Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Forest Service Lands (Region 1), Idaho Panhandle National Forest: Volume III: Coeur d'Alene Mining District (Excluding the Prichard Creek and Eagle Creek Drainages), Major Properties

John Kauffman
Earl H. Bennett
Victoria E. Mitchell
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Field Inspection conducted by Earl Bennett, John Kauffman, and William Rember
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<td>3.16 Beacon Light Mine</td>
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</tr>
<tr>
<td>3.17 Caribou Mine</td>
<td>1:48:45-1:52:45</td>
</tr>
<tr>
<td>3.18 Gray Wolf Mine</td>
<td>1:52:45-1:55:40</td>
</tr>
<tr>
<td>3.19 Silver Tip Mine</td>
<td>1:55:40-1:59:45</td>
</tr>
</tbody>
</table>

**Tape 3 of 3**

<table>
<thead>
<tr>
<th>Description</th>
<th>Index (hours/minutes/seconds)</th>
</tr>
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<tbody>
<tr>
<td>Introduction</td>
<td>0:00:05-0:01:10</td>
</tr>
<tr>
<td>3.20 Blue Goose Group</td>
<td>0:01:10-0:05:35</td>
</tr>
<tr>
<td>3.21 Charles Dickens Mine (aerial and ground)</td>
<td>0:05:35-0:35:10</td>
</tr>
<tr>
<td>3.22 Chicago-London Mine—update</td>
<td>0:35:10-0:38:20</td>
</tr>
<tr>
<td>3.23 Cedar Mountain Lode Group</td>
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</table>
1.0 PROJECT OVERVIEW

1.1 INTRODUCTION

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

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 National Forest Service lands.

2. Identify the human health and environmental risks at each location based on site characterization factors (see Section 1.5), including screening-level soil and water samples taken and analyzed in accordance with Environmental Protection Agency (EPA) protocols and quality control procedures.
3. Based on site characterization factors, identify those sites that are not affecting National Forest Service lands and that can therefore be eliminated from further consideration.

4. Cooperate with other state and federal agencies, and integrate the Northern Region program with their programs.

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

In addition to the USFS objectives outlined above, the IGS objectives 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 (FeS₂) and pyrrhotite (Fe₁₋ₓS). Other sulfides play a minor role in acid generation. Oxidation of iron sulfides forms sulfuric acid (H₂SO₄), sulfate ions (SO₄²⁻), and reduced iron (Fe²⁺). When sulfide-bearing rock is mined, the sulfide minerals are exposed to atmospheric oxygen and oxygen-bearing water. Consequently, the sulfide minerals are oxidized, and acid mine waters are produced (Trexler and others, 1975; Marvin and others, 1995).

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

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

1.4.2 Solubility of Selected Metals

The following information is paraphrased from Marvin and others (1995, p. 5-6). This report cites the following references as sources for this material: Lindsay (1979), Stumm and Morgan (1981), Hem (1985), and Maest and Metesh (1993).
At a pH above 2.2, ferric hydroxide [Fe(OH)$_3$] produces a brownish orange color in surface waters and forms a precipitate with a similar color on rocks in affected streams. If other metals, such as copper, lead, cadmium, zinc, and aluminum, are present in the source rock, they may also precipitate with or adsorb onto the ferric hydroxide (Stumm and Morgan, 1981). Alunite [KAl$_3$(SO$_4$)$_2$(OH)$_6$] and jarosite [KFe$_3$(SO$_4$)$_2$(OH)$_6$] will precipitate at a pH of less than 4, depending on SO$_4^-$ and 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 [MnO$_2$] dissolves and manganite [MnO(OH)] precipitates. Manganese is found in mineralized environments as rhodochrosite [MnCO$_3$] and its weathering products.

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

**Arsenic** tends to precipitate and adsorb with iron at low pH and de-sorb or dissolve at higher pH. Once oxidized, arsenic will be found in solution in higher pH waters. When the pH is between 3 and 7, the dominant arsenic compound is a monovalent arsenate, H$_2$AsO$_4$. Arsenic is abundant in metallic mineral deposits as arsenopyrite [FeAsS], enargite [Cu$_3$AsS$_4$], tennantite [Cu$_{12}$As$_4$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 [CdCO$_3$]; when the pH of the soil is below 6, cadmium solubility is controlled by strengite [Cd$_6$(PO$_4$)$_2$]. Octavite is the dominant control on the solubility of cadmium in soils. In water, at low partial pressures of H$_2$S, CdCO$_3$ is easily reduced to CdS.

**Copper** solubility in natural waters is controlled primarily by the amount of carbonate present; malachite [Cu$_2$(OH)$_2$CO$_3$] and azurite [Cu$_2$(OH)$_2$(CO$_3$)$_2$] form when CO$_3^-$ ions are available in sufficient concentrations. In soil, copper combines readily with iron to form cupric ferrite. Other compounds, such as sulfate and phosphates, may also control copper solubility in soils. Copper is present in many ore minerals, including chalcopyrite [CuFeS$_2$], bornite [Cu$_9$FeS$_4$], chalcocite [Cu$_2$S], and tetrahedrite [Cu$_{12}$Sb$_4$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. Franklinite may control solubility at pH less than 5 in water and soils, and its formation is strongly affected by sulfate concentrations. Thus, production of sulfate from 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. all mines and prospects noted on the appropriate USGS 7.5-minute quadrangle maps
8. data held in private collections or company information.

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

1.5.2 Pre-field Screening

Field crews visited almost all the mine sites in the study area, emphasizing the properties with the potential to release hazardous substances and those for which there was not enough information available to make that determination without a field visit. The 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></td>
<td>1. Mill site or tailings present.</td>
</tr>
<tr>
<td></td>
<td>2. Adits with discharge or evidence of discharge.</td>
</tr>
<tr>
<td></td>
<td>3. Evidence of or strong likelihood for metal leaching or AMD (water stains, stressed or lack of vegetation, waste below water table, etc.)</td>
</tr>
<tr>
<td></td>
<td>4. Mine waste in floodplain or shows signs of water erosion.</td>
</tr>
<tr>
<td></td>
<td>5. Residences, high public use area, or environmentally sensitive area (as listed in HRS) within 200 feet of the disturbance.</td>
</tr>
<tr>
<td></td>
<td>6. Hazardous wastes/materials (chemical containers, explosives, etc.)</td>
</tr>
<tr>
<td></td>
<td>7. Open adits/shafts, highwalls, or hazardous structures/debris.</td>
</tr>
</tbody>
</table>

If the answers to criteria 1 through 6 were all "NO" (based on literature, personal knowledge, or a site visit), the site was not investigated further.

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 entire site was photographically recorded using both still images and videotape. The videotape record proved especially useful for site description and review, and is recommended for future studies.

1.5.3.1 Soil, Rock, and Mine Waste Sampling Procedures

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

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

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

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

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

1.5.3.2 Water Sampling Procedure

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

The geologist selected and marked water sample sites based on field parameters (SC, pH, temperature) and observations (such as erosion and staining of soils or stream beds). Sample locations were chosen that would provide the best information on the relative impact of the site to surface water and soils. All sites were accurately located on topographic base maps. Surface water samples were collected at all discharge points at the site, as well as samples from upstream and downstream of the site.

At each water sampling site, the temperature, specific conductivity, and pH were measured. A unique sample number was affixed to the sample bottle. 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, background water-quality data at a particular mine site was restricted to upstream surface water samples. However, in some drainages background samples were collected at sites with no visible contamination and no known mining activity upstream from the sampling location. Background soil samples were not collected. Laboratory leach tests were used to determine if metals might be released from mine waste material, which could provide additional insight to possible ground-water contamination.

1.5.4 Analytical Methods

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

Water Samples (acidified and unfiltered)—Total Recoverable Metal Screen (EPA Test 200.7). Water Samples (acidified and unfiltered)—Arsenic (EPA Test 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—Metal Screen (EPA Test 1311/6010).

1.5.5 Standards

EPA and various state agencies have developed human health and environmental standards for various metals. 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.

9
Table 1.5-2. Standards for contaminants in water.

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

1.5.5.2 Soil and Rock Background Standards

It is useful to have some idea about the natural background values of rocks and soils when interpreting geochemical data. Although no whole rock or soil samples were run for this study, an estimate can be made from the analyses presented by Gott and Cathrall (1980). They analyzed 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 is still useful, especially for estimating background values. For example, an average sample of soil above the Prichard Formation might contain 54 ppm (mg/Kg) lead, 140 ppm (mg/Kg) zinc, 21 ppm (mg/Kg) copper, 0.13 ppm (mg/Kg) mercury, and 10 ppm (mg/Kg) arsenic. These data were used by the Environmental Protection Agency as background data for their studies of the Bunker Hill Superfund Site (Nick Ceto, 1997, personal communication).
Table 1.5-3. Median values of metals in rock samples from various units of the Belt Supergroup (data from Gott and Cathrall, 1980; ppm = mg/Kg).

<table>
<thead>
<tr>
<th>Element</th>
<th>Prichard Formation</th>
<th>Burke Formation</th>
<th>Revett Formation</th>
<th>St. Regis Formation</th>
<th>Wallace Formation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron (percent)</td>
<td>3</td>
<td>1.8</td>
<td>1.4</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>Magnesium (percent)</td>
<td>0.4</td>
<td>0.1</td>
<td>0.05</td>
<td>0.19</td>
<td>0.48</td>
</tr>
<tr>
<td>Calcium (percent)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.05</td>
</tr>
<tr>
<td>Titanium (percent)</td>
<td>0.3</td>
<td>0.19</td>
<td>0.13</td>
<td>0.19</td>
<td>0.21</td>
</tr>
<tr>
<td>Manganese (ppm)</td>
<td>224</td>
<td>386</td>
<td>381</td>
<td>600</td>
<td>360</td>
</tr>
<tr>
<td>Barium (ppm)</td>
<td>343</td>
<td>360</td>
<td>235</td>
<td>543</td>
<td>378</td>
</tr>
<tr>
<td>Beryllium (ppm)</td>
<td>1.3</td>
<td>---</td>
<td>---</td>
<td>0.9</td>
<td>0.89</td>
</tr>
<tr>
<td>Cobalt (ppm)</td>
<td>5</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>3.9</td>
</tr>
<tr>
<td>Chromium (ppm)</td>
<td>40</td>
<td>13</td>
<td>8.3</td>
<td>20</td>
<td>23.8</td>
</tr>
<tr>
<td>Molybdenum (ppm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Nickel (ppm)</td>
<td>10</td>
<td>5.5</td>
<td>4.2</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Strontium (ppm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Vanadium (ppm)</td>
<td>54</td>
<td>26</td>
<td>20</td>
<td>30</td>
<td>36</td>
</tr>
<tr>
<td>Sulfur (percent)</td>
<td>.01</td>
<td>0.007</td>
<td>0.006</td>
<td>0.007</td>
<td>0.009</td>
</tr>
<tr>
<td>Mercury (ppm)</td>
<td>.03</td>
<td>---</td>
<td>0.03</td>
<td>0.03</td>
<td>0.04</td>
</tr>
<tr>
<td>Copper (ppm)</td>
<td>22</td>
<td>6.2</td>
<td>8</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Lead (ppm)</td>
<td>34</td>
<td>14</td>
<td>10</td>
<td>11</td>
<td>23</td>
</tr>
<tr>
<td>Zinc (ppm)</td>
<td>60</td>
<td>31</td>
<td>15</td>
<td>20</td>
<td>41</td>
</tr>
<tr>
<td>Silver (ppm)</td>
<td>0.4</td>
<td>0.36</td>
<td>0.2</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Cadmium (ppm)</td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Arsenic (ppm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Antimony (ppm)</td>
<td>109</td>
<td>1.1</td>
<td>1.6</td>
<td>2.2</td>
<td>1.1</td>
</tr>
<tr>
<td>No. of Samples</td>
<td>727</td>
<td>402</td>
<td>455</td>
<td>839</td>
<td>998</td>
</tr>
</tbody>
</table>
Table 1.5-4. Median values of metals in soil samples from various units of the Belt Supergroup (data from Gott and Cathrall, 1980; ppm = mg/Kg).

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

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

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

1.5.6 Analytical Results

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

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

2.1 INTRODUCTION

The report covers the major mines in the Coeur d'Alene River drainage surrounding of the Coeur d'Alene mining district, excluding the drainages of Prichard and Eagle Creeks. The area extends from the Montana border on the east to Coeur d'Alene Lake on the west and includes Kootenai County north of the Coeur d'Alene River and Shoshone County north of the southern drainage divide for the South Fork of the Coeur d'Alene River. Access to the area is by paved and unpaved roads from the major highways. Interstate 90 provides access to the southern part of the area, and U.S. Highway 95 is near the western boundary. Most of the secondary drainages have dirt roads, especially those with past mining activity.

The study area is in the Wallace and Fernan Districts of the Panhandle 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 twenty-two mining properties described in this report (Part 1 of the discussion of the Coeur d'Alene River basin, excluding the Prichard and Eagle Creek drainages) are located on ten 7.5-minute topographic maps (U.S. Geological Survey). The location of these twenty-two properties is shown in Figure 2.1-1. Elevations range from 2,125 feet at Coeur d'Alene Lake to over 6,500 feet on the Idaho-Montana border. The area is heavily forested with dense brush and conifers, and the topography is generally very steep.

In addition, an update on the Chicago-London, examined during the 1996 field season, is provided. This mine is discussed in Volume I (Prichard-Eagle Creek drainages) of this report.

2.1.1 Summary of the Coeur d'Alene River Basin Study Area

There were 153 mining properties (Table 2.1.1-1 and Part 2 of this report) examined in the Coeur d'Alene River basin surrounding the Coeur d'Alene mining district. The twenty-two sites discussed below are those with the most significant environmental problems. These properties have either significant environmental problems (usually acid water, high metal loadings in the water, or old mill tailings) or physical hazards (open adits, tunnels, shafts, or pits). Properties with less serious environmental problems or with only physical hazards are covered in Part 2 of this report.

Of the 22 mines in the Coeur d'Alene River drainage discussed in Part 1, 20 have the potential to have an environmental impact on or near USFS lands. The magnitude of the problem almost always correlates with the amount of production at the property (the larger the production, the larger the problem). The tailings impoundments at the Carlisle and Charles Dickens mines could have serious environmental impacts from either metal contamination, erosion of mill tailings, or
Figure 2.1-1b. Location of properties in the southwest part of the Coeur d'Alene River drainage surrounding the Coeur d'Alene mining district (U.S. Geological Survey St. Maries 1:100,000-scale map).
Figure 2.1-1c. Location of properties in the northeast part of the Coeur d'Alene River drainage surrounding the Coeur d'Alene mining district (U.S. Geological Survey Thompson Falls 1:100,000-scale map).
Figure 2.1-1d. Location of properties in the southeast part of the Coeur d'Alene River drainage surrounding the Coeur d'Alene mining district (U.S. Geological Survey Wallace 1:100,000-scale map).
Table 2.1-1. Summary of the major sites in the Coeur d'Alene River drainage surrounding the Coeur d'Alene mining district (excluding the Prichard and Eagle Creek drainages). The properties are arranged in the order they are discussed in the text, approximately in relative order of importance regarding environmental concerns and/or physical hazards.

Explanation:

**Site No.:** Idaho Geological Survey file number, or field designation number.

**Surface Owner:** FS = Forest Service; P = Private; M = mixed Forest Service/Private, or undetermined.

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

**Environmental Concerns:** W = adit water; D = waste dump; 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; T or D - tailings or dump samples that exceed background or environmental standards for one or more elements in the *Element Screen*, and/or tailings or dump samples that show significant leaching of one or more metals in the *TCLP for Metals Screen*.

**Physical Conditions:** AO = open adit; AG = open adit, gated; AG(o) = open adit, gated, gate open; AC = caved or otherwise closed adit; SO = open shaft; SC = caved shaft; StO = open stope; T = trench or dozer cut; P = prospect pit. Numbers indicate number of each type of working at the site; queried when type or condition of workings uncertain or unknown.

