample B7159801 was collected from the water flowing from the adit.

<table>
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<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (μS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
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<td>B7159801</td>
<td>Regal Mine adit</td>
<td>78</td>
<td>48</td>
<td>6.6</td>
<td>10-12</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.6.4.2.3 Analytical Results

Solid Samples (Table 2.5-3 and 2.5-4)

Tailings sample B7159802 exceeds the Clark Fork Superfund background levels for arsenic, lead and cadmium. In addition, the sample contains more arsenic, cadmium, copper, lead, nickel, and zinc than would be expected in rocks from most of the formations in the Belt Supergroup (Table 1.5-3). All elements with the exception of barium are below detection limit in the TCLP for metals screen.
Water Samples (Tables 2.5-1 and 2.5-2)

In both the dissolved metals and total recoverable metals screens, water sample B7159801 equals or exceeds all standards for cadmium and exceeds both Aquatic Life standards for zinc. The sample also exceeds the Secondary MCL for aluminum in the dissolved metals screen, and the Aquatic Life Acute standard for lead in the total recoverable metals screen.

3.6.5 Structures

The lean-to and the old mill are the only buildings at the site.

3.6.6 Safety

There are no major safety issues at this site.
Figure 3.6-1. Location of the Regal Mine, Boundary County, Idaho (U.S. Geological Survey Ritz 7.5-minute topographic map).
Figure 3.6-2. Sketch of the Regal Mine.
Figure 3.6-3. Gated adit with water flowing from it at the Regal Mine. Note the Idora Silver Mines, Inc., sign (Roll B4-98, frame #1).

Figure 3.6-4. Looking across the surface of the Regal dump toward the lean-to and the access road (to the right) to the Regal Mine. This part of the dump is north of the adit (Roll B4-98, frame #2).
Figures 3.6-5. Upper mill structure at the Regal Mine, looking west (Roll B4-98, frame #4).

Figures 3.6-6. Lower mill structure at the Regal Mine, looking east. The upper mill structure is in the background (Roll B4-98, frame #7).
Figure 3.6-7. Flotation tails in the lower mill structure at the Regal Mine (Roll B4-98, frame #8).
3.7 GOLDEN TRIPLET GROUP (Site Nos. SA-80, SA-87, SA-88, and SA-89)
Alternate names—Cornmeal Tunnel; Quartz Tunnel; Idamont Lead-Zinc Mines Co.;
Leonia Gold Mining Co.; Idaho Gold and Ruby Mining Co.; Boulder Creek Mine; Oscar
Claim (SA-89); McGinty Creek Adit (SA-87); Unnamed Prospect (SA-88).

3.7.1 Site Location and Access (Figure 2.1-1)
A number of tunnels and adits attributed to the Golden Triplet Group of the Idamont Lead-Zinc
Mines Co. are on Boulder Creek in section 32, T. 61 N., R. 3 E., on the Leonia 7.5-minute
quadrangle (Figure 3.7-1). Access is via County Road 24 east from Bonners Ferry to connecting
FS Road 314, which goes to Boulder Creek. Just across the bridge at Boulder Creek is an old
road that heads west and follows the creek to the mine workings. Close to the workings, the road
splits. One spur goes uphill to Adit #5 and the other heads down to the bank of the creek and
Adits #2 and #3 (Oscar property). Adit #4 (McGinty Creek Prospect) is across Boulder Creek
from Adit #3. These sites collectively impact 4-5 acres and are on Forest Service land.

3.7.2 Geologic Features (Figure 2.2-1)
The Golden Triplet Group is underlain by the Precambrian Prichard Formation. In this area, the
Prichard is intruded by the diabasic and dioritic Purcell sills, and both northwest-trending and
north-northeast-trending faults occur near the property (Aadland and Bennett, 1979). Miller
(1973, p. 80) described the Oscar property (Golden Triplet Adit No. 2 or No. 3) as follows:
This unpatented claim was held by the Kootenai Copper-Silver Mines company in
June 1970. The adit is located in the center of sec. 32, T. 61 N., R. 3 E. on the
south side of Boulder Creek about a half a mile west of the gaging station (Plate 1
and Plate 3 [omitted; see Figure 3.7-1 instead]). The adit follows a narrow vein
(less than a foot wide at the portal) that trends N. 10° E., dips 65° W. and is in the
west contact zone of a north-trending (?) sill. The foliated Prichard in the hanging
wall is N. 10° W. with a vertical dip.

The vein contains galena and considerable sphalerite with pyrite and chalcopyrite
in a gangue of milky-white, fractured quartz. Some of the quartz is so highly
fractured that it has a medium-gray (N5), internal reflection.

The McGinty Creek adit (Golden Triplet Adit No. 4) was described as follows (Miller, 1973,
p. 80):
This adit is located across Boulder Creek and 500 feet north of the Oscar adit in
SE¼NW¼ sec. 32, T. 61 N., R. 3 E. Arsenopyrite and very minor chalcopyrite
with some galena and pyrite are the sulfides in a gangue of quartz, muscovite,
calcite, and considerable tourmaline. The adit was open in October 1971 but did
not appear safe as the Prichard Formation at the portal was intensely sheared and
folded into tight chevrons. As the large dump contains mostly sill rock, the adit
must be of considerable length and enter a sill.
Kiilsgaard (1951, p. 22) described the underground workings on Boulder Creek:
In addition to the placer development, there are about 2500 feet of tunnels, adits, and shafts on several quartz veins. These veins transverse Boulder Creek and all development on them is located in the immediate vicinity of that stream. The No. 1 and 2 adits, i.e., the older workings are now inaccessible. The No. 3 adit [Oscar property], located on the east bank of Boulder Creek immediately east of the old power house, follows a quartz vein, which strikes almost due north and dips 70° to 77° W. The vein lies on the contact of a basic sill and sericitic quartzite. It varies in width from 4 to 13 inches and has yielded values ranging from $6.72 to $112.00 a ton in silver, lead, and zinc. Shattered quartz within the vein suggests that faulting, both pre-mineral and post-mineral, has been active.

At a point 505 feet from the No. 3 adit portal, a 113-foot winze has been sunk on the vein. Near the bottom of the winze, drifts have been driven to the north and south and a crosscut driven to the east. These lower workings are now flooded but are reported by R. M. King to contain good showings of silver, lead, and zinc ore. Mining on this lower level was active during the early 1930’s but was stopped by the inability of the compressor to supply air to both the pumps and the rock drills.

The No. 4 tunnel [McGinty Creek adit] is situated on the west side of Boulder Creek directly opposite the No. 3 adit. It follows a small northeast-trending quartz vein but veers away from the vein about 300 feet from the portal. At the tunnel face, about 800 feet from the portal, there is a large northwest-trending quartz vein. The vein has been drifted on to the northwest and southeast, but appears to be barren.

3.7.3 Site History

In 1905, J. M. Schnatterly acquired a number of mining claims (both lode and placer) along Boulder Creek (Idamont Lead-Zinc Mines Company, 1949). The Idaho Gold and Radium Mining Company was incorporated in 1910 to develop the claims. By 1913, the property had 250 feet of tunnels, but the company was concentrating its efforts on the placer claims (see section 3.22 for a discussion of the placer operations).

The company changed its name to the Idaho Gold and Ruby Mining Company in 1916, but little else changed. The company kept up its assessment work on the lode claims but concentrated its major effort on the placer workings. In 1919, the company described the total development on the property as “$525,000.00.” By 1923, the company held 124 lode and placer claims along Boulder Creek.

Schnatterly was killed by an explosion while aboard a boat at Bonners Ferry in 1924. Because Idaho Gold and Ruby was several thousand dollars in debt at the time and the company was in the
hands of a receiver, the stockholders formed a new company to take over the property (Idamont Lead-Zinc Mines Company, 1949). The Leonia Gold Mining Company was incorporated in 1924, and Idaho Gold and Ruby forfeited its corporate charter the following year. By 1926, development on the lode claims included four tunnels (No. 1, 690 feet; No. 2, 30 feet; No. 3, 176 feet; and No. 4, 145 feet). By 1928, the company was focusing on underground work in two of the four tunnels. Development on the property totaled 1,863 feet. The No. 1 tunnel was 977 feet long and the No. 2 tunnel was 866 feet long. The company's holdings had been declining for several years and had decreased to 68 claims by 1928.

Idamont Lead-Zinc Mines Company was incorporated in 1928 and purchased the property in September of that year. (Leonia Gold forfeited its corporate charter in 1930.) Idamont continued development on the property for the next few years. This work included driving a 113-foot winze 505 feet from the portal of the No. 3 adit (Kulessgaard, 1951); the designation for this adit does not match the numbering system the company used to report to the Idaho Inspector of Mines. New buildings were also added to the mine camp. By 1935, the property had 2,328 feet of development, including three tunnels, two shafts, two crosscuts, and five drifts. A fourth tunnel, on which 112 feet of work was done during the year, was started in 1937. Between 1936 and 1939, the company's holdings decreased from 68 to 44 claims.

The property was leased to A. W. Nelson in October 1938. Nelson or his Metals Production Company (incorporated in 1938) worked the Idamont property until 1941. Much of this appears to have been surface work. The company forfeited its corporate charter in 1942.

Idamont's holdings dropped to 26 claims in 1942. The company attempted to get help from the U.S. government during World War II for a diamond drilling project to explore the property, but was unsuccessful (Shaffer, 1945). The property was idle until the end of World War II, but the company's holdings jumped to 86 claims in 1946. Also during 1946, a sawmill was built with the assistance of $25,000 (about half of the total cost) from the Reconstruction Finance Corporation. A geophysical survey was planned for 1947, and the company tested the placer ground and conducted other exploration work over the next couple of years. In 1948, the No. 3 and No. 4 adits (Figure 3.7-2) were open, but the winze and the workings below the No. 3 tunnel were flooded (Kulessgaard, 1951).

Kootenai Dike Mines, Inc. (incorporated in 1951), acquired a 25-year lease to the property in August 1951. The lease called for an annual expenditure of $10,000 for exploration and development, as well as a royalty of 5 percent of the net smelter returns on all ore and concentrate shipped. Work in 1952 included road repair, prospecting, and bulldozer trenching. In addition to continuing these activities, Kootenai Dike also did some diamond drilling in 1953. The company forfeited its corporate charter in 1954, and its lease on the Idamont property was canceled the following year.

Idamont completed a geophysical survey of the property in 1957 and started a diamond drilling program on June 1. The company continued its exploration program for the next two years, but
appears to have done only assessment work since that time. Idamont changed its name to Kootenai Copper-Silver Mines, Inc., in 1970.

3.7.4 Environmental Conditions

3.7.4.1 Site Features

The site was visited by Earl Bennett on July 15, 1998. A video segment describing the property is on the Bonners Ferry District Videotape (Tape 1, index 00:52:30-00:57:58). Documenting photographs are Roll B4-98, frames 9-13.

Workings include Adits #2 and #3 (Oscar Mine) of the Golden Triplet claims on the south bank and in the flood plain of Boulder Creek, and Adit #4 (McGinty Creek adit) on the north side of the creek. In addition, a caved adit and a dump (called #5 in this report) are on an old road just south of and above Adits #2 and #3.

Adit #2 is open and dry with a competent rock portal (Figure 3.7-3). The spring floods in Boulder Creek have completely removed the dump. Adit #3 is gated but open. A sign painted on the door reads “No Entry.” A seep of water is coming from the adit (Figure 3.7-4). Again, there is no dump left at this site. Adit #4 is on the north side of Boulder Creek (100 yards up McGinty Creek) and is open, although partially caved (Figure 3.7-5). The narrow, double-stacked dump at this site measures approximately 125 feet long and is about 20 feet thick (Figure 3.7-6). There is a pile of possible mine timbers at the base of this dump. Adit #5, on the upper spur road above Adits #2 and #3, is caved. There is little sign of the adit except for an overgrown dump.

3.7.4.2 Sample Locations

3.7.4.2.1 Solid Samples

No soil or rock samples were collected at this site.

3.7.4.2.2 Water Samples

Sample B7159803 was taken from the seep at Adit #3.

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<th>Flow (gpm)</th>
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</table>
3.7.4.2.3 Analytical Results

Water Samples (Tables 2.5-1 and 2.5-2)

In both the dissolved metals and total recoverable metals screens, water sample B7159803 exceeds all standards for cadmium, the Secondary MCLs for iron and manganese, and both Aquatic Life standards for zinc. It also exceeds the Aquatic Life Chronic standards for lead and mercury.

3.7.5 Structures

There are no structures at this property.

3.7.6 Safety

The open adits could be hazardous if entered.
Figure 3.7-1. Location of the Golden Triplet Group, Boundary County, Idaho (U.S. Geological Survey Leonia, Idaho-Montana, 7.5-minute topographic map).
Figure 3.7-3. Adit #2 at the Golden Triplet Claims of Idamont Lead-Zinc Mines (Roll B4-98, frame #9).

Figure 3.7-4. Adit #3 (main Oscar adit), with “No Entry” painted on the door, at the Golden Triplet Claims of Idamont Lead-Zinc Mines (Roll B4-98, frame #10).
Figure 3.7-5. Adit #4 (McGinty Creek adit), which is across Boulder Creek from Adits #2 and #3 (Oscar Mine), at the Golden Triplet Claims of Idamont Lead-Zinc Mines (Roll B4-98, frame #11).

Figure 3.7-6. Looking down the Adit #4 dump from the old road that crosses it (Roll B4-98, frame #13).
3.8 GOLDEN SCEPTRE MINE (Site No. SA-1)
Alternate name—Golden Scepter Mine.

3.8.1 Site Location and Access (Figure 2.1-1)

The Golden Sceptre Mine is in sections 11 and 14, T. 65 N., R. 1 W., on the Copeland 7.5-minute quadrangle (Figure 3.8-1). Access is via State Highway 1 to the junction with County Road 51, and then on County Road(?) 51A (the first road to the east past the junction of Road 51 and State Highway 1) to the property. The mine road crosses private land and is gated. The 3-5 acre mine site also is privately held.

3.8.2 Geologic Features (Figure 2.2-1)

The country rock in the area around the Golden Sceptre is the Precambrian Prichard Formation (Aadland and Bennett, 1979). The mine is in a sill that was explored as a source of thorium. In 1948, Kiilsgaard (1951, p. 29) noted the following:

The Golden Sceptre mine is in Sec. 12, T. 65 N., R. 1 W., Boise Meridian, about 4 miles due east of Porthill. The old mill building and lower tunnel portal are near the foot of the westerly-sloping mountain front; a second tunnel portal is a few hundred feet on up the mountain side above the lower one. These two tunnels comprise the total mine development, one being 1850 feet in length, the other 1250 feet in length. In 1941 a small (25-ton) mill was installed to handle ores from the lower tunnel; however, there is no record of its production. All milling and mining equipment has since been removed.

During the 1948 field season both tunnels were partially caved and flooded, making complete mapping of the mine impossible. Where available for examination, within the mine workings, the vein strikes N. 10° W. and dips 35° E. It is about 3 feet thick, composed mainly of quartz and calcite, and appears to be a fissure filling since it shows little or no movement along the vein walls. The vein follows the footwall contact of a large basic sill and underlying quartzite. Ore exposed on the dump consists of galena, chalcopyrite, and sphalerite, in a calcite and quartz gangue. Gold has been reported in the ores, but was not observed in the specimens studied.

The property has been inactive for several years.

3.8.3 Site History

The Golden Sceptre Mining Company, Ltd., was incorporated in 1909. By 1913, the property had about 1,300 feet of development. By 1921, total development had increased to 3,000 feet of workings (although shorter totals were reported in succeeding years). In 1923, the mine had one 1,500-foot tunnel and three vertical shafts, which totaled 180 feet in depth. A new, lower tunnel
was started in 1924. By 1930, the property had four tunnels and five vertical shafts. The two main tunnels were 1,800 feet and 700 feet long, and the other two tunnels were each 50 feet long. Little or no work appears to have been done between 1930 and 1935, but development resumed in 1936. By 1938, the property had two main tunnels (1,800 and 1,150 feet long), six shafts ranging from 15 to 125 feet in depth, and four or five short tunnels, which were between 20 and 40 feet long.

In 1939, the company connected its upper and lower tunnels through a raise started 600 feet from the portal of the lower tunnel (1939 Idaho Mine Inspector's Report (IMIR)). A mill was built in either 1940 (1940 IMIR) or 1941 (1941 IMIR). The mill had a capacity of 25 tons per day (tpd) and consisted of crushing equipment and concentrating tables. Lack of funds forced the company to suspend operations before any ore was processed through this mill. The milling equipment and much of the mining equipment was apparently removed from the property during World War II. The workings in 1944 totaled about 3,400 feet. By 1948, both the main tunnels were partially caved and flooded (Kiilsgaard, 1951).

The company started rehabilitating the workings in 1953. Repairs continued the following year, and the mine was leased to the Northwest Prospecting and Development Company in 1955. The lessees continued rehabilitating the property, and thorium was discovered on the property in 1956. Exploration the following year included two 80-foot diamond drill holes. Le Moine (1959, p. 51-53) described the property in 1958:

The main workings (see Fig. 12 [Figure 3.4-2]) consist of two adits located from 600 to 700 feet below the upper contact of a large diorite sill. One level is located 90 feet above the other. They are connected underground by an inclined raise. A map of the underground workings furnished by the Northwest Prospecting and Development Company shows that the lower adit is about 1350 feet long and the upper adit about 1850 feet. Both have numerous short crosscuts which together have a combined length of about 800 feet. The upper adit is caved 350 feet from the portal and can be reached only through the inclined raise from the lower level.

The upper adit intersects a weakly radioactive fault 190 feet from the portal and follows the fault, which strikes N 25° W and dips 85-89° NE, from that point southeastward to the raise between the two levels. The fault cuts a sub-parallel quartz-calcite lens at a small angle in the vicinity of the raise. Thin quartz-calcite stringers extend southeastward from the raise and are followed by the adit; 250 feet from the raise the quartz-calcite stringers become a vein, four to five feet wide, which strikes N 35° W, dips 80° SW, and is radioactive (up to 3 mr/hr) for about 20 feet. Although the vein is exposed by the adit for another 600 feet southeastward no other zones of anomalous radioactivity were found along the adit in that direction.

The lower adit trends roughly eastward except for 100 feet of its length where it turns southeastward, 450 feet from the portal, and follows the fault and sub-
parallel quartz-calcite lens to their intersection near the raise. Radioactivity readings of 2-5 mR/hr were obtained from the quartz-calcite lens at several points in the lower and upper levels near the raise; however, the lens as a whole is only weakly radioactive (less than 1 mR/hr).

Northwest Prospecting continued to lease the property until around 1968. In 1969 or 1970, the mine was leased to Atomic Fuels, Inc. After several years of minimal activity, the Golden Sceptre was leased to the Washington Water Power Co. in late 1977 or early 1978. No further activity has been reported at the property.

3.8.4 Environmental Conditions

3.8.4.1 Site Features

The mine was visited by Earl Bennett on July 16, 1998. A video segment describing the property is on the Bonners Ferry District Videotape (Tape 1, index 00:58:00-01:05:23). Documenting photographs are Roll B4-98, frames 14-23.

The property contains two adits, both of which are shown on the topographic map (Figure 3.8-1). The upper adit is caved and dry, and the lower, main adit is open and wet (Figure 3.8-3). A short access road leads from the main mine road to the upper adit (Figure 3.8-4). The dump at the upper adit measures 86 feet long, 86 feet wide, and 70 feet thick on the nose (Figure 3.8-5). The lower adit, which is 90 feet below the upper adit, has a strong flow of water (25 gallons per minute) coming from it (Figure 3.8-6). The dump at the lower adit measures about 80 feet wide, 50 feet long, and 50 feet thick. It has been partially removed and bulldozed (Figure 3.8-7). There is an orange-painted claim post (with the claim notice missing) by the adit and some rails on the dump (Figure 3.8-8). The lower adit is not far from the mine access road.

About 150 feet north of the lower adit are two buildings. One is partially collapsed and has a tin roof, and the other is a totally collapsed log structure (Figures 3.8-9 and 3.8-10). A shallow shaft or pit (Figure 3.8-11) about 25 feet deep is located 50 feet south of the building and is not fenced or marked in any way. There is some bull quartz on a small dump by the shaft. The millsite covers about 0.5 acre.

3.8.4.2 Sample Locations

3.8.4.2.1 Solid Samples

No soil or rock samples were collected at this site.

3.8.4.2.2 Water Samples

Sample B7169801 was collected from the water flowing from the lower adit.
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<td>20-25</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### 3.8.4.2.3 Analytical Results

Water Samples (Tables 2.5-1 and 2.5-2)

Water sample B7169801 does not exceed any standards in either the dissolved metals or the total recoverable metals screens.

### 3.8.5 Structures

There are two collapsed buildings at this site.

### 3.8.6 Safety

The open Adit #1 and the shaft near the collapsed buildings are potential hazards.
Figure 3.8-1. Location of the Golden Sceptre Mine, Boundary County, Idaho (U.S. Geological Survey Copeland 7.5-minute topographic map).
Figure 3.8-2. Sketch map of the Golden Sceptre Mine (LeMoine, 1960, Figure 6).
Figure 3.8-3. Sketch of the Golden Sceptre Mine.
Figure 3.8-4. Upper, caved Adit #2 at the Golden Sceptre Mine (Roll B4-98, frame #14).

Figure 3.8-5. Looking down the dump at Adit #2 of the Golden Sceptre Mine (Roll B4-98, frame #16).
Figure 3.8-6. Lower, main Adit #1 at the Golden Sceptre Mine. This adit is open and wet (Roll B4-98, frame #17).

Figure 3.8-7. Dump at Adit #1 of the Golden Sceptre Mine (Roll B4-98, frame #19).
Figure 3.8-8. Dump, claim post, and watercourse at Adit #1 of the Golden Sceptre Mine (Roll B4-98, frame #18).

Figure 3.8-9. Newer collapsed building with tin roof at the Golden Sceptre Mine (Roll B4-98, frame #21).
Figure 3.8-10. Looking past the corner of the newer collapsed building toward the corner of the older, collapsed log building at the Golden Sceptre Mine (Roll B4-98, frame #22).

Figure 3.8-11. Looking down the shallow shaft by the collapsed buildings at the Golden Sceptre Mine (Roll B4-98, frame #23).
3.9 SCHELLE PROSPECTS (Site No. SA-5)
Alternative names—Scheller & Dougherty; Lucky Seven Prospect.

Four other prospects are also within the area covered by the site description. These prospects are: SA-2—Hall Mountain No. 1 Prospect; SA-3—Barringer Prospect (Bruce Barringer Prospect; TMU; The Man Upstairs); SA-4—Northwest Prospecting and Development Co. (Wawa Claims; Atomic Fuels Corp.); and SA-6—Lucky Betsy Prospect.

3.9.1 Site Location and Access (Figure 2.1-1)

The Hall Mountain No. 1 Prospect is in the S\(\frac{1}{2}\) of section 12, T. 65 N., R. 1 W., according to the U.S. Bureau of Mines. The Barringer Prospect, the Northwest Prospecting and Development Co. property, and the Scheller Prospect are in the W\(\frac{1}{2}\) of section 13, T. 65 N., R. 1 W. The Lucky Betsy claims are in the NE\(\frac{3}{4}\) of the NW\(\frac{1}{4}\) of section 24, T. 65 N., R. 1 W. All five of these prospects are on the Copeland 7.5-minute quadrangle (Figure 3.9-1). Access is via State Highway 1. About 5.5 miles north of the junction of Highway 1 and U.S. Highway 95, a lane leads to a farm. Just before the house, the access road to these prospects heads to the north. The road switches back up the hill to a well-maintained cabin, which is part of the Scheller property. Most of the Scheller Prospect is bulldozer roads and a few small pits. Behind the cabin, the road continues uphill. The Lucky Betsy claims are on this road near the prospect symbol in section 24 on the topographic map. There are no workings at the site. These prospects are on a mixture of private and Forest Service land. The disturbed area is small, totaling less than 0.5 acre.

3.9.2 Geologic Features (Figure 2.2-1)

The area surrounding these prospects is underlain by the Precambrian Prichard Formation, which has been intruded by quartz diorite and diorite sills (Aadland and Bennett, 1979; LeMoine, 1960).

3.9.3 Site History

Thorite lode deposits were discovered in the Hall Mountain area in 1955 (Le Moine, 1959). The area was explored for the next few years, but no ore was produced from the area. In 1956, there were a few bulldozer cuts on the Barringer Prospect (SA-3; Powers, 1956a). By 1958, a 25-foot adit had been driven eastward into mineralized quartzite breccia (Figure 3.9-2; Le Moine, 1959; LeMoine, 1960). In 1928, the Northwest Prospecting and Development Company's prospect (Figure 3.9-3) had a trench and a prospect pit that exposed the vein (Le Moine, 1959; LeMoine, 1960). The Scheller Prospect (SA-5; Figure 3.9-4) was explored by several bulldozer cuts and a diamond drill hole in 1956 (Powers, 1956b). By 1958, there were over 1,000 feet of trenches on the property (Le Moine, 1959; LeMoine, 1960). Le Moine (1959, 1960) noted that the diamond drill hole was 130 feet long.
3.9.4 Environmental Conditions

3.9.4.1 Site Features

This property was visited by Earl Bennett on July 16, 1998. No video was taken at this site. Documenting photograph is Roll B5-98, frame 1.

Several miles of roads were walked on the hillside, and only a few possible trenches or pits were noted.

3.9.4.2 Sample Locations

3.9.4.2.1 Solid Samples
   No waste dump samples were collected at this site.

3.9.4.2.2 Water Samples
   No water samples were collected at this site.

3.9.5 Structures

A well-maintained cabin is the only structure on any of these prospects (Figure 3.9-5).

3.9.6 Safety
   There are no safety hazards at this site.
Figure 3.9-1. Location of the Hall Mountain No. 1, Barringer, Northwest Prospecting and Development Company, and Scheller prospects, Boundary County, Idaho (U.S. Geological Survey Copeland 7.5-minute topographic map).
Figure 3.9-2. Sketch map of the Berringer Prospect (LeMoine, 1960, Figure 8).
Figure 3.9-3. Sketch map of the Northwest Prospecting and Development Company Prospect (LeMoine, 1960, Figure 7).
Figure 3.9-4. Sketch map of the Scheller Prospect (LeMoine, 1960, Figure 5).
Figure 3.9-5. Cabin along one of the bulldozed exploration roads on the Scheller Prospect (Roll B5-98, frame #1).
3.10 MONTGOMERY MINE (Site No. SA-8)

3.10.1 Site Location and Access (Figure 2.1-1)

This mine is in the center of section 30, T. 65 N., R. 1 E., on the Copeland 7.5-minute quadrangle (Figure 3.10-1). Access is via FS Road 49, which leaves State Highway 1 about 3.5 miles north of the junction of Highway 1 and U.S. Highway 95. Road 49 crosses private land and goes past a house and outbuildings. A spur road from Road 49 goes to the compressor house and a nearby adit at the mine. This mine is on both private and Forest Service land, and it covers less than three acres.

3.10.2 Geologic Features (Figure 2.2-1)

Kiilsgaard (1951, p. 23) described the geology of the Montgomery property:

The Montgomery mine comprises 15 unpatented claims in Sec. 30 T. 65 N., R. 1 W. [sic], Boise Meridian, about 6 miles southeast of Porthill, Idaho. It is accessible by good roads, being situated about one mile east of State Highway No. 1. The property is developed by 7 tunnels whose total length approximates 3200 feet. Mine equipment consists of a compressor house and blacksmith shop, miscellaneous mining tools, and cabins.

The 3 upper tunnels, situated high on the hillside and reached only by trails, explore a prominent quartz vein that follows the footwall contact of a basic sill and argillaceous quartzite. (See Plate 5 [Figure 3.10-2]). The vein varies slightly in attitude but generally strikes N. 15° to 30° W., and dips 25° to 40° NE. It ranges in width from 10 inches to 5 feet and, although heavily iron-stained in certain portions, is relatively barren of noticeable amounts of sulphides. Occasional samples taken on this vein have indicated good lead, zinc, and silver values but there is no evidence of ore production.

The tunnel located a few feet northwest of the compressor house explores the lower portion of a basic uralite-diorite sill, whose thickness approaches 250 feet. (See Plate 6 [Figure 3.10-3]). Although the tunnel cuts several minor slits and seams, it does not expose a definite vein. Instead, the walls are heavily pyrrhotitized and appear to be components of an extensive low-grade ore body. Three 30-foot diamond drill holes, 2 drilled from the tunnel level, yielded drill cores which indicate that the grade of the ore body remains fairly constant and that it is quite large. Assays made on the drill cores contain as much as 3.5 percent copper and 1.1 percent nickel, according to Mr. J. A. Berry, President of the mine. Minerals obtained from wall rock samples and drill cores include pyrrhotite[,] chalcopyrite, pentlandite, and gersdorffite. Conclusions derived from a study of the ores and their field occurrence are that the deposit has resulted from immiscible
liquid segregation of the above mentioned sulphides during emplacement of the
basic sill.

A lower tunnel, located about 400 feet down the hill from the sill tunnel, has been
advanced to intersect the overlying, eastward-dipping, mineralized sill at a deeper
level. It did not reach its objective and is now caved at the portal; however, the
company plans to continue its advancement.

The occurrence of nickel in the ores makes this mine interesting. Furthermore, the
character of the deposit and the exposures noted in the sill tunnel imply that it may
be quite extensive.

3.10.3 Site History

The three upper tunnels mentioned by Kiilsgaard (1951) are probably the workings of the Trust
Mining Company (Kirkham and Ellis, 1926). In 1925, this property was described as follows
(Kirkham and Ellis, 1926, p. 66):
The vein strikes N. 7° to 15° W. and dips 35° to 40° E. Its thickness ranges from
two to six feet. The footwall is quartzite and the hanging wall is for the most part
a basic sill. . . . The vein seems to be a fissure, showing little or no movement. The
filling is mostly a hard white quartz containing iron sulphides. Occasionally stains
of copper carbonate were noted. Varying amounts of siderite accompany the
quartz as a gangue. A picked sample assayed 0.06 pounds of gold and 5.4 ounces
of silver to the ton.

The vein has been opened up on three different levels. The lowest tunnel is
approximately 600 feet long, picking up the vein about 480 feet from the portal.
The company has located six claims all told and has done more or less surface
work.

The surface equipment consists of accommodations for eight men, blacksmith
shop, 35 h. p. Turmo Gas Engine, 8 in. x 6 in. Gardener compressor, mine car,
rails, and mining tools.

Montgomery Mines, Inc., was organized in 1935. By 1939, the property had a total of 2,842 feet
of workings, including four tunnels, a vertical shaft, and an inclined shaft. Another tunnel was
started soon after, but the only work during World War II consisted of 500 feet of diamond
drilling. By 1946, the mine had six tunnels and three shafts, but the total workings had decreased
to 2,200 feet. This decrease probably marks when the company abandoned the upper workings.
A seventh tunnel was started in late 1946 or early 1947. U.S. Bureau of Mines personnel
examined the property in 1952 (Reynolds, 1953), with discouraging results. Montgomery Mines
abandoned the property soon afterwards.
3.10.4 Environmental Conditions

3.10.4.1 Site Features

The Montgomery Mine was visited by Earl Bennett on July 16, 1998. A video segment describing the property is on the Bonners Ferry District Videotape (Tape 1, index 01:22:05-01:30:19). Documenting photographs are Roll B5-98, frames 2-10.

The property consists of two upper adits and a lower caved tunnel, which is the main adit and is next to a collapsed building and a compressor (Figure 3.10-4). The first of the upper adits (Figure 3.10-5) is approximately 200 feet above the main adit. This upper adit is the Sill tunnel (Kiilsgaard, 1951). It is dry, open, and was driven into solid rock. The heavily iron-stained dump is long and narrow, measuring about 80 feet north-south, 15 feet east-west, and 20 feet thick (Figure 3.10-6). A small creek borders this dump on the south side.

An old trail heads north from the Sill tunnel. About 150 feet north of, and slightly higher than the Sill tunnel, is a caved pit or adit (Figure 3.10-7). The dump at this location measures about 20 feet in diameter and six or seven feet deep (Figure 3.10-8).