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Mine/Prospect 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>WL-159</td>
<td>Carlisle Mine</td>
<td>P</td>
<td>5</td>
<td>4</td>
<td>W, T, D</td>
<td>1AC</td>
</tr>
<tr>
<td>SP-87</td>
<td>Empire Copper Mine</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP-133,</td>
<td>St. Joe Quartz</td>
<td>FS</td>
<td>9</td>
<td>5</td>
<td>W, D</td>
<td>7AO, 1AG</td>
</tr>
<tr>
<td>SP-147,</td>
<td>Prospect (includes St. Joe #1, #2, #3, #4 and Terror Mine)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WL-202</td>
<td>Blue Sky</td>
<td>FS</td>
<td>1</td>
<td>D</td>
<td></td>
<td>4AO, 1AG</td>
</tr>
<tr>
<td>WL-197</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP-286</td>
<td>National Mine</td>
<td>M</td>
<td>3</td>
<td>2</td>
<td>W, D</td>
<td>1AO</td>
</tr>
<tr>
<td>SP-54</td>
<td>Silver Strand</td>
<td>FS</td>
<td>3</td>
<td>1</td>
<td>W, D ?</td>
<td>3AG, 1AO</td>
</tr>
<tr>
<td>WL-361,</td>
<td>Snowstorm Mine</td>
<td>P</td>
<td>1</td>
<td></td>
<td>W</td>
<td>1T, 3AC, 2P, 1AG</td>
</tr>
<tr>
<td>WL-378,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WL-396,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WL-400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WL-374</td>
<td>Snowshoe Mine</td>
<td>P</td>
<td>1</td>
<td></td>
<td>W</td>
<td>1AG, 1AC, several P</td>
</tr>
<tr>
<td>WL-356</td>
<td>Lucky Calumet Mine</td>
<td>FS</td>
<td>1</td>
<td></td>
<td>W</td>
<td>1AC</td>
</tr>
</tbody>
</table>
Table 2.1-1. Summary of the major sites in the Coeur d'Alene River drainage surrounding the Coeur d'Alene mining district (continued).

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Mine/Prospect 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>WL-367</td>
<td>National Copper Mine</td>
<td>P</td>
<td>2</td>
<td>2</td>
<td>W, D</td>
<td>3AG 2AC 1SC</td>
</tr>
<tr>
<td>WL-318, WL-345</td>
<td>Copper King Mine</td>
<td>P</td>
<td>1</td>
<td>1</td>
<td>W, D</td>
<td>4AC 4P</td>
</tr>
<tr>
<td>WL-460</td>
<td>Reindeer Queen Mine</td>
<td>P</td>
<td>1</td>
<td>1</td>
<td>W, D</td>
<td>1AG</td>
</tr>
<tr>
<td>WL-179</td>
<td>Red Monarch</td>
<td>FS</td>
<td>3</td>
<td>1</td>
<td>W, D</td>
<td>1AO 1AC</td>
</tr>
<tr>
<td>WL-125</td>
<td>Pony Gulch Mine</td>
<td>FS</td>
<td>1</td>
<td>T</td>
<td></td>
<td>3AO 1AC</td>
</tr>
<tr>
<td>SP-296</td>
<td>Lucky Boy Prospect</td>
<td>FS</td>
<td>2</td>
<td>1</td>
<td>D</td>
<td>3AO</td>
</tr>
<tr>
<td>WL-433</td>
<td>Beacon Light Mine</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AG</td>
</tr>
<tr>
<td>SP-99</td>
<td>Caribou Mine</td>
<td>M</td>
<td>1</td>
<td>1</td>
<td>W, D</td>
<td>1AO 2AC</td>
</tr>
<tr>
<td>SP-106</td>
<td>Gray Wolf Mine</td>
<td>FS</td>
<td>1</td>
<td></td>
<td>D</td>
<td>2AO 1AC 1SC</td>
</tr>
<tr>
<td>SP-111</td>
<td>Silver Tip Mine</td>
<td>FS</td>
<td>3</td>
<td>1</td>
<td>W, D</td>
<td>2AO 1S ? (underground)</td>
</tr>
<tr>
<td>SP-93</td>
<td>Blue Goose Group</td>
<td>FS</td>
<td>3</td>
<td>1</td>
<td>D</td>
<td>1AC</td>
</tr>
<tr>
<td>SP-119</td>
<td>Charles Dickens Mine</td>
<td>FS</td>
<td>2</td>
<td>2</td>
<td>D, T</td>
<td>1SC(?)</td>
</tr>
<tr>
<td>WL-120</td>
<td>Chicago-London Mine (update)</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td>1StO</td>
</tr>
<tr>
<td>SP-33</td>
<td>Cedar Mountain Lode Group</td>
<td>FS</td>
<td>2</td>
<td></td>
<td>W</td>
<td>2AG</td>
</tr>
</tbody>
</table>
both. However, the tailings impoundment area at the Charles Dickens is being used as the U.S. Forest Service repository for tailings and mine wastes; presumably, the repository design includes sufficient provision for erosion control.

The jig tailings and the three tailings impoundments at the Carlisle Mine represent the largest accumulation of tailings in the area (except for the Charles Dickens). In particular, the jig tailings (as well as the waste dump) are in the active waterway of Carbon Creek. The oxidized dump at the St. Joe No. 4 impinged significantly on Terror Gulch, but this material was removed to the Charles Dickens repository in the summer of 1997. Twelve of the mines in the area had dumps which impinged on the nearby streams, and several of these showed signs of erosion. For many of these sites, silt from the eroding material is at least as serious a problem as the metals contained in the dump. Many of the mines in the area slightly exceeded one or more water quality standards (usually for cadmium). While additional sampling is needed to fully characterize the environmental effects of this water, the impacts from most of these adits is probably slight. Of greater concern are those properties that significantly exceed the standards for several different metals, such as the St. Joe No. 4 and the Carlisle adit.

Eleven properties in the area have open adits or shafts. Of particular concern is the shaft at the Empire Copper Mine, which is unmarked and opens to the surface. An additional six mines had gated openings, and some of these gates could be bypassed by someone determined to enter the adit. Also, the hole in the road at the Chicago-London Mine, which is probably an old stope that has broken through to the surface, is five times larger than it was in the summer of 1996 and now covers the entire width of the road.

2.2 GEOLOGY

The most recent references to the geology of the Coeur d'Alene River basin are Griggs (1973) and Harrison and others (1986). The geology and ore deposits of parts of the area are discussed in Anderson (1940) and Hobbs and others (1965). Additional references include Ransome (1904), Ransome and Calkins (1908), and Umpleby and Jones (1923). A brief description of the geologic framework of the area follows.

The metal mines in the district are hosted by metasedimentary rocks of the Belt Supergroup of Precambrian age (Figure 2.2-1). The characteristics of the various units comprising the supergroup is shown in Table 3.2.1. Almost half of the mines in the study area are lead-zinc-silver deposits in the Prichard Formation. This formation is broken into an upper and lower part by Hosterman (1956) and Harrison and others (1986). Key references to the Prichard are Cressman (1982) and Cressman (1989). Another important group of mines consists of stratabound copper-silver deposits located near the contact between the Revett and St. Regis Formations. These deposits are found on the eastern edge of the study area near the Montana border.

Igneous rocks include several Cretaceous or Tertiary granitic intrusives near the western edge of the area. The mines in the Beauty Bay area are associated with one of these granitic stocks (Anderson, 1940).
Figure 2.2-1a. Geology of the western part of the Coeur d'Alene River drainage, Idaho (Griggs, 1973). pCqd = Middle Proterozoic quartz diorite or amphibolite; pCp, pCpu, pCpf, pCpp, pCpg = Middle Proterozoic Prichard Formation; pCf = Middle Proterozoic Burke Formation; pGf = Middle Proterozoic Revett Formation; pGfb = Middle Proterozoic Revett and Burke Formations, undivided; pGfw, pGfwa, pGwel = Middle Proterozoic Wallace Formation; pGsp = Middle Proterozoic Striped Peak Formation; pGf = Middle Proterozoic Liberty Formation; TMe = Tertiary and Mesozoic granitic rocks; Tcf = Miocene and Pliocene Columbia River Basalt and Latah Formation; QTg = Tertiary and Quaternary older gravel deposits; Qp = Pleistocene Palouse Formation; Qgo = Pleistocene older glacial deposits; Qgf = Pleistocene glacial flood deposits; Qgy = Pleistocene younger glacial deposits; QIs = Quaternary landslide deposits; Qal = Holocene alluvium.
Figure 2.2-1b. Geology of the eastern part of the Coeur d'Alene River drainage, Idaho (Harrison and others, 1986). Ypu, Ypl = Middle Proterozoic Prichard Formation; Yb = Middle Proterozoic Burke Formation; Yr = Middle Proterozoic Revett Formation; Yw, Ywu, Ywm, Ywl = Middle Proterozoic Wallace Formation; Ysp = Middle Proterozoic Striped Peak Formation; ZYd = Late and Middle Proterozoic mafic dikes and sills; Ks, Kg = Cretaceous granitic rocks; QTg = Tertiary and Quaternary gravel deposits; Qg = Pleistocene glacial, fluvial and flood deposits; Ql = Quaternary lake sediments; Qal = Holocene alluvium.
<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 Formation</td>
<td>Interbedded quartzite and argillite with some arenaceous dolomitic beds. Purplish gray and pink to greenish gray. Ripple marks, mud cracks common. Top eroded.</td>
<td>1,500+</td>
</tr>
<tr>
<td>Wallace</td>
<td>Upper part</td>
<td>Mostly medium- to greenish-gray finely laminated argillite. Some arenaceous dolomite and impure quartzite, and minor gray dolomite and limestone in the middle part.</td>
<td>4,500-6,500</td>
</tr>
<tr>
<td>Formations</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 Formation</td>
<td>Upper part 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>Revett Quartzite</td>
<td></td>
<td>Thick-bedded vitreous light yellowish-gray to nearly white pure quartzite. Grades into nearly pure and impure quartzite at bottom and top. Cross-stratification common.</td>
<td>1,200-3,400</td>
</tr>
<tr>
<td>Burke Formation</td>
<td></td>
<td>Light greenish-gray impure quartzite. Some pale red and light yellowish-gray pure to nearly pure quartzite. Ripple marks, swash marks, and pseudo-conglomerate.</td>
<td>2,200-3,000</td>
</tr>
<tr>
<td>Prichard Formation</td>
<td>Upper part</td>
<td>Interbedded medium-gray argillite and quartzose argillite and light-gray impure to pure quartzite. Some mud cracks and ripple marks.</td>
<td>12,000+</td>
</tr>
<tr>
<td></td>
<td>Lower part</td>
<td>Thin- to thick-bedded, medium gray argillite and quartzose argillite; laminated in part. Pyrite abundant. Some discontinuous quartzite zones. Base buried.</td>
<td></td>
</tr>
</tbody>
</table>
A series of northwest-trending strike slip faults including the Thompson Pass, Osburn, and Kellogg faults are part of the Lewis and Clark line. The Osburn fault separates the Coeur d'Alene district into two halves and follows the South Fork of the Coeur d'Alene River near the southern boundary of the study area. North of the Kellogg fault, a series of faults that trend north-south marks the southern end of the Purcell trench. Folds generally trend north-south, mimicking better known structures in the Coeur d'Alene mining district. The Dobson Pass fault is a major structure that separates the Prichard Formation from the Wallace Formation in the central part of the study area and is a continuation of a major fault that extends up Ninemile Creek north of Wallace, ID.

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 (Figure 2.2-1). Over half of the mines in the study area are lead-zinc-silver deposits, usually hosted in the Prichard Formation. The ore veins have variously been described as hydrothermal deposits (Umpleby and Jones, 1923; Fryklund, 1964) or as mobilized syngeneic stratabound deposits (Hershey, 1916; Bennett, 1984). Sphalerite, galena, pyrite, and pyrrhotite are commonly found in these deposits (Fryklund, 1964; Umpleby and Jones, 1923).

Another important group of mines consists of stratabound disseminated copper-silver deposits located near the contact between the Revett and St. Regis Formations (Bennett, 1984; Umpleby and Jones, 1923). Chalcopyrite, tetrahedrite, chalocite, and pyrite are common minerals in these deposits (Umpleby and Jones, 1923; Fryklund, 1964). The Snowstorm and National mines are the only ones in this group that produced significant amounts of ore.

The mines in the Beauty Bay area are lead-zinc veins hosted by the Prichard Formation. Two of the mines are along the contact between the Prichard and a quartz monzonite stock. Common minerals in the veins are galena, sphalerite, arsenopyrite, and pyrrhotite (Anderson, 1940).

2.3.2 Summary of Mill Development

The location and history of ore processing mills in the study area is important because one of the problem areas in many mining camps is old mill tailings disposal sites. At one time or another, the following mills were operated (ranked by decreasing quantity of mill tails noted at the site):

The volume of jig tailings at the Carlisle Mine attests to the presence of a jig plant at the mine, but it is not known when this mill was built nor how long it operated. A 400-tpd mill, which included flotation equipment, was built in 1916. The property operated until 1918. Monitor Mining consolidated several properties in the area and began development work in 1942. From 1944 until 1952, part or all of Monitor's production was processed through the Carlisle mill.

A 100-tpd mill was constructed at the Charles Dickens Mine in 1907. This mill was destroyed by fire in January 1908, but was soon replaced by a 150-tpd mill which operated intermittently for
the next decade. In 1929, a new 150-tpd flotation mill was built, but it only operated for a few days before operations were suspended in December. The mill was repaired in 1937. It was operated intermittently as a custom mill for most of the 1940s.

A 5-stamp water-powered mill was operated at the Pony Gulch Mine for a few years.

A 500-tpd flotation mill was built at the National Copper Mine in 1914. The mill treated several thousand tons of ore for each of the next five years.

A 200-tpd leaching plant was built at the Snowstorm around 1905 but was not used much. It was abandoned by 1912. A 100-tpd gravity mill (later enlarged to 250-tpd) was in operation in 1912, but most of the production was shipped crude to the smelters. The mill was moved to Troy, Montana, in 1917.

A 75-tpd gravity mill was built at the Caribou Mine in 1923, but needed more equipment to operate profitably. The mill was sold in 1930 and rebuilt as a 50-tpd custom flotation mill. Probably no more than a few lots were ever processed through this mill.

A mill was built at the Empire Copper Mine in 1916. It operated that year and most of the following year. The amount of ore processed through this mill is not known.

2.4 HYDROLOGY AND HYDROGEOLOGY

The study area includes all of the drainage of the Coeur d'Alene River, except the drainages of Prichard and Eagle Creeks (which are covered in Volumes I and IV of this report). Prichard Creek flows into the Coeur d'Alene River at Prichard. The major drainages in the area (Figures 2.1-1 and 2.1-2) are the Coeur d'Alene River (which forms the southern boundary of the western half of the study area) and the North Fork of the Coeur d'Alene River. The South Fork of the Coeur d'Alene River, which drains the Coeur d'Alene mining district (most of which is not Forest Service land), flows into the Coeur d'Alene River west of Enaville. In the eastern part of the area, the southern boundary of the study area follows the drainage divide of the South Fork of the Coeur d'Alene River.

As noted, most of the lead-zinc mines in the study area are hosted by rocks of the Prichard Formation. In places these rocks contain visible sulfides (primarily pyrite and pyrrhotite). These rocks also contain significantly higher values of base metals than some of the other Belt rocks. Table 1.5-3 (based on 727 samples) shows that rocks in the Prichard Formation contain 60 ppm zinc, 34 ppm lead, 3 percent iron, 22 ppm copper, and 0.5 percent cadmium, and soils above 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.

To test whether the high metal content from the Belt Supergroup, especially the Prichard Formation, was impacting stream waters, eight background water samples were collected. The
chemical analyses for these samples 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 background water samples were collected:

- B7169711 — collected from the East Fork of Twomile Creek
- B7169712 — collected from Ninemile Creek
- B7259704 — collected from Daisy Gulch
- K07299704 — collected from the head of Stewart Creek
- R07309701 — collected from Lost Man Creek
- R08069702 — collected from Big Creek
- R08119701 — collected from Varnum Creek
- R72297001 — collected from Beauty Creek

Of these eight samples, only R08119701 was below all EPA standards for all elements. In the total recoverable metals screen, samples B7169712, K07299704, R07309701, and R08069702 exceed all standards for cadmium, samples B7259704 and R72297001 exceed the Aquatic Life Chronic standard and are within the range of the Aquatic Life Acute standard for cadmium, and sample B7169711 exceeds the Aquatic Life Chronic standard for cadmium. In the dissolved metals screen, sample B7169712 exceeds all standards for cadmium, and samples R07309701 and R72297001 exceed the Aquatic Life Chronic standard for cadmium.