The lower adit is dry and caved (Figure 3.10-9). The adit is just north of the collapsed building, which has a chimney that is still standing (Figure 3.10-10), and just south of the compressor site. An old four-cylinder diesel engine, sacks of cement, and collapsed walls are at the site of the compressor house. The dump (Figure 3.10-11) measures 74 feet long, 68 feet wide, and 25 feet deep. A heavily overgrown spur road leads from this adit to the main access road to the mine (FS Road 49). Another collapsed building is on this spur road about ¼ mile south from the compressor and collapsed building.

Following FS Road 49 to the north from the junction with the spur road leads to another caved adit. According to Kiilsgaard (1951), this adit never reached its objective. The dump at this site (400 feet below the adit with the collapsed building and the compressor site) has been bulldozed and disturbed by logging (Figure 3.10-12).

According to a man who lives on the farm that is crossed by Road 49, there are three more, very old adits (at least one of which may be open) high on the hillside and south of the upper workings and the creek described above. These adits (noted by Kiilsgaard, 1951; Figure 3.10-2) are in dense trees and brush and were not examined during this study.

The total disturbed area covers about 1.5 acres.
3.10.4.2 Sample Locations

3.10.4.2.1 Solid Samples

Sample B7169802 is a composite sample collected from the upper adit (Sill tunnel) waste dump.

<table>
<thead>
<tr>
<th>Sample No</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7169802</td>
<td>Upper Adit (Sill tunnel) dump sample</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.10.4.2.2 Water Samples

No water samples were collected from this site.

3.10.4.2.3 Analytical Results

Solid Samples (Table 2.5-3 and 2.5-4)

Sample B7169801 exceeds the Clark Fork Superfund background levels for arsenic, lead, and cadmium. In addition, the sample contains more arsenic, cadmium, chromium, copper, lead, and nickel than would be expected in rocks of the Prichard Formation (Table 1.5-3). All elements with the exception of barium are below detection limits in the TCLP for metals screen.

3.10.5 Structures

There is a collapsed cabin at the site of the main adit and another collapsed building about ¼ mile to the south.

3.10.6 Safety

The open adit could be a minor safety hazard.
Figure 3.10-1. Location of the Montgomery Mine, Boundary County, Idaho (U.S. Geological Survey Copeland 7.5-minute topographic map).
Figure 3.10-2. Geologic map of the upper workings at the Montgomery Mine (Kilsgaard, 1951, Plate 5).
Figure 3.10-3. Plan and profile of the lower workings at the Montgomery Mine (Kiilsgaard, 1951, Plate 6).
Figure 3.10-4. Sketch of the Montgomery Mine.
Figure 3.10-5. Open upper tunnel at the Montgomery Mine. This is the Sill tunnel shown in Figure 3.10-3 (Roll B5-98, frame #2).

Figure 3.10-6. Dump for the Sill tunnel at the Montgomery Mine, looking north from the adit (Roll B5-98, frame #3).
Figure 3.10-7. Caved and dry upper adit, which is north of the Sill tunnel at the Montgomery Mine (Roll B5-98, frame #4).

Figure 3.10-8. Small dump at the caved upper adit at the Montgomery Mine (Roll B5-98, frame #5).
Figure 3.10-9. Lower caved tunnel by the compressor house at the Montgomery Mine (Roll B5-98, frame #7).

Figure 3.10-10. Collapsed building with standing chimney just south of the lower tunnel at the Montgomery Mine (Roll B5-98, frame #9).
Figure 3.10-11. Dump from the lower tunnel (by the compressor house) at the Montgomery Mine (Roll B5-98, frame #8).

Figure 3.10-12. Caved and dry tunnel, which is 400 feet below the lower tunnel and compressor house, at the Montgomery Mine. The dump at this site was bulldozed during logging (Roll B5-98, frame #10).

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3.11 IDAHO CONTINENTAL MINE (Site No. SA-17)

3.11.1 Site Location and Access (Figure 2.1-1)

The Idaho Continental Mine (which had the largest production in Boundary County) is at the head of Blue Joe Creek in the S1/2 of section 6 (unsurveyed), T. 64 N., R. 4 W., on the Continental Mountain 7.5-minute quadrangle (Figure 3.11-1). It takes over two hours to get from Bonners Ferry to the mine. Visitors should check with the USFS office in Bonners Ferry before proceeding to the property. The Canadian and U.S. border patrols should also be notified because the Boundary Creek Road crosses the international border. Access is further complicated because the mine owners are contesting the USFS's right to restrict access along the Boundary Creek and Blue Joe Creek roads. The mine can be reached via the Copeland road (labeled "Wallen Road" on the Copeland 7.5-minute map), which goes west from State Highway 1 about 1 mile north of the junction of U.S. Highway 95 and Highway 1. The Copeland road connects to County Road 18 on the west side of the Kootenai River Valley (labeled "West Side Road" on the Copeland 7.5-minute map). Proceed north on County Road 18 to the paved Smith Creek Road (FS Road 281) and turn west. From the Smith Creek Road (which changes to FS Road 655 after about 7 miles), turn northeast onto FS Road 282. After about 1/2 mile, turn northwest onto FS Road 2454 and continue to the gated and locked FS Road 1009. Follow Road 1009 to FS Road 636 on the west side of Grass Creek. Continue north on Road 636 to the Boundary Creek Road (which is gated and locked), then west to the Blue Joe Creek Road (FS Road 2546). A bridge with a locked gate crosses Blue Joe Creek about 1 mile south from Boundary Creek. The mine is another 4 miles south from this gate and is on patented claims surrounded by Forest Service land.

3.11.2 Geologic Features (Figure 2.2-1)

The Idaho Continental Mine is a lead-silver deposit hosted in metamorphosed sedimentary rocks of the Precambrian Wallace Formation (Miller, 1982). See Mitchell (1999) for a detailed description of the geology of the mine.

3.11.3 Site History

The Idaho Continental was discovered in 1890, and the Idaho Continental Mining Company was organized in 1902. The property was controlled by the original locator until the mid-1940s and by his widow or her estate for many years thereafter. The first mill was built in 1914, and most of the ore produced from then on was processed by this mill or one of its successors. The last production from the mine was reported in 1979 and 1980. Recent activity at the mine has focused on cleaning up the large volume of mine waste and tailings in Blue Joe Creek. See Mitchell (1999) for a complete history of the Idaho Continental.
3.11.4 Environmental Conditions

3.11.4.1 Site Features

The Idaho Continental Mine was visited by Earl Bennett on July 30 and August 6, 1998. Another trip to sample and videotape the lower reaches of Blue Joe Creek was made on August 5. Video segments describing the mine are on the Bonners Ferry District Videotape (Tape 1, index 01:30:20-01:57:20; and Tape 2, index 00:01:30-00:12:50 and 1:10:50-1:35:15). Documenting photographs are Roll B7-98, frames 10-25; Roll B8-98, frames 1-11; Roll B9-98, frames 11-25; and Roll B10-98, frames 1-8.

A special video entitled “The Continental Mine” was prepared at the request of the USFS. This video includes slides (Grunenfelder, 1987) showing the mine before it was cleaned up by the Idaho National Guard in 1987. In addition, a detailed history has been written for this mine (Mitchell, 1999) for the USFS. Relative locations of the features described at this mine are shown in Figure 3.11-2.

The Idaho-Continental Mine is on patented claims that cover an area about 1.75 miles long and 0.25 mile wide. The claims are oriented northeast-southwest. The workings include at least two adits, an open stope, and an open pit or trench along the ridge above the old millsite and tailings impoundment. The open pit is about 2,000 feet long and follows the strike of the vein, which is again northeast-southwest (Figures 3.11-3 and 3.11-4). The dimensions of the trench vary, with a maximum depth of about 50 feet and a maximum width of about 40 feet. The alteration related to the mineralization is very evident in the rocks exposed in the trench.

The shaft (open stope) and adit shown on the topographic map near the northeast end of the trench are still there. This tunnel (Figure 3.11-5) is probably the No. 4 level of the mine and is designated Adit #4. Adit #4 is open, dry, and has a strong flow of cold air coming from it. A raise connects the #4 level to the #5 level at the base of the ridge. Just above Adit #4 is an open stope (Figure 3.11-6), which has timbers exposed. The stope (shown by the shaft symbol on the map) is on an old road that goes from Adit #4 to the open pit, which is several hundred feet above the adit. Several other adits may have been on the strike of the open pit between the lower end of the trench and Adit #4, but these have been obliterated by sloughing from the open pit. There was no water flowing from any of these workings.

Adit #5 also has a strong flow of cold air and is very wet. A significant amount of water (estimated at more than 25 gallons per minute) flows from the opening (Figure 3.11-7). This was the main haulage level and is just above the old millsite. The National Guard directed this water across the tailings impoundment and down to Blue Joe Creek in an armored channel (Figure 3.11-8). At least part of the water from Adit #5 flows into a small pond that has heavy iron staining in the bottom and a good growth of green plants that appear to be unique to this pond (Figure 3.11-9).
The tailings impoundment is bisected by Blue Joe Creek (Figures 3.11-10, 3.11-11, and 3.11-12). The channel was originally moved to the east by the miners but was shifted to its present location and armored by the National Guard. The impoundment is about 1,000 feet long and 250 feet wide. The tailings vary in thickness to an estimated maximum of 20 feet. Both jig and flotation tails are in the impoundment (Figures 3.11-13 and 3.11-14). The National Guard scooped the coarser jig tailings out of the waterway and placed them on top of the flotation tailings, probably to control wind-blown dust from the finer flotation tails. However, erosion is eating through the tailings and moving this material into the active waterway of Blue Joe Creek. A wooden dam at the northeast end of the tailings impoundment was breached in the early 1940s.

The old millsite is just northeast of the Adit #5 (Figure 3.11-15). There is a fair-sized waste dump with an old ore bin and another building at this site. Just northeast of the ore bin is a cabin built on jig tails.

A considerable amount of reworked jig tailings is apparent in Blue Joe Creek about 4 miles northeast of the mine at the bridge across Blue Joe Creek (Figures 3.11-16). These reworked tailings probably extend all the way to the mine.

3.11.4.2 Sample Locations

3.11.4.2.1 Solid Samples

Sample B8059802 was collected from the reworked jig tailings near the bridge across Blue Joe Creek four miles north of the mine. Sample B8069801 was collected from flotation tailings beneath a cover of jig tails. The sample was taken about 20 feet above Blue Joe Creek and 250 feet northeast of the cabin in a small gully on the west side of the creek. Sample B7309803 was collected from flotation tailings just below the access road at the southwest end of the tailings impoundment on the east side of the creek. Sample B7309804 was collected from the jig tailings below the cabin.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8059802</td>
<td>Reworked jig tails from Blue Joe Creek, just above the bridge.</td>
<td>Yes</td>
</tr>
<tr>
<td>B8069801</td>
<td>Flotation tailings, 250 feet northeast of cabin</td>
<td>Yes</td>
</tr>
<tr>
<td>B7309803</td>
<td>Flotation tails, southwest end of tailings impoundment</td>
<td>Yes</td>
</tr>
<tr>
<td>B7309804</td>
<td>Jig tailings from below cabin</td>
<td>Yes</td>
</tr>
</tbody>
</table>
3.11.4.2.2 Water Samples

Sample B7309801 was collected from the discharge from Adit #5. Sample B7309802 is from Blue Joe Creek, upstream from the tailings impoundment, and sample B8069802 was collected from Blue Joe Creek near the site of the old tailings dam. Sample B8069803 is from a seep in the tailings impoundment 150 feet east of the cabin. Sample B8069804 is a reference sample taken above the bridge that crosses Grass Creek near Road 1006.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (µS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7309801</td>
<td>Adit #5</td>
<td>106</td>
<td>50</td>
<td>7.4</td>
<td>&gt;50</td>
<td>Yes</td>
</tr>
<tr>
<td>B7309802</td>
<td>Blue Joe Creek, upstream from tailings</td>
<td>15</td>
<td>50</td>
<td>8.3</td>
<td>&gt;50</td>
<td>Yes</td>
</tr>
<tr>
<td>B7309805</td>
<td>Blue Joe Creek, 250 feet south of the bridge and 4.5 miles north of the mine.</td>
<td>39</td>
<td>50</td>
<td>8.0</td>
<td>&gt;50</td>
<td>Yes</td>
</tr>
<tr>
<td>B8069802</td>
<td>Blue Joe Creek near the tailings dam</td>
<td>82</td>
<td>50</td>
<td>8.2</td>
<td>&gt;50</td>
<td>Yes</td>
</tr>
<tr>
<td>B8069803</td>
<td>Seep, 150 feet east of cabin</td>
<td>64</td>
<td>50</td>
<td>8.2</td>
<td>Seep</td>
<td>Yes</td>
</tr>
<tr>
<td>B8069804</td>
<td>Grass Creek bridge near 1006 road</td>
<td>11</td>
<td>50</td>
<td>7.1</td>
<td>&gt;100</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.11.4.2.3 Analytical Results

Solid Samples (Table 2.5-3 and 2.5-4)

Two samples of the flotation tailings (B8069801, B7309803) and two samples of jig tailings (B7309804 and B8059802) exceed EPA Clark Fork Superfund background levels for lead and cadmium. All four samples exceed the amount of copper, lead, zinc, and cadmium expected from rocks from various formations in the Belt Supergroup (Table 1.5-3), and sample B8059802 contains more manganese than average for the rocks in this area. In the TCLP for metals screen, all four samples show significant leaching of lead. In addition, samples B8069801 and B8059802 show significant leaching of cadmium, and B8069801 shows some leaching of mercury.

Water Samples (Tables 2.5-1 and 2.5-2)

In both the dissolved metals and total recoverable metals screens, samples B7309801 and B8069802 exceed all standards for cadmium and both Aquatic Life Acute standards for zinc.
addition, these samples exceed all standards for lead. Sample B7309802 exceeds both Aquatic Life standards for lead, and samples B7309805 and B8069803 exceed all standards for lead. Sample B8069803 exceeds the Aquatic Life Chronic standard for cadmium in both the dissolved metals and total recoverable metals screens, is within the range of both the Aquatic Life standards for zinc in the total recoverable metals screen, and exceeds all standards for lead. Sample B8069804 from Grass Creek (reference sample) does not exceed any EPA water quality standards in either the dissolved metals screen or total recoverable metals screen.

3.11.5 Structures

There are several structures at this site. These include a maintained cabin, the old power shack, and an ore bin.

3.11.6 Safety

The open stope above Adit #4 is a hazard, as are open Adits #4 and #5.
Figure 3.11-1. Location of the Idaho Continental Mine, Boundary County, Idaho (U.S. Geological Survey Continental Mountain 7.5-minute topographic map).
Figure 3.11-2. Sketch of the Idaho Continental Mine.
Figure 3.11-3. Mineralized area in the open cut at the Idaho Continental Mine, looking north (Roll B7-98, frame #12).

Figure 3.11-4. Looking northeast down the open cut at the Idaho Continental Mine (Roll B7-98, frame #10).
Figure 3.11-5. Open Adit #4 (probably the No. 4 tunnel) at the Idaho Continental Mine (Roll B10-98, frame #1).

Figure 3.11-6. Open stope above Adit #4 at the Idaho Continental Mine (Roll B9-98, frame #23).
Figure 3.11-7. Open 500 level adit (Adit #5) at the Idaho Continental Mine. Both cold air and lots of water are coming from the opening (Roll B7-98, frame #13).

Figure 3.11-8. Looking east along the watercourse from Adit #5 at the Idaho Continental Mine to Blue Joe Creek (Roll B7-98, frame #14).
Figure 3.11-9. Power shack just north of Adit #5 at the Idaho Continental Mine. The water from the adit flows down the channel in the lower right corner of the picture. Some of this water collects in a pond, which is in the green area visible in the center between the power shack and the tall evergreen (Roll B7-98, frame #15).

Figure 3.11-10. Looking down (northeast) at the tailings area from the northeast end of the open cut at the Idaho Continental Mine (Roll B9-98, frame #21).
Figure 3.11-11. South end of the mine tailings area at the Idaho Continental Mine (Roll B10-98, frame #5).

Figure 3.11-12. Looking north from the bunkhouse toward the end of the tailings impoundment at the Idaho Continental Mine. Blue Joe Creek crosses the right side of the picture (Roll B7-98, frame #25).
Figure 3.11-13. Site where flotation tailings sample B806901 was taken at the Idaho Continental Mine. The flotation tailings are on top of jig tailings and are also covered by jig tails (Roll B10-98, frame #4).

Figure 3.11-14. Upper end of the tailings impoundment at the Idaho Continental Mine, looking upstream. The view is to the southwest (Roll B7-98, frame #22).
Figure 3.11-15a. Picture 1 of a four-picture panorama of the west side of the Idaho Continental property from south to north. The view is to the southwest, with the open pit in the background (Roll B8-98, frame #2).

Figure 3.11-15b. Picture 2 of a four-picture panorama of the west side of the Idaho Continental property from south to north. The power shack and a collapsed structure are in the middle of the picture. The left side of this photograph overlaps the right side of Figure 3.11-15a (Roll B8-98, frame #4).
Figure 3.11-15c. Picture 3 of a four-picture panorama of the west side of the Idaho Continental property from south to north. The pile of coarse rock in the center of the picture (to the left of the ore bin) is stockpiled ore, which is surrounded by waste rock. The left side of this photograph overlaps the right side of Figure 3.11-15b (Roll B8-98, frame #6).

Figure 3.11-15d. Picture 4 of a four-picture panorama of the west side of the Idaho Continental property from south to north. The cabin to the left of the ore bin is built on jig tailings. The left side of this photograph overlaps the right side of Figure 3.11-15c (Roll B8-98, frame #8).
Figures 3.11-16. Gravel (reworked jig tails) on the north side of Blue Joe Creek by the bridge that crosses the creek. Sample B8059802 was taken at this site (Roll B9-98, frame #12).
3.12 MILLER BROTHERS MINE (Site No. SA-9)
Alternate name—Lucky Charlie Mine.

3.12.1 Site Location and Access (Figure 2.1-1)

The Miller Brothers Mine is near Miller Creek near the center of the southern edge of section 26, T. 65 N., R. 1 E., on the Hall Mountain 7.5-minute quadrangle (Figure 3.12-1). It is not more than 200 feet north of U.S. Highway 95 and is about 4½ miles from the junction between Highway 95 and State Highway 1. The easiest way to reach the mine is by walking across the west end of the hay field that is on the north side of the highway (Figure 3.12-2). From the mine dump, a barn with a tin roof is visible on the south side of Highway 95. Forest Service Road 2228 is north of the mine workings. The mine is on a mixture of Forest Service and private property, and it impacts less than ¼ acre.

3.12.2 Geologic Features (Figure 2.2-1)

Brackebusch (1969, p. 63-64) described the geology of the Miller Brothers Prospect:

The Miller Brothers mine in sec. 26, T. 64 N., R. 1 E. was described by Kiiilsgaard (1951, p. 29). The vein is about one foot thick and coincides with the upper contact of sill A. The vein strikes N. 5° E. and dips 22° E. The vein is chiefly quartz with minor amounts of pyrite, galena, chalcopyrite, and sphalerite. Both the footwall material (quartz diorite) and the hanging wall material (Prichard feldspathic quartzite) have been silicified and sheared parallel to the contact.

An inclined shaft 160 feet in length has been sunk on the vein. A vertical shaft about 50 feet in depth has been sunk on a minor quartz vein in sill A about 100 feet west of the inclined shaft. The prospect has been idle for several years, but in the fall of 1968 a small mining-hand sorting operation was begun on the contact vein. The contact vein apparently extends southward, intermittently, for two miles as evidenced by several prospects along the upper contact of sill A.

Close and others (1975, p. 50) noted:

The Miller Brothers prospect . . . now called the Lucky Charlie mine is about 6 miles west by U.S. Highway 95 from Addie, Idaho. Several shipments of ore were reportedly produced from the property in the late 1930's [Kiiilsgaard, 1949].

Workings consist of a 160-foot-deep main inclined shaft that is flooded 90 feet below the collar and several small exploration shafts and cuts. The inclined shaft follows a sheared gabbroic sill-quartzite contact. The sheared zone trends N 10° to 20° W, dips 25° to 30° NE and is about 3 feet thick. It is partially filled by a massive quartz vein that averages 1.1 feet in thickness. The vein is composed of 60 percent massive quartz, 23 percent gouge and limonite, 10 percent coarse-grained pyrite, 2 percent combined coarse-grained galena and sphalerite,
and 5 percent siderite. The pyrite is disseminated; the galena and sphalerite occurs in one-half to 2 inch thick lenses and pods.

The sheared footwall, composed of gabbroic and quartzite horses, is altered, cut by small quartz stringers, and contains disseminated, coarse-grained pyrite for 3 feet below the quartz vein.

The vein is exposed by the inclined shaft for 70 feet down-dip, and by drifts for 50 feet along strike. Samples from the main shaft average 1.19 ounces silver per ton, 1.69 percent lead, 0.42 percent zinc, and trace amounts of gold and copper.

Additional resources may occur along the shear zone which is intermittently exposed for over 2,000 feet to the south.

3.12.3 Site History

In 1928, the property was leased to the Boundary Consolidated Mining Company, which was organized in that year. At that time, the property had two tunnels and five shafts, for a total development of about 262 feet of workings. The company forfeited its corporate charter the following year. In 1939, the mine shipped lead ore to a smelter. Brackebusch (1969) noted a small mining operation was started at the property in the fall of 1968.

3.12.4 Environmental Conditions

3.12.4.1 Site Features

The Miller Brothers property was visited by Earl Bennett on July 29, 1998. A video segment describing the site is on the Bonners Ferry District Videotape (Tape 2, index 00:12:54-00:16:20). Documenting photographs are Roll B6-98, frames 12-13.

All that is left of this old mine is a caved, dry, and overgrown adit or pit (Figure 3.12-3), flanked by two smaller pits. The dump measures 80 feet long, 40 feet wide, and 8 feet thick. An old electric fence is in front of the adit.

3.12.4.2 Sample Locations

3.12.4.2.1 Solid Samples

No waste dump samples were collected at this site.

3.12.4.2.2 Water Samples

No water samples were collected at this site.
3.12.5 Structures
    There are no structures at this property.

3.12.6 Safety
    There are no safety hazards at this property.
Figure 3.12-1. Location of the Miller Brothers Mine, Boundary County, Idaho (U.S. Geological Survey Hall Mountain 7.5-minute topographic map).
Figure 3.12-2. Highway 95, as seen from the Miller Brothers Mine. Note the tin-roofed barn in the center of the picture (Roll B6-98, frame #13).

Figure 3.12-3. Caved and dry adit at the Miller Brothers Mine (Roll B6-98, frame #12).
3.13 COPPER FALLS PROSPECT (Site No. SA-14)
Alternate name—Big T Prospect; Geneva Claims; Copper Ridge Mine; Pulpit Mountain Mining Co.

Examination of the property files shows that properties SA-12 (Pulpit Mountain mining Co.), SA-13 (Copper Falls Prospect), SA-14 (Big T Prospect) and SA-15 (Geneva Claims) are all the same property. The different names reflect different operators and references which did not link the various names and operators together.

3.13.1 Site Location and Access (Figure 2.1-1)

The Big T adit at the Copper Falls Prospect is south of Copper Falls and Copper Creek near the center of section 24, T. 65 N., R. 2 E., on the Eastport 7.5-minute quadrangle (Figure 3.13-1). Access is via FS Road 2517, which goes southeast from U.S. Highway 95. A road to the adit is just south of the Copper Falls Self-Guided Nature Trail. Signs directing people to the nature trail are prominently posted on Road 2517. Copper Creek flows between the nature trail and the road to the mine. The adit can be reached from either the trail or the road.

3.13.2 Geologic Features (Figure 2.2-1)

The Copper Falls Prospect is in an area where the Prichard Formation has been intruded by Precambrian gabbro sills. A northeast-trending fault passes near the property (Aadland and Bennett, 1979). According to Wallace (1952, p. 1-2):

The main vein, consisting principally of quartz with some limonite and very little galena, chalcopyrite and malachite is in a large diorite sill that has been intruded into Belt sediments of pre-Cambrian age. . . . The vein strikes approximately N. 45° W. and dips 50° to 55° southwest. It is as much as 2 feet wide, but elsewhere is only a few inches wide. It has been exposed for a length of over 200 feet.

The quartz in the vein is commonly shattered, and limonite occupies fractures and permeates breccia-like zones. Galena is more plentiful than chalcopyrite in the vein, but nowhere was either mineral seen to be abundant. Pods of galena as much as an inch wide were observed in only a few places, although thin stringers penetrating the quartz in a few places made bodies of "high-grade" as much as 1 foot wide and a few feet long.

Other similar veins have been prospected by pits and short adits on the claims, but did not appear as promising as the ore as the one described above.

3.13.3 Site History

The Copper Falls Mining Company was incorporated in 1911. By 1914, the property had about 800 feet of workings, which the company's report to the Idaho inspector of Mines described as
"300 feet adit tunnel — 220 feet crosscut and 80 feet drift in lower crosscut tunnel — 45 ft shaft in tunnel on lead and numerous open cuts." Work continued until about 1918, when the total development on the property had increased to 1,400 feet of workings. In 1934, the property had three tunnels (240 feet, 600 feet, and 50 feet) and a 45-foot shaft. The company forfeited its corporate charter the following year.

In 1952, the property (now rechristened the Geneva Claims and controlled by the Pulpit Mountain Mining and Exploration Co.) was examined by a U.S. Geological Survey geologist in connection with the Defense Minerals Exploration Administration (DMEA) program (Wallace, 1952). The results of this examination were not promising, and no more activity seems to have occurred on the property. Close and others (1975) mapped the main adit on the property (Figures 3.13-2 and 3.13-3), which they called the Big T.

3.13.4 Environmental Conditions

3.13.4.1 Site Features

The Copper Falls Prospect (Figure 3.13-4) was visited by Earl H. Bennett on July 29, 1998. A video segment describing the property is on the Bonners Ferry District Videotape (Tape 2, index 00:16:25 - 00:20:44). Documenting photographs are Roll B6-98, frames 14-16.

The property consists of a partially open, dry, sloughed adit (Figures 3.13-5 and 3.13-6) and a dump measuring 30 feet long, 30 feet wide, and 90 feet thick on the nose (Figure 3.13-7). The slough has created a pit. The adit is only about 150 feet above the Copper Falls Self-Guided Nature Trail that goes to Copper Falls (which is about 100 yards north of the adit).

3.13.4.2 Sample Locations

3.13.4.2.1 Solid Samples

No waste dump samples were collected at this site.

3.13.4.2.2 Water Samples

No water samples were collected at this site.

3.13.5 Structures

There are no structures at this site.

3.13.6 Safety

The close proximity to the nature trail makes the partially open adit more of a hazard than it would be if it were in a more remote area.
Figure 3.13-1. Location of the Copper Falls Prospect, Boundary County, Idaho (U.S. Geological Survey Eastport 7.5-minute topographic map).
Figure 3.13-2. Workings at the Copper Falls Prospect (Close and others, 1975, Figure 11).
Figure 3.13-3. Geologic map of the Big T adit (Close and others, 1975, Figure 12).
Figure 3.13-4. Sketch of the Copper Falls Prospect.
Figure 3.13-5. Adit from the end of the dump at the Copper Falls Prospect (Roll B6-98, frame #16).

Figure 3.13-6. Partially open and dry adit at the Copper Falls Prospect (Roll B6-98, frame #14).
Figure 3.13-7. Dump below the adit at the Copper Falls Prospect (Roll B6-98, frame #15).
3.14 UNNAMED PROSPECT ON RUBY RIDGE (Site No. B7299801)

3.14.1 Site Location and Access (Figure 2.1-1)

This is an unnamed prospect on Ruby Ridge in the SW corner of section 8 (unsurveyed), T. 64 N., R. 3 E., on the Canuck Peak 7.5-minute quadrangle (Figure 3.14-1). Access is about 2 miles west on the Ruby Ridge Trail (FS Trail 35) from the junction of the trail with FS Road 403.1. The trail is excellent and easily walked. Two shaft symbols are shown on the topographic map. This prospect is on Forest Service land and has minimal impact.

3.14.2 Geologic Features (Figure 2.2-1)

This prospect is in an area where rocks of the Precambrian Prichard Formation are intruded by the Precambrian diorite and diabase Purcell sills (Aadland and Bennett, 1979).

3.14.3 Site History
   Nothing is known about the history of this site.

3.14.4 Environmental Conditions

3.14.4.1 Site Features

This prospect was visited by Earl Bennett on July 29, 1998. No video was taken of this property. Documenting photograph is Roll B6-98, frame 18.

The workings consist of a 15-foot-long dry trench that is 6 feet deep on the uphill side and about 3 feet wide (Figure 3.14-2). There is iron-stained bull quartz piled along the west side of the trench from the quartz vein that was explored. There are also a few small pits above this trench.

3.14.4.2 Sample Locations

3.14.4.2.1 Solid Samples
   No waste dump samples were collected at this site.

3.14.4.2.2 Water Samples
   No water samples were collected at this site.

3.14.5 Structures
   There are no structures at this site.

3.14.6 Safety
   There are no hazards at this site.
Figure 3.14-1. Location of the Unnamed Prospect, Site No. B7299801, Boundary County, Idaho (U.S. Geological Survey Canuck Peak, Idaho-Montana, 7.5-minute topographic map).
Figure 3.14-2. Prospect trench at Unnamed Prospect B7299801 (Roll B6-98, frame #18).
3.15 BUCKHORN MINE (Site No. SA-58)
Alternate names—Cynide Gold Mining Property; Cyanide; Deer Creek Gold Mining Co.; Hoosier Boy.

3.15.1 Site Location and Access (Figure 2.1-1)

The Buckhorn Mine is in the NE¼ of section 27 (unsurveyed), T. 64 N., R. 3 E., on the Line Point 7.5-minute quadrangle (north end) and the SW¼ of section 22 (unsurveyed), T. 64 N., R. 3 E., on the Canuck Peak 7.5-minute quadrangle (south end; Figure 3.15-1). The millsite is on FS Road 435.1 close to Deer Creek and near the mouth of the first unnamed gulch south of Mill Creek in the SE¼ of the NE¼ of section 32 (unsurveyed), T. 64 N., R. 3 E., on the Line Point 7.5-minute quadrangle. Access from FS Road 435.1 along Deer Creek is by a mine road that heads east along the south bank of Mill Creek for about 1.5 miles, then switches back up the hillside to the mine workings, which are shown as an adit symbol on the Line Point quadrangle. The mine road has numerous kelly humps along the upper end and does not follow the route shown on the topographic map. The mine is on Forest Service land and impacts about 5 acres.

3.15.2 Geologic Features (Figure 2.2-1)

The Buckhorn Mine is in rocks of the Precambrian Prichard Formation (Aadland and Bennett, 1979). Close and others (1975, p. 49) described the Buckhorn geology:

The Buckhorn workings, now caved, are reported to be on a 3- to 5-foot-thick shear zone that closely conforms to the N 30° to 40° W trending, southwest dipping quartzite country rock. The quartzite is intruded by diorite in the vicinity of the mine. Ore shoots in the shear zone are 1.5 to 4 feet thick and are as much as 250 feet long. They are composed of limonite stained quartzite breccia, quartz stringers as much as 1.5 feet thick, and 1 to 5 percent combined disseminations and masses of pyrite and galena.

Gold is the most important metal and is, for the most part, free. The ore shoots may average $10 per ton at a price of gold of $20.67 per troy ounce [Kirkham and Ellis, 1926. This material is paraphrased, despite the formatting of Close and others, which implies the material is quoted.]

Samples of the vein material taken from caved adit dumps contained 0.09 to 0.42 ounce gold per ton, trace to 4.2 ounces silver per ton, trace to 2.9 percent lead and trace amounts of copper and zinc.