In addition, sample B7169712 exceeds both Aquatic Life standards for zinc in the total recoverable metals and the dissolved metals screens. In the dissolved metals screen, samples K07299704 and R07309701 exceed the Aquatic Life Chronic standard and are within the range of the Aquatic Life Acute standard for copper, sample R72297001 is within the range of the Aquatic Life Chronic standard for copper, and sample R08069702 is at the lower limit of the Aquatic Life Chronic standard for copper.

2.5 SUMMARY OF THE COEUR D'ALENE RIVER DRAINAGE

2.5.1 Summary of Environmental Observations

Most, but not all, samples which significantly exceed EPA water standards are from the larger mines in the area (Tables 2.5-1 and 2.5-2). Properties with notable water quality variances for lead, zinc, and/or copper include the Carlisle, Snowstorm, and Red Monarch mines, as well as smaller properties such as the St. Joe property and the Cedar Mountain Lode Group. Cadmium in excess of one or more water quality standards is the most prevalent water quality variance in the Coeur d'Alene River drainage; in nearly half of these samples, cadmium is the only element that exceeds any standard. Most of the elements detected in the water samples are also found in the rock units underlying the drainages.
Table 2.4-1. Dissolved metals screen for background samples from the Coeur d’Alene River drainage surrounding the Coeur d’Alene mining district (excluding the drainages of Prichard and Eagle Creeks).

<table>
<thead>
<tr>
<th>FIELD NO.</th>
<th>REMARKS</th>
<th>Al (ppm)</th>
<th>As (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Cu (ppm)</th>
<th>Fe (ppm)</th>
<th>Pb (ppm)</th>
<th>Mn (ppm)</th>
<th>Hg (ppm)</th>
<th>Ni (ppm)</th>
<th>Zn (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7169711</td>
<td>East Fork of Twomile Creek</td>
<td>---</td>
<td>0.0720</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0053</td>
<td>2.9000</td>
<td></td>
</tr>
<tr>
<td>B7169712</td>
<td>Nine Mile Creek</td>
<td>---</td>
<td>0.0200</td>
<td>0.0180</td>
<td>0.0080</td>
<td>---</td>
<td>---</td>
<td>0.0310</td>
<td>---</td>
<td>0.0031</td>
<td>0.020</td>
<td></td>
</tr>
<tr>
<td>B7259704</td>
<td>Daisy Gulch</td>
<td>---</td>
<td>0.0260</td>
<td>---</td>
<td>0.0100</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0028</td>
<td>0.0130</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K07299704</td>
<td>Stewart Creek, head</td>
<td>---</td>
<td>0.0056</td>
<td>0.0066</td>
<td>0.0200</td>
<td>0.0037</td>
<td>0.0031</td>
<td>0.020</td>
<td>---</td>
<td>0.0039</td>
<td>0.0021</td>
<td>0.0080</td>
</tr>
<tr>
<td>R07309701</td>
<td>Lost Man Creek</td>
<td>---</td>
<td>0.0099</td>
<td>0.0029</td>
<td>---</td>
<td>0.0180</td>
<td>0.0120</td>
<td>0.0057</td>
<td>0.0025</td>
<td>---</td>
<td>0.0080</td>
<td></td>
</tr>
<tr>
<td>R08069702</td>
<td>Big Creek</td>
<td>---</td>
<td>0.0220</td>
<td>---</td>
<td>0.0120</td>
<td>0.0057</td>
<td>0.0180</td>
<td>---</td>
<td>0.0028</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R08119701</td>
<td>Varnum Creek</td>
<td>---</td>
<td>0.0100</td>
<td>---</td>
<td>0.0097</td>
<td>0.1500</td>
<td>0.0160</td>
<td>---</td>
<td>0.016</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R72297001</td>
<td>Beauty Creek</td>
<td>---</td>
<td>0.0100</td>
<td>0.0032</td>
<td>0.0055</td>
<td>0.0160</td>
<td>---</td>
<td>0.016</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>
<td></td>
</tr>
<tr>
<td>Secondary MCL</td>
<td>0.05-0.2</td>
<td>0.004-0.009</td>
<td>1.7-3.1</td>
<td>0.018-0.034</td>
<td>1.000</td>
<td>0.082-0.2</td>
<td>1.4-2.5</td>
<td>0.12-0.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.360</td>
<td>0.001-0.002</td>
<td>0.21-0.37</td>
<td>0.012-0.021</td>
<td>0.003-0.008</td>
<td>0.000012</td>
<td>0.16-0.28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.190</td>
<td>0.0006</td>
<td>0.0023</td>
<td>0.0044</td>
<td>0.0084</td>
<td>0.0015</td>
<td>0.0012</td>
<td>0.0005</td>
<td>0.007</td>
<td>0.0025</td>
<td></td>
</tr>
</tbody>
</table>

Estimated Detection Level (33% confidence): 0.089 | 0.0029 | 0.0006 | 0.0023 | 0.0044 | 0.0084 | 0.0015 | 0.0012 | 0.0005 | 0.007 | 0.0025
Table 2.4-2. Total metals screen for background samples from the Coeur d’Alene River drainage surrounding the Coeur d’Alene mining district (excluding the drainages of Prichard and Eagle Creeks).

<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>B7169711</td>
<td>East Fork of Twomile Creek</td>
<td>0.076</td>
<td>0.003</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.006</td>
<td>0.03</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>B7169712</td>
<td>Ninemile Creek</td>
<td>0.022</td>
<td>0.022</td>
<td>0.018</td>
<td>--</td>
<td>--</td>
<td>0.038</td>
<td>0.03</td>
<td>3.000</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>B7259704</td>
<td>Daisy Gulch</td>
<td>0.026</td>
<td>0.005</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>K07299704</td>
<td>Stewart Creek, head</td>
<td>0.006</td>
<td>0.006</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.003</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>R07309701</td>
<td>Lost Man Creek</td>
<td>0.010</td>
<td>0.006</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.016</td>
<td>0.004</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>R08069702</td>
<td>Big Creek</td>
<td>0.028</td>
<td>0.006</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.006</td>
<td>0.03</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>R08119701</td>
<td>Varnum Creek</td>
<td>0.009</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.220</td>
<td>0.016</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>R72297001</td>
<td>Beauty Creek</td>
<td>0.010</td>
<td>0.004</td>
<td>--</td>
<td>--</td>
<td>0.032</td>
<td>0.002</td>
<td>--</td>
<td>--</td>
<td>0.051</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>
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<th>Fe (mg/L)</th>
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<th>Mn (mg/L)</th>
<th>Hg (mg/L)</th>
<th>Ni (mg/L)</th>
<th>Zn (mg/L)</th>
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</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>
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<tr>
<td>Secondary MCL</td>
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<td>0.050</td>
<td>5.000</td>
<td>1.40-2.5</td>
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<td>0.110-0.28</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>0.120-0.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.190</td>
<td>0.001-0.002</td>
<td>0.21-0.37</td>
<td>0.012-0.021</td>
<td>0.003-0.008</td>
<td>0.000012</td>
<td>0.16-0.28</td>
<td>0.11-0.19</td>
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<tr>
<td>Estimated Detection Level (33% confidence)</td>
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Table 2.5-1. Dissolved metals in water samples from major properties in the Coeur d’Alene basin surrounding the Coeur d’Alene mining district (excluding the drainages of Prichard and Eagle Creeks).

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<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 (ppb)</th>
<th>Hg (ppm)</th>
<th>Ni (ppb)</th>
<th>Zn (ppm)</th>
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<tbody>
<tr>
<td>B7179703</td>
<td>Charles Dickens (SP-119), upstream</td>
<td>0.0270</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.015</td>
<td>0.0028</td>
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<tr>
<td>B7179704</td>
<td>Adit south of Charles Dickens on the road</td>
<td>0.0210</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.2500</td>
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<td>0.014</td>
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<tr>
<td>B7179705</td>
<td>Moon Gulch, downstream from SP-127</td>
<td>0.0200</td>
<td>0.0037</td>
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<td>---</td>
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<td>---</td>
<td>0.0081</td>
<td>0.007</td>
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<tr>
<td>B7189701</td>
<td>Terror Gulch (SP-133), upstr eam</td>
<td>0.0077</td>
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<td>---</td>
<td>---</td>
<td>---</td>
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<td>B7189702</td>
<td>St. Joe #4 (SP-147)</td>
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<td>0.0028</td>
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<td>---</td>
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<td>Lucky Calumet (WL-356), main adit</td>
<td>0.0290</td>
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<td>0.0076</td>
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<td>---</td>
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<td>National Copper Mine (WL-367), middle workings, lower adit</td>
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<td>0.0034</td>
<td>0.0072</td>
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<td>upper adit, north side of Cedar Mtn. (K07229701)</td>
<td>0.0026</td>
<td>0.0071</td>
<td>0.0051</td>
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EXPLANATION

Blank space equals no analysis

Below Detection Limit is ---

WATER QUALITY STANDARDS

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<td>1.7-3.1</td>
<td>0.018-0.034</td>
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<td>0.082-0.2</td>
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<td>0.21-0.37</td>
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<td>Hg (ppm)</td>
<td>Ni (ppb)</td>
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<td>0.0037</td>
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**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    | 0.05-0.2  | 2.000     | 0.005     | 0.100     | 0.050     | 0.002     | 0.100     |
| Secondary MCL  | 0.05-0.2  | 2.000     | 0.005     | 0.100     | 0.050     | 0.002     | 0.100     | 5.000     |
| Aquatic Life, Acute | 0.750     | 0.360     | 0.004-0.009 | 1.7-3.1   | 0.018-0.034 | 1.000     | 0.082-0.2 | 0.0024   | 1.4-2.5   | 0.12-0.21 |
| Aquatic Life, Chronic | 0.087     | 0.190     | 0.001-0.002 | 0.21-0.37 | 0.012-0.021 | 0.003-0.008 | 0.000012 | 0.16-0.28 | 0.11-0.19 |
| Estimated Detection Level (33% confidence) | 0.089     | 0.009     | 0.0006     | 0.0023     | 0.0044     | 0.0037     | 0.0015     | 0.0012     | 0.0005     | 0.007     | 0.0025     |
Table 2.5-1. Dissolved metals in water samples from major properties in the Coeur d’Alene basin surrounding the Coeur d’Alene mining district (continued).

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<th>FIELD NO.</th>
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<th>Ba (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
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<th>Mn (ppb)</th>
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EXPLANATION
Blank space equals no analysis
Below Detection Limit is —

WATER QUALITY STANDARDS

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<th>Cu (mg/L)</th>
<th>Fe (mg/L)</th>
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<th>Ni (mg/L)</th>
<th>Zn (mg/L)</th>
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<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>
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<tr>
<td>Secondary MCL</td>
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<td>0.018-0.034</td>
<td>1.000</td>
<td>0.082-0.2</td>
<td>0.0024</td>
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<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.190</td>
<td>0.001-0.002</td>
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<td>0.012-0.021</td>
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<td>0.16-0.28</td>
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<td>0.0005</td>
<td>0.0007</td>
<td>0.0025</td>
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*The University of Idaho Analytical Sciences Laboratory incorrectly reported this analysis under the sample number B7179701.
Table 2.5-2. Total recoverable metals in water samples from the major mines in the Coeur d'Alene River basin surrounding the Coeur d'Alene district (excluding the drainages of Prichard and Eagle Creeks).

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<th>REMARKS</th>
<th>Al (ppm)</th>
<th>As (ppm)</th>
<th>Ba (ppm)</th>
<th>Cd (ppm)</th>
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<th>Cu (ppm)</th>
<th>Fe (ppm)</th>
<th>Pb (ppm)</th>
<th>Mn (ppm)</th>
<th>Hg (ppm)</th>
<th>Ni (ppm)</th>
<th>Zn (ppm)</th>
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<tbody>
<tr>
<td>B7179703</td>
<td>Charles Dickens (SP-119), upstream</td>
<td>---</td>
<td>0.029</td>
<td>0.007</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.004</td>
<td>---</td>
<td>0.04</td>
<td>---</td>
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<tr>
<td>B7179704</td>
<td>Adit south of Charles Dickens on the road</td>
<td>0.0230</td>
<td>0.025</td>
<td>0.006</td>
<td>---</td>
<td>---</td>
<td>0.300</td>
<td>---</td>
<td>0.150</td>
<td>---</td>
<td>0.04</td>
<td>0.03</td>
<td>---</td>
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<tr>
<td>B7179705</td>
<td>Moon Gulch, downstream from SP-127</td>
<td>---</td>
<td>0.023</td>
<td>0.005</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0031</td>
<td>0.012</td>
<td>---</td>
<td>0.04</td>
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<tr>
<td>B7189701*</td>
<td>Terror Gulch (SP-133), upstream</td>
<td>---</td>
<td>0.010</td>
<td>0.006</td>
<td>0.016</td>
<td>---</td>
<td>0.041</td>
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<td>0.006</td>
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<tr>
<td>B7189702</td>
<td>St. Joe #4 (SP-147)</td>
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<td>0.005</td>
<td>---</td>
<td>---</td>
<td>1.100</td>
<td>---</td>
<td>0.360</td>
<td>---</td>
<td>0.03</td>
<td>0.340</td>
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<tr>
<td>B7189704</td>
<td>Terror Gulch Mine (SP-133), downstream</td>
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<td>0.010</td>
<td>0.009</td>
<td>0.016</td>
<td>---</td>
<td>---</td>
<td>0.0065</td>
<td>0.008</td>
<td>---</td>
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<td>B7259701</td>
<td>Snowstorm #3 (WL-396)</td>
<td>---</td>
<td>0.023</td>
<td>---</td>
<td>---</td>
<td>0.310</td>
<td>---</td>
<td>---</td>
<td>0.014</td>
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<tr>
<td>B7259702</td>
<td>Snowshoe Mine (WL-374), main adit</td>
<td>---</td>
<td>0.017</td>
<td>0.004</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0039</td>
<td>---</td>
<td>---</td>
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</tr>
<tr>
<td>B7259703</td>
<td>Lucky Calumet (WL-356), main adit</td>
<td>---</td>
<td>0.033</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.004</td>
<td>---</td>
<td>---</td>
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<tr>
<td>B7299701</td>
<td>National Copper Mine (WL-367), Adit #2</td>
<td>---</td>
<td>0.230</td>
<td>0.005</td>
<td>0.013</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.004</td>
<td>---</td>
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<tr>
<td>B7299703</td>
<td>Copper King Mine (WL-345/318), main adit</td>
<td>0.0062</td>
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<td>0.004</td>
<td>0.016</td>
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<tr>
<td>B7299705</td>
<td>National Copper Mine (WL-367), middle workings, lower adit</td>
<td>---</td>
<td>0.027</td>
<td>0.006</td>
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<td>0.044</td>
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<tr>
<td>B8059704</td>
<td>Reindeer Queen (WL-460)</td>
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<td>0.007</td>
<td>---</td>
<td>0.03</td>
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EXPLANATION
Blank space equals no analysis
Below Detection Limit is

mg/L = ppm

WATER QUALITY STANDARDS

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<th>Cu (mg/L)</th>
<th>Fe (mg/L)</th>
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<th>Mn (mg/L)</th>
<th>Hg (mg/L)</th>
<th>Ni (mg/L)</th>
<th>Zn (mg/L)</th>
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<td>Primary MCL</td>
<td>0.50</td>
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<td>0.100</td>
<td>0.050</td>
<td>0.050</td>
<td>0.002</td>
<td>0.100</td>
<td>5.000</td>
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<tr>
<td>Secondary MCL</td>
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<td>1.000</td>
<td>0.300</td>
<td>0.050</td>
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<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.360</td>
<td>0.004-0.009</td>
<td>1.7-3.1</td>
<td>0.018-0.034</td>
<td>1.000</td>
<td>0.082-0.2</td>
<td>0.0024</td>
<td>1.4-2.5</td>
<td>0.12-0.21</td>
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<tr>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.190</td>
<td>0.001-0.002</td>
<td>0.21-0.37</td>
<td>0.012-0.021</td>
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<td>0.000012</td>
<td>0.16-0.28</td>
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<td>Estimated Detection Level (33% confidence)</td>
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<td>0.013</td>
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Table 2.5-2. Total recoverable metals in water samples from the major mines in the Coeur d’Alene River basin surrounding the Coeur d’Alene district (continued).