The ore shoots developed by the Cyanide [Cynide] Gold Mining Co. are probably mined out, but the shear zone is traceable for over 1 mile, and ore shoots may occur in undeveloped parts of the shear zone [Kirkham and Ellis, 1926].
3.15.3 Site History

Close and others (1975, p. 48) noted:

Considerable development work was done on the property by the Cyanide Gold Mining Co. in the 1920’s and 1930’s. They drove 6,000 feet of underground workings, constructed a 200 ton per day cyanide mill, a 4,200-foot-long aerial tramway, and the Eileen Dam, on the Moyie River. The company mined and milled 1,760 tons of ore containing 360 troy ounces gold, 1,230 troy ounces silver, 1,060 pounds copper, and 35,060 pounds lead valued at $11,800 from the property [USBM Minerals Yearbook, 1971]. The Buckhorn mine is owned by Robert Causton.

The Deer Creek Gold Mining Company, Ltd., was incorporated in 1913, and a small amount of ore was produced. By 1917, the property had 1,200 feet of development and a good road had been built to the mine. A five-stamp mill was on the property, and an arrastra was added during the summer. Deer Creek continued to develop the property the next year.

In early 1919, Cynide Gold Mining Company (incorporated in 1919) took over the property from Deer Creek. Soon after this, Cynide described the reduction plant as “10-ton stamp mill, but cannot save values, are figuring on another plant to save values.” Total development by 1920 was 2,300 feet, and the company was expanding the mill. The existing plant was a “10 ton amalgamating plant,” which was to be replaced by a “50 ton reduction mill with a centrifugal amalgamator.” By the following year, Cynide was planning to install a 100-tpd cyanide plant. By 1923, both the mill and a hydroelectric plant to power it were nearing completion. The USGS also mentioned the presence of an aerial tramway; this was probably the 4,200-foot tramway noted by Kirkham and Ellis (1926). By 1924, the mine had a total of 4,000 feet of workings, which included seven tunnels, two shafts, four raises, four crosscuts, and six drifts. The company completed its dam, hydroelectric plant, and transmission line, and continued installing machinery for the new cyanide plant.

Cynide completed its purchase of the property in 1925, and Deer Creek forfeited its corporate charter. The new cyanide plant made a short run, and the company marketed the resulting precipitates and gold bullion. In addition, a test lot of sulfide lead ore was shipped to the Bunker Hill smelter. Also during 1925, high water damaged the power plant and washed out the spillway on the company’s dam. Development work continued for the next few years, but the mine was sold at a receiver’s sale on June 5, 1930. Cynide Gold forfeited its corporate charter in 1931. A little gold ore was produced from the mine in the late 1930s.
3.15.4 Environmental Conditions

3.15.4.1 Site Features

The Buckhorn was visited by Earl Bennett on July 29, 1998. A video segment of the mine is on the Bonners Ferry District Videotape (Tape 2, index 00:21:05-00:33:20), and a video segment of the Buckhorn Mill is on the Bonners Ferry District Videotape (Tape 2, index 01:18:07-01:19:45). Documenting photographs are Roll B6-98, frames 20-25; Roll B7-98, frames 2-8; and Roll B10-98, frame 20.

The main workings consist of three adits (#1, #2, and #3), one above the other, that are connected by a switchback road (Figure 3.15-2). Two other adits are north of these three. The upper Adit #3 (elevation 5,720 feet) is a caved, dry tunnel (Figure 3.15-3) with about 100-150 feet of workings. This estimate is based on the size of the dump, which measures 20 feet in diameter and 80 feet thick on the nose down a steep hillside. Adit #2 is at an elevation of 5,550 feet and is directly below #3 (Figure 3.15-4). It is caved, dry, and has an iron-stained dump measuring 60 feet long, 15 feet wide, and 150 feet thick on the nose on the steep hillside (Figure 3.15-5). There is a sump between the adit and the dump to contain spring runoff water. A pathway (as well as the switchback road) connects Adits #2 and #1.

Adit #1 is the main opening and is at an elevation of 5,420 feet (Figure 3.15-6). It is caved but has about 2 gallons per minute flowing from it (Figure 3.15-7) and the watercourse is iron stained. The water flows under the access road in a culvert. The dump at Adit #1 (Figure 3.15-8) is split into two parts or conical-shaped piles about 25-30 feet thick. The opening between the piles is about 60 feet across. On the south side of this opening is a collapsed building (Figure 3.15-9) that may be the old tram station (Kirkham and Ellis, 1926) where the ore was loaded for the trip down the hill to the mill located on Deer Creek. There is pipe and scrap iron at this site. Another collapsed building is located about 200 feet north of the split dump along the access road (Figure 3.15-10).

About ¼ mile north of Adit #1 at an elevation of 5,240 feet is a junction between the access road and an unnumbered mine road. About 0.1 mile north on this road, Adit #4 is at an elevation of 5,540 feet (Figure 3.15-11). The adit is caved and dry (Figure 3.15-12). It has a dump measuring 108 feet from the caved portal to the nose, 86 feet north-south, and 20 feet thick. There are a number of survey ribbons at this site. About 500 feet north from Adit #4 on the same road is Adit #5 (Figure 3.15-13). This adit is mostly caved but has a 6 inch opening at the top of the collapsed debris. The dump at this adit is small, measuring about 20 feet long, 20 feet wide, and 20 feet thick.

A trail continues north from Adit #5 and probably goes to the small prospects that are shown on the ridge below and to the west of Buckhorn Peak on the south end of the Canuck Peak quadrangle. These were not examined during this study.
The concrete footings and timbers for what is believed to be the mill for the Buckhorn Mine (Figures 3.15-14) are located on the east side of FS Road 435.1 at the mouth of the first unnamed gulch of Mill Creek. This site was visited on August 12, 1998, by Earl Bennett. No mill tailings were found except near the old foundation. Deer Creek is on the west side of the road about 100 feet from the millsite, and a small campground is across the road from the mill.

### 3.15.4.2 Sample Locations

#### 3.15.4.2.1 Solid Samples

Sample B7299803 is a composite sample from the dump at Adit #1. Sample B8129801 was taken from the material suspected to be tailings at the probable site of the Buckhorn mill.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
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<tr>
<td>B7299803</td>
<td>Composite sample from the dump at Adit #1</td>
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<tr>
<td>B8129801</td>
<td>Tails(?) from the Buckhorn mill site near the mouth of Mill Creek.</td>
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#### 3.15.4.2.2 Water Samples

Sample B7299802 was taken from the water flowing from Adit #1.

<table>
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<th>Specific Conductivity (µS)</th>
<th>Temperature (° F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
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<td>B7299802</td>
<td>Adit #1</td>
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<td>50</td>
<td>5.2</td>
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</tbody>
</table>

#### 3.15.4.2.3 Analytical Results

Solid Samples (Table 2.5-3 and 2.5-4)

Sample B7299803, a composite from the Buckhorn dump, contains the highest value of arsenic (4,400 ppm) of any of the solid samples collected for this study and exceeds the Clark Fork Superfund background levels for cadmium and lead. In addition, the sample is above the expected background values (Table 1.5-1) for similar rocks in the Belt Supergroup for arsenic, cadmium, copper, iron, lead, nickel, and zinc. In the TCLP for metals screen, a significant amount of lead was leached from the sample. Sample B8129801 also exceeds Clark Fork background levels for arsenic, cadmium, and lead; and the sample exceeds the expected background values (Table 1.5-1).
for similar rocks in the Belt Supergroup for arsenic, cadmium, copper, iron, lead, manganese, nickel, and zinc. In the TCLP for metals screen, all elements except for barium are below detection limits.

Water Samples (Tables 2.5-1 and 2.5-2)

In the dissolved metals screen, water sample B7229802 exceeds the Primary MCL and Aquatic Life Acute standards for aluminum, equals or exceeds both Aquatic Life standards for cadmium, and exceeds both Aquatic Life standards for zinc, the Aquatic Life Chronic value for copper, and the Secondary MCL for manganese. In the total recoverable metals screen, sample B7229802 equals or exceeds all standards for lead and cadmium, exceeds both Aquatic Life standards for zinc, and exceeds the Secondary MCL for manganese.

3.15.5 Structures

There are two collapsed buildings at the mine site and footings for a mill on Deer Creek.

3.15.6 Safety

The partially open Adit #5 is a minor hazard.
Figure 3.15-1. Location of the Buckhorn Mine, Boundary County, Idaho (U.S. Geological Survey Canuck Peak, and Line Point, Idaho-Montana, 7.5-minute topographic maps).
Figure 3.15-2. Sketch of Adits #1, #2, and #3 at the Buckhorn Mine.
Figure 3.15-3. Caved and dry Adit #3 at the Buckhorn Mine (Roll B6-98, frame #20).

Figure 3.15-4. Caved and dry Adit #2 at the Buckhorn Mine (Roll B6-98, frame #21).
Figure 3.15-5. Dump at Adit #2 of the Buckhorn Mine, as seen from the adit (Roll B6-98, frame #22).

Figure 3.15-6. Looking down at dump #1 from dump #2 at the Buckhorn Mine (Roll B6-98, frame #23).
Figure 3.15-7. Watercourse at Adit #1 of the Buckhorn Mine (Roll B7-98, frame #2).

Figure 3.15-8. Part of the dump at Adit #1 at the Buckhorn Mine (Roll B7-98, frame #4).
Figure 3.15-9. Collapsed building just south of Dump #1 at the Buckhorn Mine. Note the split, which divides the dump into two piles (Roll B7-98, frame #5).

Figure 3.15-10. Collapsed building and access road 100 feet north of Dump #1 at the Buckhorn Mine (Roll B7-98, frame #6).
Figure 3.15-11. Sketch of Adit #4 at the Buckhorn Mine.
Figure 3.15-12. Caved and dry Adit #4 at the Buckhorn Mine. This adit is 500 feet north of Adit #1 (Roll B7-98, frame #8).

Figure 3.15-13. Partially open and dry Adit #5 at the Buckhorn Mine. This adit is 500 feet north of Adit #4 (Roll B7-98, frame #7).
Figure 3.15-14. Millsite for the Buckhorn Mine (Roll B10-98, frame #20).
3.16 BOULDER MINE (Site No. SA-91)
Alternate names—Boulder Gold Mining Co. Prospect; Middle Mountain Prospect.

3.16.1 Site Location and Access (Figure 2.1-1)

The Boulder Mine is in the NW¼ of the SW¼ of section 9 (unsurveyed), T. 60 N., R. 2 E., on the Clifty Mtn. 7.5-minute quadrangle (Figure 3.16-1). Access is via a private mine road that goes east from FS Road 4274. Road 4274 is accessible from either the Twentymile Road or from FS Road 408.1 (Boulder Creek Road) to the east. There is a gate at the junction of these roads, but one of the supporting posts is broken and the gate to the mine road is easily opened. This road goes uphill to the main adit and cabin. The mine is on Forest Service land and covers about 1 acre.

3.16.2 Geologic Features (Figure 2.2-1)

The Boulder Mine is in an area where rocks of the Precambrian Prichard Formation are intruded by the Precambrian diorite and diabase of the Purcell sills and by Cretaceous granodiorite (Aadland and Bennett, 1979). According to Kirkham and Ellis (1926, p. 62):

The vein is entirely in a basic sill. Quartzite float indicates a contact within this formation somewhere between the tunnel and the top of the mountain.

The main vein strikes N. 25° W. and dips 50° N. E. It varies in width from a few inches to five feet. The owners report that the vein has been traced for 3000 feet changing in strike in that distance to N. 70° W. It is possible, of course, that the vein showing a changed strike is an entirely different vein.

The vein at the outcrop is over three feet in width and shows “lively” quartz. Samples taken at the outcrop, when crushed and panned showed fine free gold. Indeed very little crushing was required to liberate the metal. A cross-cut picks up the vein some 15 feet below the out-crop, at which point the quartz is largely absent and the vein has narrowed down to a few inches. Work had not been done to ascertain whether or not the vein continued at depth or whether it increased in width again. Another tunnel at a lower elevation, some distance from the first tunnel but along the strike of the vein, picks up the vein again though the gold is absent.

3.16.3 Site History

The Boulder Mine was discovered in 1916 by Clarence Nelson, while he was on a hunting trip. After several years of exploration, Nelson and some partners purchased a testing plant, which was sold to the men as a 10 tons-per-day mill (Platts, 1931). In 1924 or 1925, the mine was held by the Boulder Gold Mining Company (Kirkham and Ellis, 1926). Nothing is known about this company. Kirkham and Ellis (1926, p. 62) noted:

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Beside hand mining tools the equipment consisted of a small bunk house and one other building in which were assembled a few pieces of machinery for milling on a small scale.

Platts (1931) examined the property for a prospective purchaser in the early 1930s. Nothing further is known about the property.

3.16.4 Environmental Conditions

3.16.4.1 Site Features

The property was visited by Earl Bennett on July 31, 1998. A video segment describing the property is on the Bonners Ferry District Videotape (Tape 2, index 00:33:30-00:39:48). Documenting photographs are Roll B8-98, frames 12-15.

The site contains one caved and wet adit, a well-maintained cabin, and a prospect pit (Figure 3.16-2). Water was flowing from the caved adit (Figure 3.16-3) at a rate of 2 gallons per minute. A rainstorm the night before the site visit probably accounts for most of this water. The small dump from this adit has been bulldozed where the access road crosses it. A pile of fence posts is across the road from the adit, and rails and an old ore car are near the sloughed portal. About 150 feet north of the adit is the cabin, which appears to be used and well maintained (Figure 3.16-4). Another adit is supposed to be located north of the cabin on a trail, but the ice storm of 1996 and spring flood of 1997 knocked down a large number of trees, making access to where the adit is supposed to be (if it is still there) difficult. This adit was not found.

About 150 feet south of the main adit is a spur road that goes to a small pit or possibly a short, caved adit. A "No Trespassing" sign is posted near this junction. An old air compressor tank is at this site, and sheet metal has been used to channel a small stream across the area (Figure 3.16-5). This watercourse may have been used to do some minor placer work in the gold-bearing diabase dike. A pile of concrete blocks is piled on the side of the short spur road. The total disturbed area at this site is 1 acre.

3.16.4.2 Sample Locations

3.16.4.2.1 Solid Samples

No soil or rock samples were collected from this site.

3.16.4.2.2 Water Samples

Sample B7319801 was collected from the water flowing from the main adit.
<table>
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<th>Sample No.</th>
<th>Location</th>
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<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
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<tbody>
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<td>B7319801</td>
<td>Boulder Mine, main adit</td>
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<td>50</td>
<td>7.1</td>
<td>~2</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**3.16.4.2.3 Analytical Results**

Water Samples (Tables 2.5-1 and 2.5-2)

Water sample B7319801 exceeds the EPA Aquatic Life Chronic standard for cadmium in the total recoverable metals screen.

**3.16.5 Structures**

A cabin in good condition is at the site.

**3.16.6 Safety**

There are no safety hazards at this site.
Figure 3.16-1. Location of the Boulder Mine, Boundary County, Idaho (U.S. Geological Survey Clifty Mtn. 7.5-minute topographic map).
Figure 3.16-2. Sketch of the Boulder Mine.
Figure 3.16-3. Adit #1, caved and wet, at the Boulder Mine. Note the pile of posts across the access road from the adit. This site is south of the cabin (Roll B8-98, frame #12).

Figure 3.16-4. Well-maintained cabin at the Boulder Mine (Roll B8-98, frame #13).
Figure 3.16-5. Compressor tank and water system at a site about 100 yards south of Adit #1 at the Boulder Mine (Roll B8-98, frame #14).
3.17 HOMESTAKE MINE (Site No. SA-75)

3.17.1 Site Location and Access (Figure 2.1-1)

This mine is in the SE¼ of the SE¼ of section 16, T. 61 N., R. 3 E., and is shown by an adit symbol on the Curley Creek 7.5-minute quadrangle (Figure 3.17-1). Access from Bonners Ferry is via USFS Road 314, which heads east towards Boulder Creek. The mine is on a short spur road parallel to Road 314 and no more than 300 feet from it. The spur road has access on both ends from Road 314, and the northernmost exit is at mile marker 13, which is also the junction of Road 314 and FS Road 2612. The mine is a few hundred feet due west of Road 314 at mile marker 12. The property is on patented land.

3.17.2 Geologic Features (Figure 2.2-1)

The Homestake Mine is in an area where the Precambrian Prichard Formation is intruded by the Purcell sills (Aadland and Bennett, 1979). Miller (1973, p. 76-78) described the geology at the Homestake Mine:

This claim is at the end of the jeep trail on the north side of Boulder Creek in SE¼SE¼ sec. 16, T. 61 N., R. 3 E. The adit, which enters a hornblende gabbro sill on a bearing of N. 85° W., had been bulldozed closed and, therefore, samples were collected from the dump and debris in front of the portal.

The vein material is vitreous, milky-white, fractured quartz with minor amounts of pyrite, chalcopyrite, and bornite in small pods (up to 1 x 1 in.) which occur along a prominent fracture set. Several cavities, also along the prominent fracture set, show euhedral quartz crystals. Pyrrhotite is also present. Malachite-stained calcite veins, with very minor chalcopyrite, form segregation bands in amphibolite gangue which probably represents altered sill.

The pods and cavities aligned along a prominent fracture set indicate that possibly the quartz was deposited first and after fracturing open spaces were filled with sulfide or lined with quartz crystals. Another possibility is that sulfide and quartz were deposited together and later fracturing allowed concentration of sulfide in low pressure areas along fractures where redeposition of quartz also took place.

3.17.3 Site History

In the late 1800s, the area around Leonia was prospected intensely. The Homestake claim (Mineral Survey 877) was patented on April 18, 1894 (Miller, 1973). In 1943, the Homestake was explored by two tunnels and a 60-foot shaft (Figure 3.17-2). The Homestake tunnel was 140 feet long, and the shaft was about 60 feet southeast of the tunnel. The Grubstake tunnel, about 125 feel lower in elevation on an adjacent unpatented claim, was 300 feet long (Lakes, 1943).
3.17.4 Environmental Conditions

3.17.4.1 Site Features

This site was visited by Earl Bennett on July 31, 1998. A video segment describing the property is on the Bonners Ferry District Videotape (Tape 2, index 00:33:30-00:39:48). Documenting photographs are Roll B8-98, frames 16-17.

The Homestake consists of an open, dry adit (Figure 3.17-3) and a small dump (Figure 3.17-4). The dump extends 20 feet out from the portal and is about 30 feet thick, indicating a short tunnel. This mine is somewhat difficult to locate in the dense vegetation just west of the spur road.

3.17.4.2 Sample Locations

3.17.4.2.1 Solid Samples
No waste dump samples were collected at this site.

3.17.4.2.2 Water Samples
No water samples were collected at this site.

3.17.5 Structures
There are no structures at this site.

3.17.6 Safety
The open adit is a potential hazard.
Figure 3.17-1. Location of the Homestake Mine, Boundary County, Idaho (U.S. Geological Survey Curley Creek, Idaho-Montana, 7.5-minute topographic map).
Figure 3.17-2. Sketch plan and cross section of the Homestake workings in 1943 (Lakes, 1943).
Figure 3.17-3. Partially open adit at the Homestake Mine (Roll B8-98, frame #16).

Figure 3.17-4. Dump at the adit of the Homestake Mine (Roll B8-98, frame #17).
3.18 JANE MINE (Site No. SA-72)
Alternate names—Two Tail; Two Tails; Western Bell; Idaho-Montana.

3.18.1 Site Location and Access (Figure 2.1-1)

The Jane Mine is just north of Two Tail Peak near the western edge of the SW¼ of the NW¼ of section 35, T. 62 N., R. 2 E., on the Moyie Springs 7.5-minute quadrangle (Figure 3.18-1). The mine can be reached by following FS Road 2683, which junctions with FS Road 314. FS Road 314 begins as County Road 2, which heads east from Bonners Ferry. About one mile west of the junction between Road 2683 and Road 314 are two overgrown access roads about 100 yards apart. The southernmost road goes about ¼-mile from Road 2683 to the mine. The main drainage east of the mine site is Katka Creek. The mine is on BLM land and disturbs about 1.5 acres.

3.18.2 Geologic Features (Figure 2.2-1)

The mine is in an area where the Precambrian Prichard Formation is intruded by the Purcell sills (Aadland and Bennett, 1979). Kiilsgaard (1951, p. 18-21) described the geology at the Jane Mine:

This mine, formerly known as the Two-Tail, comprises 7 unpatented claims in Secs. 34 and 35, T. 62 N., R. 2 E., Boise Meridian, about 12 miles east of Bonners Ferry, on the south side of the Kootenai River. Mine development consists of a 975-foot tunnel near the base of the mountain, which was full of water and inaccessible during the past summer's visit; a shorter tunnel near the hill top; a 25-foot inclined shaft with 2 short drifts leading from it; and some open cuts. A caved inclined shaft and some evidence of adjacent underhand stoping is located near the old mill building. The mine is supposed to have produced both shipping ore and mill feed during the early years but there are no records of production. All buildings are now demolished and the mine has been inactive for many years.

The vein, composed predominantly of iron-stained brecciated quartz, ranges in width from 9 inches to 8 feet. It occurs in a dioritic sill. At the outcrop, near the old mill building, the vein strikes N. 28° W. and dips 28° SW.; however, it increases in dip as it progresses downward. The increase in dip is very noticeable in a short inclined shaft located 190 feet southeast of the outcrop near the old mill building. At the bottom of the 25-foot inclined shaft, the vein is 6 feet wide and dips 61° SW. Heavy gouge on both the hanging and footwalls indicates that the vein follows a pre-mineral normal fault and that recurrent movement in the fault plane has provided openings which were later filled by mineralizers.

At the outcrop the vein presents an interesting exposure of coarsely crystalline galena in a quartz gangue. The galena is relatively fresh and unoxidized [sic] except for the more exposed portions where oxidation has created a shell of
anglesite and cerrusite about the galena crystals. Four assays taken from the outcrop show lead to range from 12.7 to 23.8 percent and silver from 3.0 to 6.4 oz. per ton. At the bottom of the shaft, the quartz vein remains strong but the sulphides are not so noticeable.

Although the outcrop has been thoroughly explored, the underground position of the vein has remained in doubt. Heavy overburden prevented tracing the outcrop northwest beyond the old mill building; however, the upper tunnel should have intersected the northwest extension of the vein, but failed to do so. (See Plate 4 [Figure 3.18-2]). During the past summer the property was diamond drilled by the Jane Silver-Lead Mining Co. Their No. 1 hole, which should have intersected the southwest-dipping vein, remained in the dioritic sill from the collar to its completion, a distance of 450 feet. The hole gave negative results. The No. 2 hole should have intersected the vein at a comparatively shallow depth but failed to do so, as did a third hole, collared on the northeast side of the vein.

The above mentioned exploration, both tunneling and diamond drilling, indicate that the vein does not continue to the northwest beyond its outcrop near the old mill building. Since there is no evidence of a transverse fault which might displace the vein in that area, it is quite probable that the vein pinches out. Probably the pre-mineral fault which controls the vein’s attitude was too tight in this area to permit emplacement of the mineralizing solutions.

The fact that the vein is so strong at the outcrop near the mill building but remains hidden at depth is interesting. It is unlikely that the upper portion of the vein could have been removed by glaciation and erosion, leaving only the roots. However, it is quite possible that since past exploration on the northwestern end of the vein outcrop has proved negative, that either the vein dies out a short distance down the dip or that its downward continuation is controlled by structure. Such a structure is suggested by the change in the attitude of the vein, and, as such, could give a decided rake to the ore body. At its northwest outcrop, near the old mill building, the vein strikes N. 28° W. and dips 28° W., whereas southeast of the inclined shaft, the vein strikes N. 34° W. and dips 45° SW. At the bottom of the inclined shaft, 25 feet below the surface, the vein dips 61° SW. These attitudes indicate that the dip not only steepens with depth but also that the southeastern outcrops dip steeper than do the northwestern ones. Since evidence on the hanging wall gouge of the vein indicates that it follows a normal fault, it falls within reason that the northwestern end i.e., the flat-dipping portion, would remain tight during normal fault movement, whereas the steeper dipping southeast and deeper portions would be opened, thus providing receptables for ore emplacement. Fault movement of this nature would create a structure which would rake from the tight areas, that is from the flat-dipping northwestern portions, to the more open areas, the southeast steeper-dipping and deeper portions. The latter area would be a likely target for future diamond drilling exploration.
3.18.3 Site History

This property was originally operated by the Idaho-Montana Amalgamated Company (incorporated in 1912). The company had ten claims and was installing a 50 tons-per-day mill in 1913. Development included a 320-foot shaft and connecting tunnels. The mill was completed in August 1914. After milling 22 tons of ore, the property was closed on August 6 because the price of lead was too low to cover the company’s costs. Idaho-Montana forfeited its corporate charter in 1916.

The property was leased to Katka Silver Lead Mining Company in 1917. At that time, the mine had about 1,800 feet of workings. Little is known of Katka Silver Lead, and the company surrendered its lease in 1918.

The Idaho Lead Silver Mines Company was incorporated in 1924. In 1924 or 1925, Kirkham and Ellis (1926) noted that the property had not been worked for several years and that the buildings and workings were in disrepair. Border Mining Company leased the mine from Idaho Lead Silver in 1928. At that time, the property had two tunnels (360 feet and 550 feet long), a 375-foot inclined shaft, and 2,000 feet of total workings.

In the late 1930s, Idaho Lead Silver resumed work on the lower tunnel, but this work was interrupted by World War II. By 1945, the company listed its workings as one 1,000-foot tunnel. Idaho Silver Lead forfeited its corporate charter in 1948.

Jane Silver Lead Mining Company (incorporated in 1947) took over the property in 1948. The new company sunk a 100-foot inclined shaft and planned a diamond drilling program. The results of the drilling were disappointing (Kiilsgaard, 1951; see above), and the company confined itself to assessment work thereafter. The mine was leased to Kootenai Dike Mines, Inc. (organized in 1951), probably in 1952. Kootenai Dike appears to have done only assessment work at the Jane Mine, and this company forfeited its corporate charter in 1954. Jane Silver Lead forfeited its charter in 1956.

3.18.4 Environmental Conditions

3.18.4.1 Site Features

This mine was visited by Earl Bennett on August 4, 1998. A video segment describing the property is on the Bonners Ferry District Videotape (Tape 2, index 00:42:40-00:49:34). Documenting photographs are Roll B8-98, frames 18-25.

The workings include a nearly caved adit or decline (Figure 3.18-3), a substantial dump (Figure 3.18-4), and a possible old millsite (Figure 3.18-5). The location of these workings and the dimensions of the irregularly shaped dump are shown in Figure 3.18-6. There is an old engine on the dump, and there may be a shallow shaft near the engine (Figure 3.18-7). A sample was
collected from the possible mill site (probably a stamp mill) that is marked by a few timbers and a flat area. The tailings (30 feet long by 20 feet wide by 1 foot thick) were noted only near the mill, although there could be more in the heavily overgrown mine area.

3.18.4.2 Sample Locations

3.18.4.2.1 Solid Samples

A sample (B8049801) of the mill tailings was collected from below the mill.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8049801</td>
<td>Mill tailings from below mill</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.18.4.2.2 Water Samples

No water samples were collected from this site.

3.18.4.2.3 Analytical Results

Solid Samples (Table 2.5-3 and 2.5-4)

Sample B8049801 exceeds the Clark Fork Superfund background values for lead (highest value recorded in soils for this study) and cadmium. The sample exceeds the median values for cadmium, copper, lead, nickel, and iron compared to similar rocks in the Belt Supergroup (Table 1.5-3). The sample also shows significant leaching for lead in the TCLP for metals screen.

3.18.5 Structures

The partial structure at the millsite is the only building.

3.18.6 Safety

The partially open adit (or decline) near the millsite is a potential hazard.
Figure 3.18-1. Location of the Jane Mine, Boundary County, Idaho (U.S. Geological Survey Moyie Springs 7.5-minute topographic map).
PLATE 4

EXPLANATION

COUNTRY ROCK

- Basic sill
  Dark, dense, igneous sill, variable composition but chiefly diorite.

ALBRIGHT—PRICHARD FORMATION

- Gray, massive quartzites, some thin, interbedded, argilaceous quartzites.

- Attitude
- Shaft
- Open cut

DIAMOND DRILL HOLE

- Hole No. 2 was 46 feet deep on June 29, 1948. Drilling was still in progress at that time.

- KNOWN WORKINGS
- INFERRED WORKINGS

GEOLOGIC MAP OF THE JANE SILVER—LEAD MINING COMPANY'S PROPERTY

Figure 3.18-2. Geologic map of the Jane Mine (Killsgaard, 1951, Plate 4).
Figure 3.18-3. Slight opening at the top of the mostly caved adit at the Jane Mine (Roll B8-98, frame #18).

Figure 3.18-4. Looking northerly from the adit across the west part of the dump at the Jane Mine (Roll B8-98, frame #21).
Figure 3.18-5. Site of possible stamp mill at the Jane Mine (Roll B8-98, frame #25).
Figure 3.18-6. Sketch showing the locations of the features at the Jane Mine.
Figure 3.18-7. Gas engine for an old hoist at the Jane Mine (Roll B8-98, frame #22).
3.19 PARKER MINE (Site No. SA-20)

Alternate name—Grass Creek Property.

The location for the Parker Mine (Site No. SA-20), as shown on the Grass Mountain 7.5-minute topographic map, is the same as that shown on information in IGS's mineral property files for International Molybdenum Company's Grass Mountain Property.

3.19.1 Site Location and Access (Figure 2.1-1)

The Parker Mine is in the SE¼ of the SE¼ of section 16, T. 64 N., R. 4 W., on the Grass Mountain 7.5-minute quadrangle (Figure 3.19-1). Access to this old molybdenum prospect below Trapper Peak is by a 2-mile-long trail that goes up Grass Creek from USFS Road 636. The trail leaves Road 636 where the road crosses Grass Creek. Road 636 joins FS Road 1009 (gated and locked), which is the primary access into this area. The prospect is on a section of state land that adjoins USFS administered lands.

3.19.2 Geologic Features (Figure 2.2-1)

The Parker Mine is in an area where the Precambrian Prichard Formation has been intruded by the Early Tertiary granitic rocks of the Selkirk Crest. A major northwest-trending fault passes within a mile of the property (Aadland and Bennett, 1979).

3.19.3 Site History

International Molybdenum Company (IMC) began leasing land in Grass Creek from the State of Idaho around 1930. IMC, which was doing business as a common law trust in the early 1920s, did not incorporate until 1926. The company also held a block of claims in nearby Cow Creek. IMC expanded its holdings in Grass Creek in the early 1930s, and in 1934, most of the company's work was focused on the Parker site. An aerial tram was installed in 1935, and by the following year, the tunnel was 315 feet long. Efforts during 1936 involved constructing a mill, which was finished and tested in December 1937. Minor work continued until World War II, and IMC forfeited its corporate charter in 1948.

3.19.4 Environmental Conditions

3.19.4.1 Site Features

This prospect was visited by Earl Bennett on August 8, 1998. A video segment describing the property is on the Bonners Ferry District Videotape (Tape 2, index 00:49:38-00:57:09). Documenting photographs are Roll B9-98, frames 2-10.

The property contains a caved adit with water seeping from it (Figure 3.19-2), a small dump (Figure 3.19-3), and parts of an old burned (mill?) building (Figure 3.19-4). There are rails going
into the adit, and cold air is venting from the caved debris at the portal. The adit is above the dump (30 feet by 30 feet by 40 feet thick) that, in turn, is above the burned mill. All that is left of the mill is galvanized sheet metal and a considerable amount of scrap pipe and other junk. An old Holt 4-cylinder gas engine, several fly wheels, and an iron boiler are near the burned building. The site is heavily overgrown with alders and other brush. The area covers about 1-1.5 acres.

3.19.4.2 Sample Locations

3.19.4.2.1 Solid Samples

No soil or rock samples were collected at this site.

3.19.4.2.2 Water Samples

Water sample B8059801 was collected from the trickle of water coming from the caved adit.

<table>
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<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (µS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
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<tr>
<td>B8059801</td>
<td>adit</td>
<td>31</td>
<td>50</td>
<td>7.3</td>
<td>Seep</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.19.4.2.3 Analytical Results

Water Samples (Tables 2.5-1 and 2.5-2)

Water sample B8059801 does not exceed any standards in either the dissolved metals screen or the total recoverable metals screen.

3.19.5 Structures

There are no structures left at this site.