<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>
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<td>K07229702</td>
<td>upper adit, north side of Cedar Mtn. (K07229701)</td>
<td>0.38</td>
<td>—</td>
<td>0.012</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.004</td>
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<td>—</td>
<td>0.690</td>
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<td>K07229703</td>
<td>Lower adit, north side of Cedar Mtn. (K07229701)</td>
<td>0.26</td>
<td>—</td>
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<td>0.0022</td>
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<td>0.011</td>
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<tr>
<td>K07249704</td>
<td>Silver Strand (SP-54), adit</td>
<td>0.065</td>
<td>0.030</td>
<td>0.005</td>
<td>—</td>
<td>0.082</td>
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<td>—</td>
<td>0.020</td>
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<td>K07249705</td>
<td>Silver Strand (SP-54), upstream</td>
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<td>—</td>
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<td>—</td>
<td>—</td>
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<tr>
<td>K07249706</td>
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<td>—</td>
<td>0.025</td>
<td>—</td>
<td>0.016</td>
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<td>—</td>
<td>0.005</td>
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<td>0.03</td>
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<td>St. Joe #2 adit (WL-202)</td>
<td>0.0042</td>
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<td>—</td>
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<td>St. Joe #2 (WL-202), upstream -150 feet</td>
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<td>0.015</td>
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<td>0.0036</td>
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**EXPLANATION**

Blank space equals no analysis

Below Detection Limit is —

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**WATER QUALITY STANDARDS**

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<th>Fe (mg/L)</th>
<th>Pb (mg/L)</th>
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<th>Hg (mg/L)</th>
<th>Ni (mg/L)</th>
<th>Zn (mg/L)</th>
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<td>Primary MCL</td>
<td>0.05</td>
<td>0.20</td>
<td>0.005</td>
<td>0.10</td>
<td>—</td>
<td>0.050</td>
<td>—</td>
<td>—</td>
<td>0.002</td>
<td>0.10</td>
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<tr>
<td>Secondary MCL</td>
<td>0.05</td>
<td>0.36</td>
<td>0.004</td>
<td>1.7</td>
<td>1.7</td>
<td>0.018</td>
<td>0.002</td>
<td>0.050</td>
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<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.36</td>
<td>0.004</td>
<td>1.7</td>
<td>3.1</td>
<td>0.018</td>
<td>0.034</td>
<td>1.000</td>
<td>0.082</td>
<td>0.0024</td>
<td>1.4</td>
<td>0.12</td>
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<tr>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
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<td>0.008</td>
<td>0.00012</td>
<td>0.16</td>
<td>0.11</td>
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</table>

Estimated Detection Level (33% confidence) | 0.004 | 0.003 | 0.013 | 0.035 | 0.012 | 0.002 | 0.02 | 0.003 |
Table 2.5-2. Total recoverable metals in water samples from the major mines in the Coeur d’Alene River basin surrounding the Coeur d’Alene district (continued).

<table>
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<th>FIELD NO.</th>
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<th>Ba (ppm)</th>
<th>Cd (ppm)</th>
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<th>Pb (ppm)</th>
<th>Mn (ppm)</th>
<th>Hg (ppm)</th>
<th>Ni (ppm)</th>
<th>Zn (ppm)</th>
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<td>K08279704</td>
<td>Beaver Creek tailings pond (Carlisle Mill;</td>
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<tr>
<td></td>
<td>WL-159)</td>
<td>0.015</td>
<td>0.009</td>
<td>0.150</td>
<td>0.036</td>
<td>2.600</td>
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<td>0.066</td>
<td>0.05</td>
<td>0.540</td>
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<td>Carlisle Mill (WL-159), upstream</td>
<td>0.020</td>
<td>0.021</td>
<td>0.024</td>
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<td>--</td>
<td>0.0025</td>
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<td>0.03</td>
<td>3.100</td>
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<td>0.007</td>
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</tr>
<tr>
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<td>Red Monarch (WL-179), adit</td>
<td>0.006</td>
<td>0.017</td>
<td>0.061</td>
<td>0.500</td>
<td>--</td>
<td>0.014</td>
<td>0.140</td>
<td>0.04</td>
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<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.004</td>
<td>--</td>
<td>0.006</td>
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<td></td>
</tr>
<tr>
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<td>Red Monarch (WL-179), downstream</td>
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<td>--</td>
<td>0.014</td>
<td>--</td>
<td>0.034</td>
<td>--</td>
<td>--</td>
<td>0.003</td>
<td>--</td>
<td>0.740</td>
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<td></td>
</tr>
<tr>
<td>R07319702</td>
<td>Blue Goose (SP-93), dump seep</td>
<td>0.020</td>
<td>0.007</td>
<td>0.020</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.004</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R08079704</td>
<td>Lucky Boy (SP-296), upstream</td>
<td>0.008</td>
<td>0.005</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.006</td>
<td>--</td>
<td>0.02</td>
<td></td>
<td></td>
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<tr>
<td>R08079705</td>
<td>Tributary to Big Creek, downstream</td>
<td>0.008</td>
<td>0.005</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.005</td>
<td>--</td>
<td>0.004</td>
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<tr>
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<td>Seep from Caribou dump (SP-99)</td>
<td>0.012</td>
<td>0.003</td>
<td>--</td>
<td>--</td>
<td>0.074</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.004</td>
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<tr>
<td>R72297005</td>
<td>Silver Tip Mine (SP-111), downstream</td>
<td>0.0033</td>
<td>0.007</td>
<td>0.004</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.006</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R72297006</td>
<td>Silver Tip Mine (SP-111), upstream</td>
<td>0.006</td>
<td>0.004</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.004</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R72297007</td>
<td>Silver Tip Mine (SP-111), north adit</td>
<td>0.015</td>
<td>--</td>
<td>0.007</td>
<td>--</td>
<td>0.710</td>
<td>--</td>
<td>0.350</td>
<td>--</td>
<td>0.680</td>
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<td></td>
</tr>
</tbody>
</table>

EXPLANATION

Blank space equals no analysis
Below Detection Limit is --

WATER QUALITY STANDARDS

<table>
<thead>
<tr>
<th></th>
<th>AI (mg/L)</th>
<th>As (mg/L)</th>
<th>Ba (mg/L)</th>
<th>Cd (mg/L)</th>
<th>Cr (mg/L)</th>
<th>Cu (mg/L)</th>
<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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<tr>
<td>Secondary MCL</td>
<td>0.050</td>
<td>2.000</td>
<td>0.005</td>
<td>0.100</td>
<td>0.050</td>
<td>0.002</td>
<td>0.100</td>
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<tr>
<td>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>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.190</td>
<td>0.001-0.002</td>
<td>0.21-0.37</td>
<td>0.012-0.021</td>
<td>0.003-0.008</td>
<td>0.000012</td>
<td>0.16-0.28</td>
<td>0.11-0.19</td>
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<td></td>
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</table>

Estimated Detection Level (33% confidence)

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<th>As</th>
<th>Ba</th>
<th>Cd</th>
<th>Cr</th>
<th>Cu</th>
<th>Fe</th>
<th>Pb</th>
<th>Mn</th>
<th>Hg</th>
<th>Ni</th>
<th>Zn</th>
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</thead>
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<tr>
<td></td>
<td>0.004</td>
<td>0.003</td>
<td>0.013</td>
<td>0.035</td>
<td>0.012</td>
<td>0.002</td>
<td>0.02</td>
<td>0.003</td>
<td></td>
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</tbody>
</table>

*The University of Idaho Analytical Sciences Laboratory incorrectly reported this analysis under the sample number B7179701.*
2.5.2 Mill Waste Samples

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

Samples of mill tailings were collected from all known mill sites in the Coeur d'Alene River drainage where enough material remained to sample. These included the Carlisle and Charles Dickens flotation tailings sites, the Charles Dickens jig tailings, and the Pony Gulch stamp mill site (Tables 2.5-3 and 2.5-4). As expected, all samples contain metal loadings, including arsenic, copper, lead, and zinc, which exceed the Clark Fork Superfund Background Levels.
### Table 2.5-3 Tailings and dump samples for the major mines in the Coeur d’Alene basin surrounding the Coeur d’Alene mining district (excluding the drainages of Prichard and Eagle Creeks).

<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>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7179701</td>
<td>Charles Dickens (SP-119), main waste dump, jig tailings</td>
<td>NA</td>
<td>1,300.00</td>
<td>18</td>
<td>110.00</td>
<td>42</td>
<td>1,400</td>
<td>110,000</td>
<td>11,000</td>
<td>73.0</td>
<td>NA</td>
<td>29.00</td>
<td>16,000</td>
<td>2.3</td>
</tr>
<tr>
<td>B7179702</td>
<td>Charles Dickens (SP-119), Dump #4, flotation tailings</td>
<td>NA</td>
<td>960.00</td>
<td>40</td>
<td>3.00</td>
<td>14</td>
<td>390</td>
<td>41,000</td>
<td>8,600</td>
<td>140.0</td>
<td>NA</td>
<td>12.00</td>
<td>1,000</td>
<td>3.0</td>
</tr>
<tr>
<td>B7189703</td>
<td>St. Joe #4 (SP-147), dump sample</td>
<td>NA</td>
<td>470.00</td>
<td>32</td>
<td>29.00</td>
<td>21</td>
<td>350</td>
<td>65,000</td>
<td>4,800</td>
<td>120.0</td>
<td>NA</td>
<td>20.00</td>
<td>6,700</td>
<td>2.5</td>
</tr>
<tr>
<td>B7299702</td>
<td>National Copper (WL-367), #2 dump</td>
<td>NA</td>
<td>---</td>
<td>240</td>
<td>1.80</td>
<td>8.7</td>
<td>52</td>
<td>12,000</td>
<td>640</td>
<td>690.0</td>
<td>NA</td>
<td>11.00</td>
<td>620</td>
<td>8.1</td>
</tr>
<tr>
<td>B7299704</td>
<td>Copper King (WL-345/318), dump</td>
<td>NA</td>
<td>---</td>
<td>940</td>
<td>6.60</td>
<td>9.0</td>
<td>1,400</td>
<td>19,000</td>
<td>1,500</td>
<td>1,800.0</td>
<td>NA</td>
<td>37.00</td>
<td>1,700</td>
<td>6.4</td>
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<tr>
<td>B7299706</td>
<td>National Copper (WL-367), middle workings, lower dump</td>
<td>NA</td>
<td>---</td>
<td>93</td>
<td>0.78</td>
<td>1.3</td>
<td>130</td>
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<td>160</td>
<td>930.0</td>
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<td>15</td>
<td>5.4</td>
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<td>B8059705</td>
<td>Reindeer Queen (WL-460), dump</td>
<td>NA</td>
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<td>190,000</td>
<td>150</td>
<td>7,500.0</td>
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<td>49.00</td>
<td>97</td>
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<tr>
<td>B8309702</td>
<td>Pony Gulch (WL-125), mill tailings</td>
<td>NA</td>
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<td>250</td>
<td>37,000</td>
<td>64,000</td>
<td>36.0</td>
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<td>11.00</td>
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<tr>
<td>K07179704</td>
<td>Cedar Mountain Prospect (SP-33), waste dump</td>
<td>NA</td>
<td>180.00</td>
<td>130</td>
<td>3.50</td>
<td>22</td>
<td>64</td>
<td>27,000</td>
<td>63</td>
<td>400.0</td>
<td>NA</td>
<td>25.00</td>
<td>56</td>
<td>6.1</td>
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<tr>
<td>K07249707</td>
<td>Silver Strand (SP-54), dump at Adit #1</td>
<td>NA</td>
<td>2,200.00</td>
<td>460</td>
<td>12.00</td>
<td>150.0</td>
<td>1,400</td>
<td>46,000</td>
<td>1,900</td>
<td>430.0</td>
<td>NA</td>
<td>190.00</td>
<td>550</td>
<td>7.4</td>
</tr>
<tr>
<td>K08059704</td>
<td>National Mine (SP-286), waste dump</td>
<td>NA</td>
<td>210.00</td>
<td>25</td>
<td>2.10</td>
<td>3.6</td>
<td>11</td>
<td>35,000</td>
<td>18</td>
<td>120.0</td>
<td>NA</td>
<td>8.80</td>
<td>7</td>
<td>3.1</td>
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<tr>
<td>K08059705</td>
<td>National Mine (SP-286), unoxidized waste</td>
<td>NA</td>
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<td>61</td>
<td>2.20</td>
<td>13.0</td>
<td>26</td>
<td>20,000</td>
<td>41</td>
<td>930.0</td>
<td>NA</td>
<td>19.00</td>
<td>120</td>
<td>7.7</td>
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<tr>
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<td>St. Joe #4 dump (SP-147), oxidized</td>
<td>NA</td>
<td>640.00</td>
<td>22</td>
<td>6.20</td>
<td>9.7</td>
<td>250</td>
<td>110,000</td>
<td>8,700</td>
<td>35.0</td>
<td>NA</td>
<td>20.00</td>
<td>1,400</td>
<td>2.2</td>
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<td>St. Joe #2 dump (WL-202), oxidized</td>
<td>NA</td>
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<td>3.80</td>
<td>7.9</td>
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<td>390</td>
<td>93.0</td>
<td>NA</td>
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<td>3.8</td>
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<td>St. Joe #2 dump (WL-202), unoxidized</td>
<td>NA</td>
<td>560.00</td>
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<td>2.60</td>
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<td>590.0</td>
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<td>St. Joe #3 dump (SP-147), composite sample</td>
<td>NA</td>
<td>500.00</td>
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<td>18.00</td>
<td>170.0</td>
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<td>82,000</td>
<td>910</td>
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<td>NA</td>
<td>130.00</td>
<td>950</td>
<td>5.6</td>
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<td>Carlisle (WL-159), tailings, lower impoundment</td>
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<td>94.00</td>
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<td>12.0</td>
<td>45</td>
<td>43,000</td>
<td>3,000</td>
<td>740.0</td>
<td>NA</td>
<td>12.00</td>
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<td>4.7</td>
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### Clark Fork Superfund BG Levels (mg/Kg) = ppm

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<th>Cd</th>
<th>Pb</th>
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<tbody>
<tr>
<td>U.S. Mean Soil</td>
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<td>0.7</td>
<td>20.0</td>
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<tr>
<td>Helena Valley Mean Soil</td>
<td>16.5</td>
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<td>11.5</td>
</tr>
<tr>
<td>Missoula Lake Bed Sediments</td>
<td>NA</td>
<td>0.2</td>
<td>34.0</td>
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<tr>
<td>Blackfoot River</td>
<td>4.0</td>
<td>&lt;0.1</td>
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<tr>
<td>Phytotoxic Concentration</td>
<td>100.0</td>
<td>100.0</td>
<td>1000</td>
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**Explanation**

Below Detection Limit is ---

Not analyzed equals NA
Table 2.5-3. Element screen for tailings and dump samples for the major mines in the Coeur d'Alene basin surrounding the Coeur d'Alene mining district (continued).