3.19.6 Safety

There are no safety problems at this site.
Figure 3.19-1. Location of the Parker Mine, Boundary County, Idaho (U.S. Geological Survey Grass Mountain 7.5-minute topographic map).
Figure 3.19-2. Rails and water at the caved adit at the Parker Mine (Roll B9-98, frame #2).

Figure 3.19-3. Looking up the dump towards the adit at the Parker Mine (Roll B9-98, frame #5).
Figure 3.19-4. Debris from the burned mill at the Parker Mine (Roll B9-98, frame #7).
3.20 KLONDIKE MINE (Site No. SA-54)

3.20.1 Site Location and Access (Figure 2.1-1)

The Klondike Mine is shown by a prospect symbol on the topographic map and is on the west side of the East Fork of Meadow Creek where the creek turns to the north. It is near the center of the western edge of the SW1/4 of the SE1/4 of section 29, T. 64 N., R. 2 E., on the Meadow Creek 7.5-minute quadrangle (Figure 3.20-1). Access is via FS Road 397, which leads north from U.S. Highway 95 about 4 miles north of the junction of Highway 95 and U.S. Highway 2. Proceed north on Road 397 to FS Road 2499, then follow Road 2499 to the Regal Mine turnoff and FS Road 32. Instead of turning onto the Regal Mine road, continue on Road 32 past a gate with a sign that reads "Restricted Access, Administrative Use Only, Beeline Water District." Past this sign, about 200 yards on the right, is an old road that is crossed with kelly humps. This is the road that goes up the East Fork of Meadow Creek. There are many unmarked (and unmapped) logging roads that turn off of the East Fork road. The road to the prospect is very overgrown. This site is on Forest Service land.

3.20.2 Geologic Features (Figure 2.2-1)

The Klondike is in an area where Cretaceous granitic rocks have intruded the Precambrian Prichard Formation. A major northwest-trending fault passes near the property (Aadland and Bennett, 1979). Kilsgaard (1951, p. 26, 29) described the Klondike:

The Klondike property, owned by Mr. William Tilley of Bonners Ferry, consists of 8 unpatented claims in Sec. 29, T. 63 N., R. 1 E., Boise Meridian, about 2 miles northeast of the Silver Crescent mine, on the headwaters of Meadow Creek. Development comprises several open cuts on the vein outcrop and about 800 feet of tunnel. The property is in the prospect stage and has no record of production.

The open cuts explore an 18- to 30-inch well-defined quartz vein that cuts granodiorite. The vein traverses a southwest-trending ridge and has been traced for approximately one-half of a mile along the strike. Development has been concentrated on the southeast side of the ridge where the vein strikes N. 54°E. and dips 75°E. Gouge and selvage on the vein walls indicate that it is confined within a fault plane, although the nature of the fault was not determined.

For the most part the vein outcrop contains few ore minerals; however, occasional exposures contain galena, sphalerite, and tetrahedrite. A selected sample assayed 72 per cent lead, 70 ozs. in silver and a trace of gold. General assays made on the vein outcrops, in the late 1930’s, averaged about $10.00 per ton in combined metal values.

In 1948, the main tunnel was being advanced, by hand steel tools in a N. 26° W. direction, in an attempt to intersect the vein 240 feet (vertical distance) below its uppermost outcrop.

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Brackebusch (1969, p. 63) noted:
During this study this prospect was not located because of a dense growth of vegetation since the abandonment of the prospect about 20 years ago. However, from Kiiilsgaard’s description the prospect must be near the edge of the Kaniksu batholith or in the Wall Mountain Stock. The attitude of this vein is similar to the attitude of the American Girl and Bethlehem veins.

3.20.3 Site History

The property was worked in the 1930s. In 1948, the Klondike had 800 feet of tunnel and several open cuts. Work was being done on the main tunnel at that time (Kiiilsgaard, 1951), but the property must have been abandoned soon after (Brackebusch, 1969).

3.20.4 Environmental Conditions

3.20.4.1 Site Features

This prospect was visited by Earl Bennet on August 11, 1998 (after several abortive attempts and many hours looking for the right road). A video segment describing the property is on the Bonners Ferry District Videotape (Tape 2, index 00:57:13-00:59:32). No photographs were taken at this site.

A road that has relatively recent bulldozer tracks joins the main, overgrown East Fork road. These tracks lead to a trench and small pit. These were recorded and thought to be the prospect. However, according to Kiiilsgaard (1951), the Klondike Mine contained an 800-foot tunnel below the pit and trench. This tunnel was not found. The site examined is less than 0.5 acres in size.

3.20.4.2 Sample Locations

3.20.4.2.1 Solid Samples
No waste dump samples were collected at this site.

3.20.4.2.2 Water Samples
No water samples were collected at this site.

3.20.5 Structures
There are no structures at this site.

3.20.6 Safety
There are no safety hazards at this site.
Figure 3.20-1. Location of the Klondike Mine, Boundary County, Idaho (U.S. Geological Survey Meadow Creek 7.5-minute topographic map).
3.21 DAMON GROUP (Site No. SA-57)

3.21.1 Site Location and Access (Figure 2.1-1)

The Damon Group is in the NE¼ of the NE¼ of section 21 (unsurveyed), T. 64 N., R. 3 E., on the Canuck Peak 7.5-minute quadrangle (Figure 3.21-1). Access is from the paved Deer Creek Road (FS Road 435). The best route is to go north past the junction of Road 435.1 and FS Road 403.1 about 1.5 miles to where the road switches back before starting the ascent to Canuck Peak. This is where a junction with FS Road 2548 is shown on the USFS version of the topographic map, although this road does not exist anymore. From there, a road continues southeast through extremely dense alders and bitterbrush for about one mile to the ridge between Davis and Deer creeks. The four-wheel-drive road on the map is present, but barely visible. The prospects are as shown on the topographic map and collectively cover about 1 acre on on USFS administered land.

3.21.2 Geologic Features (Figure 2.2-1)

The Damon Group is in rocks of the Precambrian Prichard Formation. A north-northwest-trending fault passes near the property (Aadland and Bennett, 1979). Kirkham and Ellis (1926, p. 68) described the geology of the Damon Group:

The Damon Group . . . consists of seven unpatented claims a mile or more from the Cynide Gold Mining property [the Buckhorn Mine] and along the strike of the Cynide vein. The vein on the Damon group strikes N. 25° to 30° W. and dips 55° to 60° S. W. The vein appears to be an extension of the Cynide vein.

The deposit is clearly of the shear zone type, . . . showing more or less quartz, containing gold and a small amount of silver. The gold occurs free in part and associated in part with pyrite. The width of the vein ranges from two feet to a maximum in one place of seven feet. In places the vein consists of broken up quartzite with an inch or two of gouge. At the point where the vein measured seven feet there were several feet of quartz. The gold assays are erratic, ranging from nothing up to a reported amount of several dollars per ton.

About 500 feet of development had been done on the property at the time of the writers’ visit, at which time the property was not being worked. There was little in the way of equipment other than a building or two.

3.21.3 Site History

The Moyie Gold Copper Mining & Milling Company, Ltd., was incorporated in 1911 and purchased two groups of claims from the original owners. These claims were the Damon Group and the Queen Group, which was about 7 miles northwest of the Damon Group. By 1914, the company was developing both groups. In 1915, the company started a crosscut to tap the ore
shoot 135 feet below its occurrence in the upper tunnel. However, after that the company noted that it did only assessment work, much of which was done on the roads. All work was done by hand. By 1919, the Damon Group had a 20-foot shaft sunk on the ore and two tunnels, which totaled about 450 feet in length. In 1925, Livingston and Ellis (1926) estimated that the property had about 500 feet of development. Only assessment work appears to have been done after that, and Moyie Gold Copper forfeited its corporate charter in 1932.

3.21.4 Environmental Conditions

3.21.4.1 Site Features

This site was visited by Earl Bennett on August 12, 1998. A video segment describing the property is on the Bonners Ferry District Videotape (Tape 2, index 00:59:35-01:04:42). Documenting photographs are Roll B10-98, frames 15-20.

The lowest feature is a short adit that is caved and dry. The waste dump is small, measuring 30 feet long, 30 feet wide, and 20 feet thick (Figure 3.21-2). A collapsed cabin (shown on the topographic map) is just to the east of the adit. About 100 feet above the cabin is a 50-foot-long trench (which is marked by the lower prospect symbol on the topographic map), and 100 feet above this trench is another 75-foot-long trench (Figure 3.21-3). This trench is about where the upper prospect is shown on the topographic map. Several other small pits were noted on the hillside.

3.21.4.2 Sample Locations

3.21.4.2.1 Solid Samples
No waste dump samples were collected at this site.

3.21.4.2.2 Water Samples
No water samples were collected at this site.

3.21.5 Structures

There is a collapsed cabin at the caved adit (Figure 3.21-4, #17).

3.21.6 Safety
There are no safety hazards at this site.
Figure 3.21-1. Location of the Damon Group, Boundary County, Idaho (U.S. Geological Survey Canuck Peak, Idaho-Montana, 7.5-minute topographic map).
Figure 3.21-2. Dump for the caved adit at the Damon Mine (Roll B10-98, frame #16).

Figure 3.21-3. Remains of the cabin near the caved adit at the Damon Mine (Roll B10-98, frame #17).
Figure 3.21-4. Upper trench (located about where the upper prospect symbol is shown on the topographic map) at the Damon Mine (Roll B10-98, frame #19).
3.22 IDAMONT MINE (Site No. SA-85)
Alternate names—Boulder Creek Placers; Idamont Lead-Zinc Mines Co.; Leonia Gold Mining Co.; Idaho Gold and Ruby Mining Co.

3.22.1 Site Location and Access (Figure 2.1-1)

The placer and lode claims of the Idamont Lead-Zinc Mines, Inc., are along Boulder Creek in the southern part of T. 61 N., R. 3 E., on the Leonia 7.5-minute quadrangle (Figure 3.22-1). The placer workings can be reached via State Highway 24, which connects with FS Road 314 east of Bonners Ferry. Continue on Road 314 as far as the Boulder Creek bridge (a gauging station is located here). The road to the lodes is not on the topographic map, but is just south of the bridge and follows Boulder Creek to the west. Just past this road (¼ mile or less) is another road (FS Road 408) to the east that goes to the placer claims and Boulder City.

3.22.2 Geologic Features (Figure 2.2-1)

Kuilsgaard (1951, p. 21-22) described these interesting placer workings as follows:
The Idamont Lead-Zinc property comprises 44 unpatented quartz and placer claims in T’s. 60 and 61 N., R’s. 2 and 3 E., Boise Meridian, near the mouth of Boulder Creek, about 25 miles east of Bonners Ferry. The small settlement of Leonia, on the Great Northern railroad, is located 2 miles to the northeast.

The property was extensively developed for placer mining purposes during the early 1900’s by the Idaho Gold and Ruby Mining Co., under the management of J. M. Schnatterly. Good roads were constructed from Leonia to the mine. Ditches, flumes, and dams were built to provide water for the hydraulic placer mining operations. A large concentration plant was constructed to extract the gold from the gravels. A small settlement was built that included, among other things, 35 individual homes for mine workers, a schoolhouse, and a church. All developments were based on an elaborate scheme to extract gold from relatively unsampled and unprospected gravel banks.

The method employed by the Idaho Gold and Ruby Mining Co. for separation of the gold from the gravel was devised by Schnatterly. It was unique and grandiose in its proceedings, but makes an interesting story. In many ways it typifies some of the wild and imaginative mining ventures that were prominent during early-day western mining.

The gold recovery centered about the concentrating plant located at the bottom of the Boulder Creek gorge, near the lower limits of the gravel banks. It consisted of 800 feet of longitudinal riffles made of standard railroad rails, set a few inches apart, and extending from one wall of the gorge to the other. Beneath the riffles was the “blue hole”, a large catchment basin that impounded the finer material.
dropping between the riffles. An elevator lifted the fines to overlying concentrating tables for the final separation. Upstream from the concentrating plant, the bottom of the gorge was concreted for several hundred feet. This was to prevent gold from settling in the stream bed before reaching the plant.

Hydraulic giants were stationed upstream near the center of the larger gravel banks. These giants were to wash the gravel from the nearby hillsides into the adjacent gorge. When the gravel-filled gorge was loaded to capacity (an estimated 800,000 cubic yards) the gates of an upstream dam were lifted. This action released a tremendous volume of water which was supposed to rush down the gorge, pick up the 800,000 yards of gravel, and carry them downstream to the concentrating plant for treatment.

The plan did not prove practicable. During the initial operating attempts, rolling boulders damaged the riffles in the concentrating plant and the spring floods of surging Boulder Creek soon completed their destruction. The old placer pits and gravel-filled gulleys indicate that several thousand yards of gravel were mined but there are no records of production. According to men who worked at the plant there was little, if any, gold produced.

There are enormous gravel banks on the property. They are as much as 400 feet deep, from 500 to 1000 feet wide, and extend laterally along Boulder Creek for a mile or more. The theory has been advanced that the gravels were laid down in a Pleistocene lake, formed during recession of the glacial period [(Kirkham and Ellis, 1926)]. Kirkham and Ellis [(1926)] list gold analyses made on the placer sands, and they point out that there have been several periods of deposition in the various gravel banks. As a possible source of gold, they propose the erosion of gold-bearing veins and basic sills in the Boulder Creek area, and the transportation of gold, from outside areas, by glacial action. Whether these gravel banks are of any present economic value is unknown. The property should be thoroughly and systematically explored and tested before any future mining development is commenced.

The mine has been inactive for several years and all buildings are now in disrepair. Most mining equipment has been either carried away or demolished by vandals.

3.22.3 Site History

In 1905, J. M. Schnatterly acquired a number of mining claims (both lode and placer) along Boulder Creek (Idamont Lead-Zinc Mines Company, 1949). The Idaho Gold and Radium Mining Company was incorporated in 1910 to develop the claims. By 1913, the company was concentrating its efforts on the placer claims (see section 3.7 for a discussion of the lode operations). Installation of hydraulicking equipment on the placer claims and construction of the
"concentrating plant" in Boulder Creek took place between 1914 and 1923. The company changed its name to the Idaho Gold and Ruby Mining Company in 1916, but little else changed. In 1919, the company described the total development on the property as "$525,000.00." By 1923, the company held 124 lode and placer claims along Boulder Creek. The first cleanup from the placer operation was expected in September of that year. The results, however, were disappointing.

Schnatterly was killed by an explosion while aboard a boat at Bonners Ferry in 1924. Because Idaho Gold and Ruby was several thousand dollars in debt at the time and the company was in the hands of a receiver, the stockholders formed a new company to take over the property (Idamont Lead-Zinc Mines Company, 1949). The Leonia Gold Mining Company was incorporated in 1924, and Idaho Gold and Ruby forfeited its corporate charter the following year. According to company reports, a big landslide destroyed the "reduction and concentrating plant," probably in 1925. By 1928, the company was focusing on underground work.

Idamont Lead-Zinc Mines Company was incorporated in 1928 and purchased the property in September of that year. (Leonia Gold forfeited its corporate charter in 1930.) Idamont continued development on the property for the next few years, including minor work on the placer deposits. The property was leased to A. W. Nelson in October 1938. Nelson or his Metals Production Company (incorporated in 1938) worked the Idamont property until 1941. Much of this appears to have been surface work. Metals Production Company forfeited its corporate charter in 1942.

Idamont’s holdings dropped to 26 claims in 1942. The property was idle until the end of World War II, but the company's holdings jumped to 86 claims in 1946. In 1947 and for the next few years, the company tested the placer ground and conducted other exploration work.

The property was leased to Kootenai Dike Mines, Inc. (incorporated in 1951), in August 1951. The lease called for an annual expenditure of $10,000 for exploration and development. Work in 1952 included road repair and prospecting. The company forfeited its corporate charter in 1954, and its lease on the Idamont property was canceled the following year.

Idamont explored its lode claims for the next two or three years, but appears to have done only assessment work since that time. The company changed its name to Kootenai Copper-Silver Mines, Inc., in 1970.