<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>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>K08279702</td>
<td>Carlisle (WL-159), tailings, middle impoundment</td>
<td>NA</td>
<td>110.00</td>
<td>85</td>
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<td>130</td>
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<td>16.00</td>
<td>1,200</td>
<td>6.1</td>
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<td>K08279703</td>
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<td>NA</td>
<td>82.00</td>
<td>35</td>
<td>2.40</td>
<td>16.0</td>
<td>64</td>
<td>34,000</td>
<td>920</td>
<td>1,100.0</td>
<td>NA</td>
<td>12.00</td>
<td>200</td>
<td>4.9</td>
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<td>K08279713</td>
<td>Red Monarch (WL-179), oxidized dump</td>
<td>NA</td>
<td>99.00</td>
<td>54</td>
<td>3.50</td>
<td>21.0</td>
<td>59</td>
<td>49,000</td>
<td>630</td>
<td>1,600.0</td>
<td>NA</td>
<td>20.00</td>
<td>160</td>
<td>4.2</td>
</tr>
<tr>
<td>K08289701</td>
<td>Blue Sky (WL-197), dumps 1 and 2</td>
<td>NA</td>
<td>170.00</td>
<td>180</td>
<td>8.10</td>
<td>24.0</td>
<td>97</td>
<td>146,000</td>
<td>7,600</td>
<td>2,800.0</td>
<td>NA</td>
<td>39.00</td>
<td>1,100</td>
<td>4.1</td>
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<td>Carlisle (WL 159), waste dump</td>
<td>NA</td>
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<td>42</td>
<td>15.00</td>
<td>28.0</td>
<td>90</td>
<td>43,000</td>
<td>2,100</td>
<td>1,200.0</td>
<td>NA</td>
<td>47.00</td>
<td>3,800</td>
<td>7.2</td>
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<td>R07319704</td>
<td>Blue Goose (SP-93), dump</td>
<td>NA</td>
<td>83.00</td>
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<td>3.30</td>
<td>29.0</td>
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<td>39,000</td>
<td>82</td>
<td>550.0</td>
<td>NA</td>
<td>32.00</td>
<td>100</td>
<td>4.9</td>
</tr>
<tr>
<td>R08079706</td>
<td>Lucky Boy (SP-296), dump</td>
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<td>85.00</td>
<td>110</td>
<td>2.70</td>
<td>12.0</td>
<td>45</td>
<td>21,000</td>
<td>120</td>
<td>640.0</td>
<td>NA</td>
<td>23.00</td>
<td>250</td>
<td>7.9</td>
</tr>
<tr>
<td>R72296004</td>
<td>Gray Wolf (SP-106), dump</td>
<td>NA</td>
<td>1,000.00</td>
<td>75</td>
<td>5.30</td>
<td>51.0</td>
<td>170</td>
<td>61,000</td>
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<td>4.1</td>
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<tr>
<td>R72297002</td>
<td>Caribou (SP-99), waste dump, Adit #3</td>
<td>NA</td>
<td>190.00</td>
<td>85</td>
<td>4.60</td>
<td>39.0</td>
<td>53</td>
<td>44,000</td>
<td>140</td>
<td>390.0</td>
<td>NA</td>
<td>20.00</td>
<td>200</td>
<td>4.4</td>
</tr>
<tr>
<td>R72297008</td>
<td>Silver Tip Mine (SP-111), dump, composite sample</td>
<td>NA</td>
<td>2,500.00</td>
<td>47</td>
<td>7.10</td>
<td>17.0</td>
<td>130</td>
<td>77,000</td>
<td>1,100</td>
<td>280.0</td>
<td>NA</td>
<td>20.00</td>
<td>420</td>
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Clark Fork Superfund BG Levels (mg/Kg) = ppm

<table>
<thead>
<tr>
<th></th>
<th>As</th>
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<th>Pb</th>
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<tbody>
<tr>
<td>U.S. Mean Soil</td>
<td>6.7</td>
<td>0.7</td>
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</tr>
<tr>
<td>Helena Valley Mean Soil</td>
<td>16.5</td>
<td>0.2</td>
<td>11.5</td>
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<tr>
<td>Missoula Lake Bed Sediments</td>
<td>NA</td>
<td>0.2</td>
<td>34.0</td>
</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>
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</table>

Explanation

Below Detection Limit is --

Not analyzed equals NA
Table 2.5-4. Toxicity Characteristic Leaching Procedure results for tailings and dump samples from the major properties in the Coeur d'Alene River basin surrounding the Coeur d'Alene mining district (excluding the drainages of Prichard and Eagle Creeks).

<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>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7179701</td>
<td>Charles Dickens (SP-119), main waste dump, jig tailings</td>
<td>---</td>
<td>0.073</td>
<td>0.031</td>
<td>13.000</td>
<td>ND</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>2.3</td>
</tr>
<tr>
<td>B7179702</td>
<td>Charles Dickens (SP-119), Dump #4, flotation tailings</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>30.000</td>
<td>ND</td>
<td>---</td>
<td>---</td>
<td>0.260</td>
<td>3.0</td>
</tr>
<tr>
<td>B7189703</td>
<td>St. Joe No. 4 (SP-147), dump</td>
<td>---</td>
<td>0.041</td>
<td>---</td>
<td>12.000</td>
<td>ND</td>
<td>---</td>
<td>---</td>
<td>0.190</td>
<td>2.5</td>
</tr>
<tr>
<td>B7299702</td>
<td>National Copper #2 (WL-367), dump</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>1.800</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>3.300</td>
<td>8.1</td>
</tr>
<tr>
<td>B7299704</td>
<td>Copper King (WL-345/318), dump</td>
<td>---</td>
<td>0.059</td>
<td>---</td>
<td>4.800</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.790</td>
<td>6.4</td>
</tr>
<tr>
<td>B7299706</td>
<td>National Copper (WL-367), middle workings, lower dump</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>9.100</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>1.100</td>
<td>5.4</td>
</tr>
<tr>
<td>B8059705</td>
<td>Reindeer Queen (WL-460), dump</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.850</td>
<td>8.2</td>
</tr>
<tr>
<td>B8309702</td>
<td>Pony Gulch (WL-125), mill tailings</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>53.000</td>
<td>0.0053</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>4.0</td>
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<tr>
<td>K07249707</td>
<td>Silver Strand (SP-54), Adit #1, dump</td>
<td>---</td>
<td>0.025</td>
<td>---</td>
<td>---</td>
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<td>---</td>
<td>1.800</td>
<td>7.4</td>
</tr>
<tr>
<td>K08059704</td>
<td>National Mine (SP-286), waste dump</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.400</td>
<td>3.1</td>
</tr>
<tr>
<td>K08059705</td>
<td>National Mine (SP-286), unoxidized</td>
<td>---</td>
<td>---</td>
<td>---</td>
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<td>---</td>
<td>---</td>
<td>---</td>
<td>1.300</td>
<td>7.7</td>
</tr>
<tr>
<td>K08199702</td>
<td>St Joe #4 (SP-147), dump, oxidized</td>
<td>---</td>
<td>0.029</td>
<td>---</td>
<td>10.000</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.120</td>
<td>2.2</td>
</tr>
<tr>
<td>K08199706</td>
<td>St Joe #2 (WL-202), oxidized</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.420</td>
<td>3.8</td>
</tr>
</tbody>
</table>

**EXPLANATION**

Blank space equals no analysis

Not Detected is ND

Below Detection Limit is ---

**WATER QUALITY STANDARDS**

<table>
<thead>
<tr>
<th></th>
<th>As (mg/L)</th>
<th>Cd (mg/L)</th>
<th>Cr (mg/L)</th>
<th>Pb (mg/L)</th>
<th>Hg (mg/L)</th>
<th>Se (mg/L)</th>
<th>Ag (mg/L)</th>
<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>0.05</td>
<td></td>
<td>2.000</td>
</tr>
<tr>
<td>Secondary MCL</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.1</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>0.0024</td>
<td>0.0041 - 0.0134</td>
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<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>0.000012</td>
<td></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>0.50</td>
<td>0.0017</td>
<td>0.65</td>
<td>0.27</td>
<td>0.05</td>
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</table>
Table 2.5-4. Toxicity Characteristic Leaching Procedure results for tailings and dump samples from the major properties in the Coeur d'Alene River basin north of the Coeur d'Alene mining district (continued).

<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>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>K08199707</td>
<td>St Joe #2 (WL-202), unoxidized</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>1.200</td>
<td>8.1</td>
</tr>
<tr>
<td>K08199710</td>
<td>St Joe #3 (SP-147), composite</td>
<td>---</td>
<td>0.090</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.480</td>
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<td>K08279701</td>
<td>Carlisle (WL-159), tailings, lower impoundment</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>32.000</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.310</td>
<td>4.7</td>
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<tr>
<td>K08279702</td>
<td>Carlisle (WL-159), tailings, middle impoundment</td>
<td>---</td>
<td>---</td>
<td>0.023</td>
<td>---</td>
<td>1.800</td>
<td>---</td>
<td>---</td>
<td>1.100</td>
<td>6.1</td>
</tr>
<tr>
<td>K08279703</td>
<td>Carlisle (WL-159), tailings, upper impoundment</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>2.700</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.430</td>
<td>4.9</td>
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<tr>
<td>K08279713</td>
<td>Red Monarch (WL-179), oxidized</td>
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<td>---</td>
<td>---</td>
<td>3.700</td>
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<td>---</td>
<td>0.360</td>
<td>4.2</td>
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<tr>
<td>K08289701</td>
<td>Blue Sky (WL-197), dumps 1&amp;2</td>
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<td>---</td>
<td>---</td>
<td>16.000</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.340</td>
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<tr>
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<td>Carlisle (WL-159), dump</td>
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<td>0.160</td>
<td>0.067</td>
<td>9.100</td>
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<td>---</td>
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<td>R07319704</td>
<td>Blue Goose (SP-93), dump</td>
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<td>R08079706</td>
<td>Lucky Boy (SP-296), dump</td>
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<td>---</td>
<td>---</td>
<td>---</td>
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<td>---</td>
<td>---</td>
<td>1.300</td>
<td>7.9</td>
</tr>
<tr>
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<td>Grav Wolf (SP-106), dump</td>
<td>---</td>
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<td>---</td>
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<td>---</td>
<td>---</td>
<td>---</td>
<td>0.250</td>
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<tr>
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<td>---</td>
<td>0.026</td>
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<td>---</td>
<td>0.440</td>
<td>4.4</td>
</tr>
<tr>
<td>R72297008</td>
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<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.320</td>
<td>3.5</td>
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**EXPLANATION**
- Blank space equals no analysis
- Not Detected is ND
- Below Detection Limit is ---

**WATER QUALITY STANDARDS**

<table>
<thead>
<tr>
<th></th>
<th>As (mg/L)</th>
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<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>
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</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>0.05</td>
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<tr>
<td>Secondary MCL</td>
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<td>0.1</td>
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<tr>
<td>Aquatic Life, Acute</td>
<td>0.360</td>
<td>0.004 - 0.009</td>
<td>1.7 - 3.1</td>
<td>0.082 - 0.2</td>
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<td>0.003 - 0.008</td>
<td>0.000012</td>
<td>0.00012</td>
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</tr>
<tr>
<td>Estimated Detection Level (33% confidence)</td>
<td>0.49</td>
<td>0.02</td>
<td>0.03</td>
<td>0.50</td>
<td>0.0017</td>
<td>0.65</td>
<td>0.27</td>
<td>0.05</td>
</tr>
</tbody>
</table>
3.0 SITE DESCRIPTIONS

3.1 CARLISLE MINE (Site No. WL-159)

3.1.1 Site Location and Access (Figure 2.1-1c)

The Carlisle property consists of a mine, a millsite, and three tailings impoundments (Figure 3.1-1). The mine is about ½ mile up Carbon Creek from Beaver Creek on the north side of the drainage in the NE¼ of the SE¼ of section 25. The millsite is in the NW¼ of the SE¼ of section 25. It is downstream from the mine and several hundred feet upstream from the mouth of Carbon Creek. The tailings impoundments are along Beaver Creek downstream from the confluence of Carbon Creek and Beaver Creek, and are in the SW¼ of section 25. All parts of the property are on the Osburn 7.5-minute quadrangle in T. 49 N., R. 4 E. Figure 3.1-2 is a sketch showing the relationship of the mine, mill, and tailings impoundments. All of the property is on patented claims, but Forest Service land downstream on Beaver Creek could be impacted by water or rock materials originating from the Carlisle property.

The access road to the property is privately owned. It exits to the east from the north side of Forest Primary Route 456 (Beaver Creek-Dobson Pass Road), about ¼ mile south of where the road crosses Beaver Creek. The tailings impoundments are about 1 mile up the access road. The mill is about ½ mile beyond the tailings, although the road is washed out at the mouth of Carbon Creek. The mine is another ¼-½ mile upstream from the mill and now is accessible only on foot.

3.1.2 Geologic Features (Figure 2.2-1b)

The Carlisle workings are entirely in argillite and quartzose argillite of the Prichard Formation (Hobbs and others, 1965, Plate 4). The workings extend for about 1 mile, first northeasterly and then southeasterly, until they reach the northwestern end of the Interstate-Callahan Mine. Several veins are shown on the map of the workings, but neither the mine nor the character of the veins is discussed in the text.

3.1.3 Site History

In 1915, a considerable body of lead-zinc ore was developed at the Ray Jefferson (the original name of the Carlisle), and plans were made to build a 250-ton mill. A branch railroad connecting with the Murray branch of the Oregon-Washington Railroad and Navigation Co. railway was also being planned. In 1916, a 400-ton mill, which included flotation equipment, was completed. Some ore was processed, but the concentrate was stored awaiting completion of the Beaver branch of the railroad. Shipments of both crude ore and concentrates were made in 1917 and 1918 from the Ray Jefferson Mine. In 1930, a little tunnel work was reported by the Ray Jefferson Mining Co. In December 1940, the Monitor Mining Company formed by consolidating the assets of the Ray Jefferson, Blue Grouse, and Amazon-Manhattan Mining Companies. (The latter two companies owned property adjacent to the Ray Jefferson Mine.) The new company apparently changed the mine name from Ray Jefferson to Carlisle.
The Carlisle was operated by Monitor Mining between 1944 and 1947. Starting in the fall of 1942, Monitor developed its four largest ore bodies, all of which were low grade and could not have been mined profitably without price premiums on lead and zinc. In 1944, the output from the combined Amazon-Carlisle-Portland groups was 77,003 tons of ore, which averaged 1.05 ounces of silver per ton, 2.48 percent lead, and 5.82 percent zinc. The ore was treated in the Hercules, Dayrock, and Carlisle flotation mills. The output for 1944 was more than double that in 1943, but labor shortages prevented full production. Despite the manpower shortage, substantial reserves of low-grade ore were proven in the Amazon and Carlisle workings. In 1945, production was 77,555 tons of ore, averaging 0.97 ounce of silver to the ton, 2.49 percent lead, and 5.44 percent zinc, which was treated in the Hercules, Dayrock, and Carlisle mills. Production in 1945 increased slightly over that in 1944, but labor shortages prevented the expansion that had been expected a year earlier. In August 1945, the Monitor Mining Co. purchased the Interstate group from the Callahan Zinc Lead Co. The lower part of the Interstate, under water for more than 20 years, was to be pumped out and connected to the Carlisle mill level by approximately 1,800 feet of drifting. In 1946, production declined to 48,608 tons of ore, averaging 0.97 ounce of silver to the ton, 2.21 percent lead, and 6.16 percent zinc. Development and exploration focused on rehabilitating and connecting the Interstate Mine with the Amazon and Carlisle workings. Known ore reserves, although relatively low in grade, remained substantial. In 1947, Monitor Mining operated the Amazon, Carlisle, and Interstate mines and processed 63,730 tons of zinc-lead ore at the Carlisle and Hercules mills. In October 1947, Monitor Mining and eleven other companies were consolidated to form Day Mines, Inc.

In 1948, Day Mines produced 92,989 tons of ore, containing an average of 0.71 ounce of silver to the ton, 1.74 percent lead, and 4.81 percent zinc, from the Amazon-Carlisle groups. The ore was treated in the Carlisle 500-ton flotation mill. The Carlisle Mine below the 2,800 main haulage level yielded only low-grade ore, and its operation was terminated at the end of the year. The Amazon-Carlisle-Interstate-Silver Tip groups produced 94,588 tons of zinc-lead ore in 1949. The ore was treated in the Carlisle mill. Ore breaking at the Amazon-Carlisle group ceased August 31 due to the low prices of lead and zinc. In 1950, the Monitor group (Carlisle, Interstate, Silver Tip, and Amazon) was worked by the Day Mines in January and in July through December. The zinc-lead ore was treated in the Carlisle mill. The Monitor group was the largest producer in the Beaver district in 1951. The mine was operated throughout the year, and the ore was treated in the Carlisle 300-ton mill. Much of the production was zinc ore from the Amazon vein. Day Mines terminated operations at the Monitor group and the Carlisle mill on November 30, 1952, because of low metal prices.