3.22.4 Environmental Conditions

3.22.4.1 Site Features

This site was visited by Earl Bennett on August 13, 1998. A video segment describing the property is on the Bonners Ferry District Videotape (Tape 2, index 01:04:48-01:09:24). Documenting photographs are Roll B11-98, frames 1-6.
The gorge (Figure 3.22-2) where Boulder Creek cuts through a thick section of sediments (Figure 3.22-3) and then into bedrock is as impressive as the close contours on the topographic map imply. The eroded remains of the old dam used in the placer operation form a scarp on the slope above the creek. The underground workings west of the Boulder Creek bridge are described under the Golden Triplet claims (see Section 3.7) and include the Oscar and McGinty Creek mines. A reference water sample (B8139801) was collected from Boulder Creek just west of the bridge that crosses the creek.

### 3.22.4.2 Sample Locations

#### 3.22.4.2.1 Solid Samples

No soil or rock samples were collected from this site.

#### 3.22.4.2.2 Water Samples

Reference water sample B8139801 was collected from Boulder Creek just west of the bridge that crosses the creek.

<table>
<thead>
<tr>
<th>Sample No</th>
<th>Location</th>
<th>Specific Conductivity (µS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8139801</td>
<td>Boulder Creek, just west of the bridge (reference sample)</td>
<td>25</td>
<td>50</td>
<td>6.0</td>
<td>&gt;50</td>
<td>Yes</td>
</tr>
</tbody>
</table>

#### 3.22.4.2.3 Analytical Results

Water Samples (Tables 2.5-1 and 2.5-2)

Water sample B8139801 is below all EPA water contaminant standards in both the dissolved metals and the total recoverable metals screens.

### 3.22.5 Structures

There are a number of old buildings or remains of buildings in the vicinity of Boulder City (Figures 3.22-4 and 3.22-5).

### 3.22.6 Safety

There are no safety hazards here except for the very steep topography.
Figure 3.22-1. Location of the Idamont Mine, Boundary County, Idaho (U.S. Geological Survey Leonia, Idaho-Montana, 7.5-minute topographic map).
Figure 3.22-2. Site of the dam for the Idamont placer workings on Boulder Creek (Roll B11-98, frame #1).

Figure 3.22-3. Glacial gravel above Boulder Creek near the Idamont placer workings (Roll B11-98, frame #3).
Figure 3.22-4. Standing building in Boulder City ghost town near the Idamont placer workings. This is the easternmost building shown on the topographic map (Roll B11-98, frame #4).

Figure 3.22-5. Fallen-down buildings in Boulder City ghost town near the Idamont placer workings (Roll B11-98, frame #6).
3.23 McGINTY CLAIM (Site No. B8139802)

Note: These prospect workings are on the McGinty Claim, at the location shown by Miller (1973). This site is separate from the McGinty Creek Adit (SA-87) discussed in section 3.7. Also, this site appears to be separate from the Clancy Mine (SA-82), with which it was provisionally identified.

3.23.1 Site Location and Access (Figure 2.1-1)

A very short adit and a fair-sized pit are in the NE¼ of the NW¼ of section 32, T. 61 N., R. 3 E., on the Leonia 7.5-minute quadrangle (Figure 3.23-1). About 1 mile west of the junction of paved FS Road 314 and FS Road 4081, gated FS Road 2112 heads north from Road 4081. The road to the workings, a private road, is 200 feet past Road 2112. The private road is crossed by kelly humps and leads to a log landing. The workings are on the west side of this landing about 100 feet into the trees. The patented claim is shown on the USFS version of the topographic map and on the National Forest map as a mine symbol.

3.23.2 Geologic Features (Figure 2.2-1)

The workings on this prospect are in hornblende gabbro sills (Precambrian Purcell sills) that intruded rocks of the Precambrian Prichard Formation (Miller, 1973).

3.23.3 Site History

The area around Leonia was extensively prospected in the late 1800's. The McGinty Claim was patented on April 13, 1985. In 1970 or 1971, Miller noted that recent bulldozing had removed any dumps or evidence of sulfide mineralization (Miller, 1973).

3.23.4 Environmental Conditions

3.23.4.1 Site Features

This site was visited by Earl Bennett on August 13, 1998. A video segment describing the property is on the Bonners Ferry District Videotape (Tape 2, index 01:09:28-01:14:04). Documenting photographs are Roll B11-98, frames 7-9.

The property contains a very short adit or pit (Figure 3.23-2) on a quartz vein. This vein is on the edge of a small open pit (about 100 feet long, 60 feet wide, and 30 feet high; Figure 3.23-3). The patented claim covers about 1-1.5 acres.

3.23.4.2 Sample Locations

3.23.4.2.1 Solid Samples

No waste dump samples were collected at this site.
3.23.4.2.2 Water Samples
   No water samples were collected at this site.

3.23.5 Structures
   There are no structures at this site.

3.23.6 Safety
   There are no safety hazards at this site.
Figure 3.23-1. Location of the McGinty Claim (Site No. B8139802), Boundary County, Idaho (U.S. Geological Survey Leonia, Idaho-Montana, 7.5-minute topographic map).
Figure 3.23-2. Short adit at the McGinty Claim (Site No. B8139802; Roll B11-98, frame #7).

Figure 3.23-3. Small open pits and quartz vein at the McGinty Claim (Site No. B8139802; Roll B11-98, frame #9).
3.24 EUREKA MINE (Site No. SA-78)
Alternate name—Kate Fry Group.

3.24.1 Site Location and Access (Figure 2.1-1)

The Eureka Mine is in the SW¼ of the SW¼ of section 22, T. 61 N., R. 3 E., on the Leonia 7.5-minute quadrangle (Figure 3.24-1). The mine is on patented claims no more than 200 feet east of paved FS Road 314. A nearby property, the Kate Fry Prospect, was not found.

3.24.2 Geologic Features (Figure 2.2-1)

These prospects are in a hornblende gabbro sill (one of the Precambrian Purcell sills) that has intruded rocks of the Precambrian Prichard Formation (Miller, 1973). (Kirkham and Ellis (1926, p. 63) described the Kate Fry property as follows:

The vein strikes S. 60° E. and dips 45° to 50° S. W. The formation strikes N. 25° W. and dips northeast. The vein occurs entirely within the basic sill, so far as explored, and consists of two to three feet of quartz. The vein carries small bunches of galena, arsenopyrite, pyrite, and copper stains.

The vein is explored by a tunnel some 350 feet long. There is no equipment on the property and there has been no production to date.

Another claim, known as the Eureka, belonging to the same group, lies across Boulder Creek and to the north of the Kate Fry Claim. It is located on the same basic sill as the Kate Fry. On the Eureka claim the vein parallels the contact and dips toward it. This vein has been explored by three short tunnels.

Miller (1973, p. 78) noted the following about the Eureka:

This prospect is located high above Boulder Creek in SW¼SW¼ sec. 22, T. 61 N., R 3 E. and is best reached by the overgrown track which connects with the jeep trail on the north side of Boulder Creek. . . . This prospect consists of one caved adit and a small dump. The vein minerals include galena with pyrite, pyrrhotite, and some chalcopyrite in a quartz gangue. A test shipment or ore was made in the early 1900's but results are not known.

Concerning the nearby Kate Fry claim, Miller (1973, p. 79) observed:

This property is located in NW¼NW¼ sec. 27, T. 61 N., R, 3 E. It is situated above a scenic cascade on the south bank of Boulder Creek and due south of the Eureka claim. The Kate Fry is reached by an overgrown trail which is obscured by forest growth where it joins the Leonia--Twentymile road approximately a half a mile west of Boulder Creek Cemetery (center S½ sec. 22).

The vein appears to be a quartz-carbonate pod some five feet wide that strikes east-west and dips vertically. A little chalcopyrite and some malachite stain were
noted. Kirkham and Ellis (1926, p. 63) also reported galena, arsenopyrite, and pyrite from this property.

3.24.3 Site History

The area around Leonia was extensively prospected in the late 1800's. The Eureka Claim was patented on May 13, 1983, and the Kate Fry Claim was patented on April 18, 1894 (Miller, 1973). In 1925, the Eureka had three short tunnels and the Kate Fry had a 350-foot tunnel (Kirkham and Ellis, 1926). In 1943, the Eureka had four tunnels (Figure 3.24-2). The upper tunnel, from which about 400 tons of sorted silver-lead ore had been shipped, had about 150 feet of workings. The lower tunnel was at creek level and had about 675 feet of workings. A third, short tunnel slightly below the upper tunnel did not reach bedrock (Lakes, 1943). A fourth tunnel, also short, is shown near creek level on Lakes's map (Figure 3.24-2) but is not described in his report. The Kate Fry (Figure 3.24-3) had a caved 60-foot shaft which was reported to have produced ore, a 220-foot tunnel driven along the vein, and a lower tunnel at creek level (Lakes, 1943).

3.24.4 Environmental Conditions

3.24.4.1 Site Features

The site was visited by Earl Bennett on August 13, 1998. A video segment describing the property is on the Bonners Ferry District Videotape (Tape 2, index 01:14:08-01:18:00). Documenting photographs are Roll B11-98, frames 10-12.

About 100 feet east of the highway is a flat open area in the trees. There are USFS survey flags, a corner marker, and a section marker on the south side of the open area (Figure 3.24-4). The workings consist of a shallow pit and a trench (Figure 3.24-5). The pit is in bedrock and the trench is in gravel. The area covers about 2 acres.

3.24.4.2 Sample Locations

3.24.4.2.1 Solid Samples
No waste dump samples were collected at this site.

3.24.4.2.2 Water Samples
No water samples were collected at this site.

3.24.5 Structures
There are no structures at this site.

3.24.6 Safety
There are no safety hazards at this site.
Figure 3.24-1. Location of the Eureka Mine, Boundary County, Idaho (U.S. Geological Survey Leonia, Idaho-Montana, 7.5-minute topographic map).
Figure 3.24-2. Sketch map of the Eureka workings in 1943 (Lakes, 1943).
Figure 3.24.3: Sketch plan and cross section of the Kate Fry workings in 1943 (Lakes, 1943).
Figure 3.24-4. Pit and bench mark at the Eureka Mine (Roll B11-98, frame #11).

Figure 3.24-5. Trench at the Eureka Mine (Roll B11-98, frame #10).
BIBLIOGRAPHY


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

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

<table>
<thead>
<tr>
<th>Commodity(s)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(ounces)</td>
<td></td>
<td></td>
<td></td>
<td></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>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Opening</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ownership</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opening Length (ft)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opening Width (ft)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latitude (GPS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longitude (GPS)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Sample #</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photo Number</td>
<td></td>
<td></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 visually 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>
<thead>
<tr>
<th>TABLE 2 - DUMPS, TAILINGS, AND SPOIL PILES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Number</td>
</tr>
<tr>
<td>Waste Type</td>
</tr>
<tr>
<td>Ownership</td>
</tr>
<tr>
<td>Area (acres)</td>
</tr>
<tr>
<td>Volume (cu yds)</td>
</tr>
<tr>
<td>Size of Material</td>
</tr>
<tr>
<td>Wind Erosion</td>
</tr>
<tr>
<td>Vegetation</td>
</tr>
<tr>
<td>Surface Drainage</td>
</tr>
<tr>
<td>Indicators of Metals</td>
</tr>
<tr>
<td>Stability</td>
</tr>
<tr>
<td>Location with respect to Floodplain</td>
</tr>
<tr>
<td>Distance to Stream</td>
</tr>
<tr>
<td>Water Sample #</td>
</tr>
<tr>
<td>Waste Sample #</td>
</tr>
<tr>
<td>Soil Sample #</td>
</tr>
<tr>
<td>Photo Number</td>
</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:**
- 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 if 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

**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 3 - WATER SAMPLES FROM MINE SITE DISCHARGES

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Date sample taken</th>
<th>Sampler (Initials)</th>
<th>Discharging From</th>
<th>Feature Number</th>
<th>Indicators of Metal Release</th>
<th>Indicators of Sedimentation</th>
<th>Distance to stream (ft)</th>
<th>Sample Latitude</th>
<th>Sample Longitude</th>
<th>Field pH</th>
<th>Field SC</th>
<th>Flow (gpm)</th>
<th>Method of measurement</th>
<th>Photo Number</th>
</tr>
</thead>
</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, SUF=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
<table>
<thead>
<tr>
<th>Location relative to mine site/features</th>
<th>Upstream (Background)</th>
<th>Downstream</th>
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</thead>
<tbody>
<tr>
<td>Sample Number</td>
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<tr>
<td>Sampler (Initials)</td>
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<td>Stream Name</td>
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<td></td>
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<tr>
<td>Indicators of Sedimentation</td>
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<td>Sample Latitude</td>
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<tr>
<td>Sample Longitude</td>
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<tr>
<td>Field SC</td>
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<tr>
<td>Flow (gpm)/Method of measurement</td>
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<tr>
<td>Method of measurement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photo Number</td>
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<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>
<thead>
<tr>
<th>TABLE 5 - WASTE SAMPLES</th>
</tr>
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<tr>
<td>Sample Number</td>
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<td>Sampler (Initials)</td>
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<tr>
<td>Sample Type</td>
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<tr>
<td>Waste Type</td>
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<td>Feature Number</td>
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</tr>
<tr>
<td>Sample Longitude</td>
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<tr>
<td>Photo Number</td>
</tr>
</tbody>
</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, MILL=Mill tailings, SPOIL=Overburden or spoil pile, HIGH=Highwell, 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>
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<tr>
<th></th>
<th>Sample Number</th>
<th>Date of sample</th>
<th>Sampler (Initials)</th>
<th>Sample Type</th>
<th>Sample Latitude</th>
<th>Sample Longitude</th>
<th>Likely Source of Contamination</th>
<th>Feature Number</th>
<th>Indicators of Contamination</th>
<th>Photo Number</th>
</tr>
</thead>
</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
### TABLE 7 - HAZARDOUS WASTES/MATERIALS

<table>
<thead>
<tr>
<th>Waste Number</th>
<th>Type of Containment</th>
<th>Condition of Containment</th>
<th>Contents</th>
<th>Estimated Quantity of Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</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>TABLE 8 - STRUCTURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
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<tr>
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<tr>
<td>Condition</td>
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<tr>
<td>Photo Number</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
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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
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)."
SEE

FOLDER:

Geochem_data

For data
Appendix D  
Field Forms for Properties in the Study Area
SEE

FOLDER:

Field_forms

For data
Appendix E
Reports Completed for U.S. Forest Service, Region 1, Field Inspection Program
1997 Reports


1998 Reports


1999 Reports


Kauffman, John, E.H. Bennett, and V.E. Mitchell, 1999, Site inspection report for the abandoned and inactive mines in Idaho on U.S. Forest Service lands (Region 1), Idaho Panhandle
National Forest: Volume V (Section A): Coeur d'Alene River drainage surrounding the Coeur d'Alene mining district (excluding the Prichard Creek and Eagle Creek drainages) [secondary properties]: Idaho Geological Survey unpublished report, 250 p., 1 videotape.

Kauffman, John, E.H. Bennett, and V.E. Mitchell, 1999, Site inspection report for the abandoned and inactive mines in Idaho on U.S. Forest Service lands (Region 1), Idaho Panhandle National Forest: Volume V (Section B): Coeur d'Alene River drainage surrounding the Coeur d'Alene mining district (excluding the Prichard Creek and Eagle Creek drainages) [secondary properties]: Idaho Geological Survey unpublished report, 211 p., 1 videotape.

Kauffman, John, E.H. Bennett, and V.E. Mitchell, 1999, Site inspection report for the abandoned and inactive mines in Idaho on U.S. Forest Service lands (Region 1), Idaho Panhandle National Forest: Volume V (Section C): Coeur d'Alene River drainage surrounding the Coeur d'Alene mining district (excluding the Prichard Creek and Eagle Creek drainages) [secondary properties]: Idaho Geological Survey unpublished report, 225 p., 1 videotape.

Kauffman, John, E.H. Bennett, and V.E. Mitchell, 1999, Site inspection report for the abandoned and inactive mines in Idaho on U.S. Forest Service lands (Region 1), Idaho Panhandle National Forest: Volume V (Section D): Coeur d'Alene River drainage surrounding the Coeur d'Alene mining district (excluding the Prichard Creek and Eagle Creek drainages) [secondary properties]: Idaho Geological Survey unpublished report, 276 p., 1 videotape.


2000 Reports