3.1.4 Environmental Conditions

3.1.4.1 Site Features

The Carlisle was visited by John Kauffman on August 27, 1997. A video segment describing the tailings impoundments, mill, and mine are on the Coeur d'Alene Basin Videotape (Tape 1, index 0:15:28-0:47:58). Documenting photographs are: tailings impoundments – Roll K8, frames 24-26, Roll K9, frame 1; millsite – Roll K9, frames 2-5 and 8-9; mine – Roll K9, frames 6-7.
The Carlisle adit (Figure 3.1-3) was driven northeastward into the hill on the north side of Carbon Creek near creek level. The adit is caved about 12-15 feet behind the portal but may have small openings through the caved material. Some of the portal timbers remain upright, although most are partially rotted and leaning. A significant amount of water is flowing from the adit, estimated at 20-30 gpm (or possibly more). The flow from the adit is nearly equal to the amount of water in Carbon Creek upstream from the adit. Strands of green algae and lesser amounts of brownish algae appear to thrive in the adit water. Algae can be found downstream in Carbon Creek as far as the millsite. A large waste dump extends out from the adit about 800 feet along the south side of the creek (Figure 3.1-4). The width varies from 30-50 feet wide but averages about 35 feet wide. The dump tapers from about 50 feet thick at the toe end to less than 10 feet near the adit. Near the adit, Carbon Creek crosses the dump and flows along the bottom edge of the dump for its entire length. In places, the creek cuts into the dump. The surface of the dump supports some grass and a few small trees, but otherwise is clear of vegetation.

Lumber and metal debris from a collapsed structure are scattered on the upper end of the dump about 75-100 feet from the adit on the south side of the creek. Several concrete blocks and slabs are located along the north side of the creek, also about 75-100 feet west of the adit. These probably supported equipment. A considerable amount of scrap metal, boards, and concrete debris is scattered around the site. Near the middle of the south edge of the waste dump is a possible ore chute or other structure. Although partly collapsed, this structure, which is roughly 10 feet by 10 feet square, was built between the top of the dump and an old access road 10-15 feet above the dump level. Extending along contour from the adit to the top of the mill, about ¼ mile to the west, is a tramway or railway. Most of the rails have been removed or tossed over the hillside, and only a few of the ties remain intact. The disturbed area covers 2-3 acres.

The Carlisle Mill (Figure 3.1-5) is on Carbon Creek about ¼ mile below the mine and just above the confluence of Beaver Creek and Carbon Creek. The entire lower portion of the mill has collapsed or been razed. Only the concrete foundation and scattered boards, timbers, scrap metal, and other debris remain. Several seeps or springs emerge from beneath the mill foundation. These seeps may be water from Carbon Creek that drains under the foundation or they may be springs originating from the hillside. The uppermost portion of the mill, including the ore chutes and a trestle from the mine tram (Figure 3.1-6), is mostly intact, although in disrepair.

Above the west end of the trestle is a large, circular, slightly concave concrete slab (Figure 3.1-7). This slab, 15-20 feet in diameter, may have supported a water tank or, more probably, it acted as a rainwater catchment. This is indicated by several holes on its surface and what appears to be a drain under the slab on the south side. Directly uphill from the mill on the ridge top is a small shed about 6 feet by 6 feet square. Boards laid on the surface of the slope below the shed, along with large-diameter cable, indicate that this may have been a winch operator’s shed. Several hundred feet downstream from the mill on the northeast side of the junction of Carbon and Beaver creeks is a concrete foundation (about 15-20 feet by 30 feet), along with some debris from the structure.
Upstream from the mill, the bed of Carbon Creek is strewn with coarse rock rubble; downstream, the creek has cut notches through coarse mill tailings (Figure 3.1-8). These are presumably jig tailings that filled at least the north side of the valley, if not the entire valley, to a depth of about 6-8 feet. Mounds of tailings are found along Carbon Creek from the mill to the confluence with Beaver Creek and, to some extent, along Beaver Creek downstream to the site of the flotation tailings impoundments. Most of the material along Beaver Creek has been leveled and reworked during floods. The disturbed area covers about 2-3 acres, including the mill, the downstream foundation, and the mounds of tailings along the creek.

The flotation tailings impoundments are ¼-½ mile downstream from the mill on the south side of Beaver Creek. The area of the impoundments is outlined on the Osburn 7.5-minute topographic quadrangle. There are three separate impoundments, which step down from northeast to southwest. Terminal and lateral dikes contain each impoundment. Estimates were made of the volume of tailings in the impoundments, but systematic drilling and sampling are needed to properly characterize the volume and metal content of these tailings.

The upper impoundment is about 400 feet by 400 feet, but is slightly triangular in shape with the narrow end to the northeast. The material is fine, typically silt size, and gray, tan, or yellow in color. A somewhat sparse stand of conifers 2-10 feet in height covers the surface of the impoundment. The thickness of the tailings was not determined, but the terminal dike (Figure 3.1-9) is about 20 feet above the level of the middle impoundment. The dike surface is covered with tailings material, possibly from overflow of the upper impoundment into the middle impoundment. An estimated minimum volume of tailings in this impoundment is 89,000 cubic yards of material.

The middle impoundment (Figure 3.1-10) is about 300 feet by 700-800 feet, with its long axis perpendicular to the valley. The fine material is light gray in color. Vegetation is very sparse, consisting of patchy bushes and a few small trees on the south and west portions and of marsh grasses on the northeastern portion. A few birch or aspen and several conifers, all about 20 feet in height, grow along the base of the upper impoundment dike on the surface of the middle impoundment. Near the southeastern edge of the impoundment, next to the base of the upper impoundment dike, is a circular pool of water (Figure 3.1-11) about 15 feet in diameter that may have been formed by a subsurface spring. The pool is funnel-shaped and at least 8-10 feet deep, although the bottom could not be seen. The water is very clear and is deep blue toward the center of the pool. A line of conifers on the southwestern edge marks the location of the middle impoundment dike. This dike is about 10-15 feet above the level of the lower impoundment. An estimated minimum volume of tailings in this impoundment is 83,300 cubic yards of material.

The lower impoundment is shaped like a “P” with the head area to the north. This part of the impoundment is nearly circular and about 200 feet in diameter. The yellow-orange tailings in this area are almost completely bare. The southern, tail portion is about 350 feet by 75 feet, with the long dimension perpendicular to the valley. This material is light tan to gray, and numerous small-to moderate-size conifers grow on it. An estimated minimum volume of tailings in this impoundment is 10,700 cubic yards of material.
All three impoundment areas are separated from Beaver Creek by their lateral dikes. These dikes all appear to be fairly well stabilized and relatively unaffected by floods in Beaver Creek. The creek bed has some tailings-like material in places, but these fines most likely came from the jig tailings below the mill rather than from the impounded tailings. The tailings impoundments cover about 10-15 acres.

3.1.4.2 Sample Locations

3.1.4.2.1 Soil

At the mine, a grab sample was taken from several locations along the side of the waste dump (K08279706). Tailings material was collected from each of the three impoundments. A grab sample was taken from several locations on the upper impoundment (K08279703). Light-gray material was sampled near the northwest end of the middle impoundment (K08279702). A sample was taken from the center of the circular portion of the lower impoundment (K08279701).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K08279701</td>
<td>lower tailings impoundment</td>
<td>Yes</td>
</tr>
<tr>
<td>K08279702</td>
<td>middle tailings impoundment</td>
<td>Yes</td>
</tr>
<tr>
<td>K08279703</td>
<td>upper tailings impoundment</td>
<td>Yes</td>
</tr>
<tr>
<td>K08279706</td>
<td>mine waste dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.1.4.2.2 Water

An adit water sample was taken near the portal (K08279707) and an upstream water sample (K08279708) was taken from Carbon Creek about 100 feet upstream from the portal. A downstream water sample (K08279705) was taken from Carbon Creek about 200 feet upstream from the mill. Another water sample was taken from Carbon Creek about 150-200 feet downstream from the mill (K08279709). A water sample also was collected from the pool on the middle impoundment (K08279704).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
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<tbody>
<tr>
<td>K08279704</td>
<td>pond on tailings</td>
<td>80 μs</td>
<td>60</td>
<td>6.67</td>
<td>---</td>
<td>Yes</td>
</tr>
<tr>
<td>K08279705</td>
<td>Carbon Creek, down-</td>
<td>132 μs</td>
<td>55</td>
<td>6.85</td>
<td>5 ft. wide, 0.5 ft. deep</td>
<td>Yes</td>
</tr>
<tr>
<td>K08279707</td>
<td>Carlisle adit</td>
<td>210 μs</td>
<td>49</td>
<td>7.3</td>
<td>20-30</td>
<td>Yes</td>
</tr>
<tr>
<td>Sample No.</td>
<td>Location</td>
<td>Specific Conductivity</td>
<td>Temperature (°F)</td>
<td>pH</td>
<td>Flow (gpm)</td>
<td>Analyzed (Yes/No)</td>
</tr>
<tr>
<td>------------</td>
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<td>-------------------</td>
</tr>
<tr>
<td>K08279708</td>
<td>Carbon Creek, upstream from adit</td>
<td>49µs</td>
<td>53</td>
<td>7.65</td>
<td>4 ft. wide, 0.5 ft. deep</td>
<td>Yes</td>
</tr>
<tr>
<td>K08279709</td>
<td>Carbon Creek, downstream from mill</td>
<td>125µs</td>
<td>55</td>
<td>6.75</td>
<td>---</td>
<td>No</td>
</tr>
</tbody>
</table>

### 3.1.4.2.3 Analytical Results

**Soil Samples**  (Tables 2.5-3 and 2.5-4)

In the element screen, the Carlisle waste dump sample (K08279706) contains levels of arsenic (130 ppm), cadmium (15 ppm), copper (90 ppm), iron (4.3 percent), and zinc (3,800 ppm) in excess of established background values (Tables 1.5-3 and 1.5-4) or environmental standards (Table 1.5-5). The three tailings impoundments also have values that exceed background and environmental standards for arsenic, cadmium, copper, lead, and zinc. The upper impoundment (K08279703) values are: arsenic, 82 ppm; cadmium, 2.4 ppm; copper, 64 ppm; lead, 920 ppm; and zinc, 200 ppm. The middle impoundment (K08279702) values are: arsenic, 110 ppm; cadmium, 4.9 ppm; copper, 130 ppm; lead, 1,100 ppm; and zinc, 1,200 ppm. The lower tailings impoundment sample (K08279701) values are: arsenic, 94 ppm; cadmium, 2.5 ppm; copper, 45 ppm; lead, 3,000 ppm; and zinc, 250 ppm; it also has a slightly elevated iron content (4.3 percent).

In the TCLP for metals screen, samples K08279702 and K08279706 show significant leaching for cadmium and lead. Samples K08279701 and K08279703 show significant leaching for lead.

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

On both the dissolved and total metals screens, the water sample from the Carlisle adit (K08279707) exceeds all EPA standards for cadmium and zinc. The dissolved metals screen exceeds the Secondary MCL for manganese. The test for lead exceeds the Aquatic Life Chronic value.

On both the dissolved and total metals screens, the water sample downstream from the adit, but upstream from the mill (K08279705), exceeds all standards for cadmium and both Aquatic Life standards for zinc. It should be noted, however, that the dissolved metals screen on the sample upstream from the adit (K08279708) exceeds the Aquatic Life Chronic value for cadmium and both Aquatic Life standards for zinc. For the total metals screen, the upstream sample exceeds all standards for cadmium and both Aquatic Life standards for zinc, probably the result of other mines further up Carbon Creek which are not on Forest Service land.
The dissolved metals screen on the sample collected from the small pool on the middle impoundment (K08279704) exceeds the Aquatic Life Chronic values for cadmium and both Aquatic Life standards for zinc, whereas the total metals screen exceeds all standards for cadmium and iron, the Primary MCL for chromium, both Aquatic Life standards for copper and zinc, and the Secondary MCL for manganese. The test for lead exceeds the Aquatic Life Chronic values.

3.1.5 Structures

The upper portion of the mill, the associated trestle, and the winch operator’s shed are the only structures that remain standing, although they are in disrepair. Also present are the foundations of the mill, the circular convex concrete slab, the foundation of an undetermined structure downstream from the mill, the collapsed structure on the upper end of the dump, the remnants of a possible ore chute near the middle of dump, and the concrete pillars or slabs west of the adit.

3.1.6 Safety

The millsite presents the greatest potential hazard. The upper portion of the mill or the trestle could collapse. Most of the supporting timbers are in poor condition, and some are leaning or broken. Nails, sheet metal, and other debris are a potential hazard for cuts or punctures. Although the adit is caved, the timbered portal is open for 10-15 feet. These timbers are leaning and could collapse.
Figure 3.1-1. Topographic map of the Carlisle Mine, Shoshone County, Idaho (U.S. Geological Survey Osburn 7.5-minute topographic map).
Figure 3.1-2. Sketch map of the Carlisle Mine, millsite, and tailings impoundments.
Figure 3.1-3. Portal timbers of the collapsed adit at the Carlisle Mine, looking east. Algae is growing in the water flowing from adit (Roll K9, frame #6).
Figure 3.1-4. Looking west down Carbon Creek from the adit, with the waste dump on the left and railway to the mill on the right (Roll K9, frame #7).
Figure 3.1-5a. West section of a panorama of the Carlisle mill, looking north (Roll K9, frame #4).
Figure 3.1-5b. Center section of a panorama of the Carlisle mill, looking north (Roll K9, frame #3).
Figure 3.1-5c. East section of a panorama of the Carlisle mill, looking north (Roll K9, frame #2).
Figure 3.1-6. Looking south or southeast at the trestle on the west end of the mill (Roll K9, frame #9).

Figure 3.1-7. Circular concrete pad at the west end of the trestle above the mill. This pad was possibly used to collect rain water (Roll K9, frame #8).
Figure 3.1-8. Looking west down Carbon Creek from the concrete mill foundation. The drainage cuts through tailings deposits, which are visible on both sides of the creek (Roll K9, frame #5).

Figure 3.1-9. Terminal dike of the upper tailings impoundment, with the middle tailings impoundment below the dike on the right (Roll K8, frame #26).
Figure 3.1-10a. Left half of a panorama of the middle tailings impoundment. The view in this photograph is to the southwest (Roll K8, frame #25).

Figure 3.1-10b. Right half of a panorama of the middle tailings impoundment. This view is looking to the west (Roll K8, frame #24).
Figure 3.1-11. Small pond on the middle tailings impoundment, as seen from the dike on the upper impoundment. The view is toward the southwest (Roll K9, frame #1).
3.2 EMPIRE COPPER MINE (Site No. SP-87)
Alternative names—Linfor Copper, Horst-Powell Mine, Horse Powell Mine.

3.2.1 Site Location and Access (Figure 2.1-1a)

The Empire Copper Mine is in the N½ of the SE¼ of the NW¼ of section 3, T. 49 N., R. 1 E., on the Bumblebee Peak 7.5-minute quadrangle (Figure 3.2-1). The mine is on the steep south side of the North Fork of the Coeur d'Alene River and, at the present time, there is no road to the property. Access was attained by wading the North Fork northeast of the site and hiking along the slope about ¼ mile. Forest Service Road 209 follows along the north side of the North Fork. The property is on National Forest land.

3.2.2 Geologic Features (Figure 2.2-1a)

According to Umpleby and Jones (1923, p. 115):
North of Coeur d'Alene River copper-bearing siderite veins are most abundant in the drainage basin of the Little North Fork [now known as the North Fork of the Coeur d'Alene River]. . . . The principal producer, however, the Empire Copper Co., exploits a vein on Little North Fork just east of the county line. These veins . . . trend in general northwest, and most of them appear to have been formed incidentally to northwest faulting. The Empire Copper vein is inclosed principally in the Revett quartzite. . . .

The vein on the Empire group strikes N. 54° W. and dips 53° SW. It was discovered in 1886 but was little exploited until recently. In 1916 five carloads of ore carrying 20 per cent of copper were shipped and a mill with a capacity of 150 tons a day was built. The vein is about 12 feet wide and consists principally of quartz and siderite, with chalcopyrite and pyrite as the metallic sulphides. The better ore contains about 50 per cent of copper and occurs in a shoot 40 feet long near a premineral fissure which trends northeast. The average content of the lode is said to be about 1½ per cent of copper. The ore is oxidized to a depth of 100 feet, with the development of malachite, azurite, cuprite, bornite, and rare chalcocite. Iron oxides are abundant, but there is little manganese.

3.2.3 Site History

As noted above, the property was discovered in 1886. Two of the five claims were patented before 1914, and the property was being worked by lessees Messrs. Devlin and Page of Wardner (IGS mineral property files). The first tunnel on the property was the Carbonate drift, which was about 30 feet uphill from the second tunnel, the Blacksmith tunnel or 100-foot level. The shaft was originally sunk from the Blacksmith tunnel, but was raised to the surface when the mill was constructed (Callaway, 1917). The Empire Copper Company apparently held the property under bond from 1915 to 1917. In 1915, ore averaging about 5 percent copper was developed at the
mine, and several shipments to the Tacoma smelter were made for testing purposes. The mill was built in 1916 (Umpleby and Jones, 1923), and copper concentrates were shipped during the year. According to Shenon (1944), the grade of material shipped between October 1916 and October 1917 was: crude ore, 4.25 percent; and concentrates, 17 percent. The mine and mill were operated during the first part of 1917, but a power failure allowed the mine to flood late in the year (Featherstone, 1943). Callaway (1917) noted that a large fault cut off the ore on each of the lower levels of the mine. Linfor Copper Company, organized in 1919, held the property until 1944. During most of that period, the only activity at the mine was annual assessment work on the unpatented claims. In 1937, lessees cleaned up and shipped some old concentrate. In June 1942, the property was reported as leased to Harry Scott and Roy Lance of Wallace (IGS mineral property files), but later in the year, George Austin held the lease (Featherstone, 1943). A $5,000 Reconstruction Finance Corporation loan was granted to Austin in November 1942 to dewater the mine. When the dewatering was complete in January 1943, the mine was examined by engineers from Federal Mining and Smelting Co., the Reconstruction Finance Company, the U.S. Geological Survey, and the U.S. Bureau of Mines. The mine had five principal levels, a 370-foot inclined shaft (which claimed the life of one of the examiners), and about 1,500 feet of drifts and crosscuts. All known ore of "better grade" had been mined (Shenon, 1944). Sampling of the remaining ore gave grades estimated at about 2 percent (Featherstone, 1943) and about 0.5 percent (Shenon, 1944). The operator suspended operations shortly after this examination and allowed to mine to refill with water (Featherstone, 1943). In 1944, Linfor Copper Co. reported that it had disposed of the property. Nothing further is known of activities at the mine.

3.2.4 Environmental Conditions

3.2.4.1 Site Features

The Empire Copper Mine was visited by John Kauffman on August 18, 1997. A video segment describing the site is on the Coeur d'Alene Basin Videotape (Tape 1, index 0:47:58-1:04:43). Documenting photos are Roll K6, frames 5-13.

Four adits, a shaft, and the remains of a mill were located at this property. Two of the adits and the shaft are open. The other two adits are completely caved.

Adit No. 1 (Figure 3.2-2), probably the Blacksmith tunnel, is at the base of the slope and is about 20 feet above river level. However, the river is some distance to the north and could not be seen from the adit. The adit was driven southeast into the hill and has a partial opening that slants at about 40°. Cool air blowing from the adit indicates a connection with the shaft. The waste dump for this adit has an irregular surface and is overgrown with saplings and other brush. It was built out flat from the adit for about 20 feet and is about 10 feet thick; the length is about 40 feet. Separate from and north of this main waste dump is a conical pile of oxidized, mineralized rock that is somewhat flat on top and about 20 feet in diameter at the base. A concrete footing, about 10 feet square, at the west end of the main dump may have supported a compressor or generator.
Adit No. 2 (Figure 3.2-3), which is probably the Carbonate drift, is 30-50 feet above Adit No. 1. The opening is 5 feet high by 4 feet wide. As with Adit No. 1, cool air issues from the opening. There is no waste dump associated with this adit.

What is presumed to be Adit No. 3 is at the top of the old millsite about 75-100 feet above Adit No. 2. Its presence is indicated by a shallow notch on the slope that gives the impression of a caved adit. It is also possible that the depression was related to the excavation for the mill or to its operation. Again, no dump was apparent.

The shaft is located about 30 feet west of the top of the mill in moderately thick brush (Figure 3.2-4). The opening is about 10 feet square and descends at a 60° angle. As evidenced by the cool air at Adits No. 1 and No. 2, this shaft probably is open for 100-150 feet. No dump is associated with the shaft. The material was most likely processed through the mill.

Adit No. 4 is located 250-300 feet northeast of the mill and the shaft. It is at about the same elevation as the shaft, probably 200 feet above the river. This adit appears to have been a short prospect tunnel. It is caved and has a depression on the slope over the caved portion (Figure 3.2-5). The waste dump is about 20 feet long by 15 feet wide by 15 feet thick and has numerous saplings growing on the surface (Figure 3.2-6). The face of the dump is covered with ferns that define its boundary.

Although the remains of a mill are present (see Section 3.2.5, below), no obvious mill tailings were found. There is a large, densely vegetated area between the base of the mill and the river that may contain some jig tailings, if any remain. However, it is likely that most of the tailings were discharged directly to the river and washed downstream.

3.2.4.2 Sample Locations

3.2.4.2.1 Soil

The dumps at this site were not sampled.

3.2.4.2.2 Water

No water samples were collected at this site.

3.2.5 Structures

The remains of the collapsed mill are at the site (Figures 3.2-7 and 3.2-8). Four to six concrete footings are spaced along the slope for about 150 feet. Boards and timbers from the structure litter the hillside. A 5-foot-in-diameter steel wheel, which is in the brush west of the base of the mill, may have been part of the crushing equipment. A considerable amount of scrap metal, nails, and other debris are associated with the mill.
3.2.6 Safety

There are several physical hazards at this site, the most significant of which is the open shaft. A person could fall into this large opening, although the shaft is fairly obvious in spite of the brush around it. There are no warning signs, fences, or other indications that the shaft is present.

It would not be difficult to enter the mine through either of the two open adits. Air quality would not be a hazard because of the air flow from the shaft to the adits. However, some of the rock is well fractured and probably unstable, so caving would present a potential hazard. In addition, the shaft extended another 200 or 250 feet below the lower tunnel. The shaft opening could be serious hazard to unwary explorers in either tunnel, and it could be particularly dangerous in the lower tunnel, depending on the level to which the shaft has flooded.

Nails protruding from the boards of the collapsed mill structure have the potential for inflicting puncture wounds.
Figure 3.2-1. Topographic map of the Empire Copper Mine, Shoshone County, Idaho (U.S. Geological Survey Bumblebee Peak 7.5-minute topographic map).
Figure 3.2-2. Partially open Adit No. 1 at the Empire Copper Mine (Roll K6, frame #9).

Figure 3.2-3. Open Adit No. 2 at the Empire Copper Mine, with the oxidized vein visible at the top of the opening (Roll K6, frame #13).
Figure 3.2-4. Open shaft at the Empire Copper Mine. Note the brush screening the opening (Roll K6, frame #7).
Figure 3.2-5. Caved Adit No. 4 at the Empire Copper Mine (behind the large, fallen tree in the foreground). This view is looking to the southeast (Roll K6, frame #5).
Figure 3.2-6. Small waste dump of Adit No. 4, with saplings and small trees growing from the surface (Roll K6, frame #6).

Figure 3.2-7. Collapsed mill at the Empire Copper Mine, with concrete pilings on the left. The view is uphill and to the west (Roll K6, frame #10).
Figure 3.2-8. Looking north along the base of the collapsed mill at the Empire Copper Mine (Roll K6, frame #12).
3.3 ST. JOE QUARTZ PROSPECT (Site Nos. SP-133, SP-147, and WL-202)
Alternative names—St. Joe #1-#4, Royal Mines Corp., Terror Mine, Capparelli Group.

Note: the St. Joe #4 was visited by both Bennett and Kauffman. During Bennett’s initial visit, this adit was thought to be part of the Terror Mine (Site No. SP-133). Later inspection of Plate 4 from Hobbs and others (1965) determined that the “upper adit” of Bennett’s description and video segment is actually the Terror Mine and the “main adit” in his description is really the St. Joe #4. For purposes of this report, the Terror Mine is included under the St. Joe Quartz Prospect description as the “Terror Mine Adit”. Both Bennett’s and Kauffman’s video segments of the St. Joe #4 are included in the accompanying videotape.

3.3.1 Site Location and Access (Figures 2.1-1a and 2.1-1c)

The four St. Joe workings and the Terror Mine (Figure 3.3-1) are all on a group of claims presently held by Mr. Art Capparelli of Osburn, Idaho. The St. Joe #4 is about two miles up Terror Gulch from Interstate 90. The St. Joe #1, #2 and #3 are on an east-west trending tributary of Terror Gulch that joins Terror Gulch at the St. Joe #4. The Terror Mine is on the west side of Terror Gulch several hundred feet north of the St. Joe #4. The St. Joe #4 and the Terror Mine are on the Terror Gulch road. No maintained trail presently exists to the other three St. Joe workings, and they are only accessible on foot from the bottom of the tributary. All of the properties are on unpatented claims within the National Forest boundary.

The St. Joe #1 and #2 (WL-202) are on the Osburn 7.5-minute quadrangle in section 6, T. 48 N., R. 4 E. The St. Joe #1 is in the NW¼ of the NE¼ of section 6. It is on the south slope about 100 feet above the drainage bottom at an elevation of 3,720 feet. The St. Joe #2 is in the NE¼ of the NW¼ of section 6. It is 500-600 feet west of St. Joe #1 at an elevation of 3,600 feet. The adit is on the south side of the drainage near creek level.

The St. Joe #3 and #4 (SP-147) are on the Kellogg East 7.5-minute quadrangle in section 6, T. 48 N., R. 4 E. The St. Joe #3 workings are at the center of the N½ of the NW¼ of section 6, about 700-800 feet east of the St. Joe #4 and over 1,000 feet west of the St. Joe #2. The St. Joe #4 is on the east side of Terror Gulch in the NE¼ of the NW¼ of the NW¼ of section 6.

The Terror Mine adit (SP-133) is about 100 yards north of St. Joe #4 adit. It is on the Kellogg East 7.5-minute quadrangle near the north edge of the NW¼ of the NW¼ of section 6, T. 48 N., R. 4 E.

3.3.2 Geologic Features (Figure 2.2-1a and 2.2-1b)

All the St. Joe workings and the Terror Mine are in the Prichard Formation, which consists of thin- to thick-bedded medium- to dark-gray argillite and quartzose argillite. The beds strike almost north-south and dip steeply to the east or are overturned with steep dips to the west.
Several veins or projections of underground veins are depicted with generally northwesterly strikes and moderate southerly dips (Hobbs and others, 1965, Plate 3). The character of the veins is not known.

3.3.3 Site History

The initial opening on the St. Joe property was probably made around 1908 (Reed, 1943). The St. Joe Lead & Silver Mines Co. was organized in July 1928. By the following year, the lengths of the four tunnels were: No. 1, 800 feet; No. 2, 900 feet; No. 3, 700 feet; and No. 4, 870. Except for assessment work, the company did little work at the mine for the next three decades. The company changed its name to Royal Mines Corporation in 1956. In 1959, Royal began trying to raise money for a drilling program and for extending the No. 4 tunnel. Sufficient funds were apparently raised, and this work was carried out between 1962(?) and 1964. A small amount of ore was shipped to the Bunker Hill mill in 1964.

According to Mr. Capparelli, he and his father have worked these claims for over 50 years. Mr. Capparelli is an excellent source for the history of these properties.

3.3.4 Environmental Conditions

3.3.4.1 Site Features

The four St. Joe properties (Figure 3.3-2) were visited by John Kauffman on August 19, 1997. Video segments describing each is on the Coeur d’Alene Basin Videotape (Tape 1, index 1:04:43-1:24:15). Documenting photos are as follows: St. Joe #1 – Roll K7, frames 4-6; St. Joe #2 – Roll K7, frames 1-3; St. Joe #3 – Roll K7, frames 7-14; and St. Joe #4 – Roll K6, frames 18-25.

The St. Joe #4 was also visited by Earl Bennett on July 18, 1997, although he included it in the Terror Mine (Site No. SP-133) description. The “upper adit” in his description and video segment is the Terror Mine; the “main” Terror Mine adit he describes is actually the St. Joe #4 (Hobbs and others, 1965, Plate 3). Bennett’s video segment describing the Terror Mine is on the Coeur d’Alene Basin Videotape (Tape 1, index 1:24:15-1:33:10). Documenting photos are: Terror Mine – Roll B1, frames 26-27; St Joe #4 – Roll B1, frames 28-34.

3.3.4.1.1 St. Joe #1

The St. Joe #1 is the easternmost and uppermost working on the property. The adit was driven southeast into the hill. It is open and has water flowing from it at about 4 gpm. Mr. Capparelli reported that he had opened the portal in the spring of 1997 to drain the water so the tunnel could be investigated (Art Capparelli, 1997, verbal communication). The water contains a significant quantity of iron oxides (Figure 3.3-3), and the adit was located by following the orange muck up the drainage. The waste dump is about 100 feet long, 30 feet wide, and 15-30 feet thick. It is densely covered with small saplings and brush. The sides and face of the dump have trees
growing on them that are up to several inches in diameter (Figure 3.3-4). There did not appear to be any water in the drainage upstream from this tunnel. The water from the adit flows over the dump and eventually becomes, at least in part, the water source of the drainage. Tracks in the orange muck on the dump and at the mine entrance indicated that a bear had recently visited the site. The disturbed area is less than 0.25 acre.

3.3.4.1.2 St. Joe #2

The St. Joe #2 was also driven southeast into the slope. The adit (Figure 3.3-5) is open and has a trickle of water containing iron oxides similar to the St. Joe #1. The iron-rich muck has pooled on the surface of a flattened area on the drainage bottom in front of the adit (Figure 3.3-6); part of the muck probably originated from the St. Joe #1. As at the St. Joe #1, the adit and dump had recent bear tracks in the mud. The dump is fist-shaped with the index finger extended. The fist-shaped area includes the flat area and several short extensions. This part of the dump is about 50-60 feet in diameter but relatively thin. The main, finger-like ridge of waste rock (Figure 3.3-7) is about 75 feet long, 8 feet wide on top, and 15-30 feet thick. It extends into and along the south side of the drainage. Rails extend the length of this ridge. Oxidized material on the dump makes up an estimated 10-20 percent of the total volume. Several trees 6-8 inches in diameter are growing from the dump surface, along with some brush and low bushes. The sides and face are relatively void of vegetation. The disturbed area is about 0.25 acre.

3.3.4.1.3 St. Joe #3

There are four adits at the St. Joe #3. The total disturbed area for all the St. Joe #3 workings is less than 1 acre.

Adit No. 1, the main tunnel, is on the south side of the creek and was driven east-southeast into the slope near creek level. This adit is partly accessible in spite of the large tree roots growing across the opening (Figure 3.3-8). A trickle of water seeping from the adit disappears in the rocky rubble of the creek bottom 15-20 feet from the portal. The waste dump (Figure 3.3-9) extends from the adit down the center of the drainage. It is about 60 feet long, 6 feet wide on top, and 10-50 feet thick, with the thickest portion near the downstream end. The dump material consists of a mixture of oxidized and unoxidized material; the relative proportions of each could not be determined. The creek disappears into rock rubble above the dump and reappears below the dump.

Adit No. 2 is about 50 feet down the creek from Adit No. 1 and was driven into the slope on the north side of the drainage. This adit has a ragged circular opening about 3 feet in diameter (Figure 3.3-10). It appears to be used by bears, probably to escape the heat. The adit appears dry and has no dump directly associated with it. Waste rock was presumably included in the dump from Adit No. 1.
Adit No. 3 is on the north side of the drainage about 50 feet uphill from Adit No. 2. Several trees growing in front of the portal (Figure 3.3-11) hide the opening (Figure 3.3-12), which is about 2 feet by 4 feet. As at Adit No. 2, there was evidence that a bear was using the adit. The waste dump is about 30 feet long, 15 feet wide, and forms a thin, fan-shaped veneer downslope for 25-40 feet (Figure 3.3-13). The actual thickness on the slope is probably no more than 5 feet. The dump contains fragments and boulders of oxidized, mineralized vein material. Some of the larger fragments rolled down to the drainage bottom.

Adit No. 4 was also driven into the north slope at creek level. It is approximately 100 feet west of Adit No. 1 at the toe of the waste dump. The adit is almost completely caved but has a 1 foot by 1 foot opening. It is very difficult to locate because of ferns, moss, and other vegetation growing on the sloughed material in front of the adit. Had it not been for the waste dump, this adit would have been overlooked. A seep, which was of too little volume to sample, trickles from beneath the caved material. Iron-rich material is precipitating from the water. The waste dump is small, only 20 feet long by 10 feet wide by 5-15 feet thick, and was built out into the drainage.

3.3.4.1.4 St. Joe #4

The St. Joe #4 is the longest tunnel on the St. Joe property and is described on Bennett's video as the “main Terror Mine adit.” The adit was driven eastward from Terror Gulch and, according to a map of the underground workings provided by Mr. Capparelli, extends at least 1,400 feet toward, and probably beneath, the other St. Joe workings. The adit is open, but the portal is gated, locked, and signed “Danger Bad Air Keep Out” (Figure 3.3-14). Water flows from the adit at a rate of 1-2 gpm and drains over the north end of the waste dump into Terror Gulch. Rails, which are buried in places, extend from the adit across the west edge of the dump. The dump is large, about 180 feet long, 30-50 feet wide, and 10-25 feet thick. The visible portion consists of about 80 percent oxidized material, although this may be a veneer over unoxidized rock. The west edge parallels and is truncated by Terror Gulch Creek (Figures 3.3-15 and 3.3-16), and the south end is cut by the tributary creek entering Terror Gulch from the east (Figure 3.3-17). At one time, a metal culvert or flume apparently channeled Terror Gulch Creek along or under the west edge of the dump, but the culvert is now exposed, plugged, and torn up by water action. A considerable amount of scrap metal, ore car rails, lumber, and other debris is scattered around the site. An old compressor tank sits just west of the adit, and one collapsed building is at the north end of the dump (Figure 3.3-18). Another building stands near the center of the dump (Figure 3.3-19). The disturbed area is about 0.5 acre.

The oxidized waste dump at St. Joe #4 impinged significantly on Terror Gulch and the tributary that enters Terror Gulch from the east. At the time the site was visited, Mr. Capparelli indicated that the Forest Service was in the process of remediating the situation. The sulfide-rich rock was removed in the summer of 1997 and taken to the USFS mine waste repository at the Charles Dickens Mine in Moon Gulch. Therefore, the impact of the dump on the creek has been minimized and should no longer be a problem.
3.3.4.1.5 Terror Mine Adit

This adit, described on Bennett’s video segment, is located on the west side of the Terror Gulch Road about 100 yards north of the St. Joe #4 dump and adit. The adit is partially gated with a wire-mesh cover and is posted with a “No Trespassing” sign (Figure 3.3-20). There does not appear to be a dump associated with this adit.

3.3.4.2 Sample Locations

3.3.4.2.1 Soil

Samples were taken from the St. Joe #2 dump (K08199706, oxidized material, and K08199707, unoxidized material), the St. Joe #3, Adit No. 1 dump (K08199710), and the St. Joe #4 dump (K08199702 and B7189703).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K08199702</td>
<td>St. Joe #4, oxidized dump</td>
<td>Yes</td>
</tr>
<tr>
<td>K08199706</td>
<td>St. Joe #2, oxidized dump</td>
<td>Yes</td>
</tr>
<tr>
<td>K08199707</td>
<td>St. Joe #2, unoxidized dump</td>
<td>Yes</td>
</tr>
<tr>
<td>K08199710</td>
<td>St Joe. #3, Adit No. 1 dump</td>
<td>Yes</td>
</tr>
<tr>
<td>B7189703</td>
<td>St. Joe #4 dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.3.4.2.2 Water

Water samples were collected from each of the St. Joe properties. K08199708 was taken at the St. Joe #1 adit, K08199704 was taken at the St. Joe #2 adit, K08199709 was taken at the St. Joe #3, Adit 1, and K08199701 and B07189702 were taken at the St. Joe #4 adit. A sample was taken 100 feet above St. Joe #2 (K08199705), and downstream samples were taken from Terror Gulch about 200 feet below the end of St. Joe #4 waste dump (K08199703 and B7189704). An upstream sample was also collected from Terror Gulch Creek above the St. Joe #4 adit (B7189701).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K08199701</td>
<td>St. Joe #4 adit</td>
<td>326 µs</td>
<td>49</td>
<td>7.7</td>
<td>1-2</td>
<td>Yes</td>
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<tr>
<td>K08199703</td>
<td>downstream, Terror Gulch</td>
<td>98 µs</td>
<td>54</td>
<td>7.6</td>
<td></td>
<td>Yes</td>
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<tr>
<td>Sample No.</td>
<td>Location</td>
<td>Specific Conductivity</td>
<td>Temperature (°F)</td>
<td>pH</td>
<td>Flow (gpm)</td>
<td>Analyzed (Yes/No)</td>
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<td>-------------------</td>
</tr>
<tr>
<td>K08199704</td>
<td>St. Joe #2 adit</td>
<td>265µs</td>
<td>47</td>
<td>7.8</td>
<td>&lt;0.25</td>
<td>Yes</td>
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<tr>
<td>K08199705</td>
<td>Above St. Joe #2, tributary of Terror Gulch</td>
<td>160µs</td>
<td>52</td>
<td>7.5</td>
<td>2 ft. wide, 0.25 ft. deep</td>
<td>Yes</td>
</tr>
<tr>
<td>K08199708</td>
<td>St. Joe #1 adit</td>
<td>193µs</td>
<td>45</td>
<td>7.29</td>
<td>---</td>
<td>Yes</td>
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<tr>
<td>K08199709</td>
<td>St. Joe #3, adit No. 1</td>
<td>179µs</td>
<td>50</td>
<td>7.7</td>
<td>&lt;0.25</td>
<td>Yes</td>
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<tr>
<td>B7189701*</td>
<td>upstream, Terror Gulch</td>
<td>50µs</td>
<td>54</td>
<td>8.0</td>
<td>2 ft. wide, 0.15 ft. deep</td>
<td>Yes</td>
</tr>
<tr>
<td>B7189702</td>
<td>St. Joe #4 adit</td>
<td>302µs</td>
<td>58</td>
<td>8.2</td>
<td>trickle</td>
<td>Yes</td>
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<tr>
<td>B7189704</td>
<td>downstream, Terror Gulch</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>Yes</td>
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</tbody>
</table>

*The University of Idaho Analytical Sciences Laboratory incorrectly reported this analysis under the sample number B7179701.

3.3.4.2.3 Analytical Results

Soil Samples (Tables 2.5-3 and 2.5-4)

In the element screen, the St. Joe #2 waste dump samples, both oxidized (K08199706) and unoxidized (K08199707), have values above background (Tables 1.5-3 and 1.5-4) and environmental standards (Table 1.5-5) for arsenic, cadmium, copper, and lead. The oxidized sample (K08199706) contains 700 ppm arsenic, 3.8 ppm cadmium, 100 ppm copper, and 390 ppm lead, as well as an elevated iron (9.5 percent) content. The unoxidized sample (K08199707) contains 560 ppm arsenic, 2.6 ppm cadmium, 53 ppm copper, and 84 ppm lead. The composite sample from St. Joe #3 dump (K08199710) has elevated values for arsenic (500 ppm), cadmium (18 ppm), chromium (170 ppm), copper (270 ppm), lead (910 ppm), zinc (950 ppm), and iron (8.2 percent). The two samples from St. Joe #4 (K08199702, B7189703) are high in arsenic, cadmium, copper, lead, zinc, and iron. Sample K08199702 contains 640 ppm arsenic, 6.2 ppm cadmium, 250 ppm copper, 8,700 ppm lead, 1,400 ppm zinc, and 11.0 percent iron; leachable lead is 10 ppm. Sample B7189703 contains 470 ppm arsenic, 29 ppm cadmium, 350 ppm copper, 4,800 ppm lead, 6,700 ppm zinc, and 6.5 percent iron.

In the TCLP for metals screen, the St. Joe #3 composite sample (K08199710) show significant leaching for cadmium. The St. Joe #4 dump samples (K08199702 and B7189703) both show significant leaching for cadmium and lead. Samples K08199706 and K08199707 from the St. Joe No. 2 show no significant leaching of metals.
Water Samples (Tables 2.5-1 and 2.5-2)

Adit water from the St. Joe #1 (K08199708) exceeds both Aquatic Life standards for cadmium and zinc, the Secondary MCL for manganese, and slightly exceeds the secondary MCL for iron in the dissolved metals screen. The total metals screen exceeds all standards for cadmium and iron, both Aquatic Life standards for copper and zinc, and the Secondary MCL for manganese. The test for lead exceeds the Aquatic Life Chronic standard.

The sample taken between the St. Joe #1 and the St. Joe #2 (K08199705) exceeds both Aquatic Life standards for zinc and slightly exceeds the Aquatic Life Chronic value for cadmium in the dissolved metals screen. The total metals screen exceeds the Aquatic Life Chronic value for cadmium, both Aquatic Life values for copper and zinc, and the Secondary MCL for iron. The test for lead is within the range of the Aquatic Life Chronic standard.

Sample K08199704 from the St. Joe #2 exceeds the secondary MCL for magnesium in both the total and dissolved metals screens. The total metals screen exceeds the Aquatic Life Chronic value for cadmium, both Aquatic Life values for copper, and the Secondary MCL for iron.
Sample K08199709 from the St. Joe #3 is below EPA standards in the dissolved metals screen. In the total metals screen, this sample exceeds the Aquatic Life Chronic value for cadmium and the Secondary MCL for iron and manganese.

Two samples were taken from the St. Joe #4 adit (K08199701 and B7189702). The total metals screens for both samples exceed all standards for cadmium and iron, both Aquatic Life standards for zinc, and the Secondary MCL for manganese. The dissolved metals screen of K08199701 exceeds the Secondary MCL for manganese. The test for lead exceeds the Aquatic Life Chronic standard. The dissolved metals screen of B7189702 exceeds the Aquatic Life Chronic value for cadmium, both Aquatic Life standards for zinc, and the Secondary MCL values for iron and manganese.

The sample upstream on Terror Gulch (B7189701) was below detection limits for all metals in the dissolved metals screen, but exceeds all standards for cadmium in the total metals screen. One of two downstream samples on Terror Gulch below the St. Joe #4 (K08199703) exceeds the Aquatic Life standards for zinc in both the dissolved and total metals screens. The other sample (B7189704) exceeds the Aquatic Life Chronic standard for cadmium and both Aquatic Life standards for zinc in the dissolved metals screen. The total metals screen exceeds all standards for cadmium and both Aquatic Life standards for zinc. The test for lead slightly exceeds the Aquatic Life Chronic standard.

3.3.5 Structures

There is an old house on the waste dump at St. Joe #4 (Figure 3.3-19). This structure is about 16 feet by 20 feet and is in relatively good condition, considering its age. A second structure close to the adit, which may have been a storage shed, has completely collapsed. There are no structures at the other St. Joe workings.
Two old cabins are also located on Terror Gulch Creek (Figure 3.3-21).

3.3.6 Safety

The St. Joe #1, St. Joe #2, St. Joe #3, and the Terror Mine all have open adits that can be entered. These adits could be a potential safety problem. However, because there is no maintained access to the properties, it is unlikely that the general public will find the workings. The existing gate at the St. Joe #4 appears to be secure.
Figure 3.3-1. Topographic map of the St. Joe and Terror Mines, Shoshone County, Idaho (U.S. Geological Survey Osburn and Kellogg 7.5-minute topographic maps).
Figure 3.3-2. Sketch map of the St. Joe and Terror Mine workings.
Figure 3.3-3. Oxidized, iron-rich muck and water on the surface of dump in front of the adit at the St. Joe #1 (Roll K7, frame #5).

Figure 3.3-4. Looking north across the overgrown west edge of the dump at the St. Joe #1. The iron-stained area is where water from the adit flowed over the dump to the drainage below (Roll K7, frame #6).
Figure 3.3-5. Open adit at the St. Joe #2, looking to the southeast (Roll K7, frame #1).

Figure 3.3-6. Surface of St. Joe #2 waste dump, where the creek pools and seeps into the dump. The iron-rich material is probably from both the St. Joe #1 and the St. Joe #2 adits (Roll K7, frame #2).
Figure 3.3-7. Looking northwest down the long ridge of the waste dump at the St. Joe #2. Rails for ore cars extend the length of this ridge (Roll K7, frame #3).

Figure 3.3-8. St. Joe #3, Adit No. 1, looking to the southeast. Note the large tree roots across the opening (Roll K7, frame #7).
Figure 3.3-9. Adit No. 1 dump at the St. Joe #3, looking to the west (Roll K7, frame #8).
Figure 3.3-10. St. Joe #3, Adit No. 2, looking to the north (Roll K7, frame #9)
Figure 3.3-11. Adit No. 3 (hidden behind trees) at the St. Joe #3. The view is to the north from the waste dump (Roll K7, frame #12).
Figure 3.3-12. Close-up of Adit No. 3 at the St. Joe #3 (Roll K7, frame #10).

Figure 3.3-13. Looking south down the face of the Adit No. 3 dump at the St. Joe #3 (Roll K7, frame #11).
Figure 3.3-14. St. Joe #4 adit. The tunnel is gated and has water flowing from it (Roll B1, frame #31).

Figure 3.3-15. St. Joe #4 dump, looking north-northeast up Terror Gulch. This dump is heavily oxidized and has been truncated by the creek. Terror Gulch road is on the left edge of the photograph. Note the section of culvert in the lower center (Roll B1, frame #28).
Figure 3.3-16. West edge of the St. Joe #4 oxidized waste dump. The view is south-southwest down Terror Gulch with the Terror Gulch road on the right. Note the section of culvert in the drainage (Roll B1, frame #33).

Figure 3.3-17. South end of the St. Joe #4 dump. It has been eroded by Terror Gulch Creek on the left and by a side tributary on the right (Roll B1, frame #29).
Figure 3.3-18. Collapsed cabin and boiler on the St. Joe #4 dump. The collapsed cabin or shed (visible on the left side of the photograph) is at the upper end of the dump and the boiler (center right) is outside the St. Joe #4 adit. The adit is just off the right edge of the photograph (Roll K6, frame #25).

Figure 3.3-19. Cabin on the St. Joe #4 dump, looking to the south (Roll K6, frame #20).
Figure 3.3-20. Terror Mine adit, looking west. Note that the wire-mesh screen does not cover the entire opening (Roll B1, frame #27).

Figure 3.3-21. Remains of old cabins in Terror Gulch (Roll B1, frame #26).
3.4 BLUE SKY (Site No. WL-197)
Alternative name—Silver Star.

3.4.1 Site Location and Access (Figure 2.1-1c)

The Blue Sky property is in the upper portion of Dobson Gulch, about \( \frac{1}{2} \) mile north of Dobson Pass (Figure 3.4-1). The mine is in the center of the south edge of section 36, T. 49 N., R. 4 E., on the Osburn 7.5-minute quadrangle. One of the adits (Adit No. 3 of this report) is shown on the quadrangle map on the east slope of the gulch. The workings are on Forest Service land just north of the National Forest boundary. An old, moderately overgrown access road, which is passable only on foot, leads to the workings from Primary Forest Route 456 (Dobson Pass road). The main workings are about 200 feet below the road in the bottom of the gulch.

3.4.2 Geologic Features (Figure 2.2-1b)

The main workings at the Blue Sky are in the Prichard Formation. Beds strike north-northwest and dip 45° to the west. A vein parallel to the bedding is intersected by the main adit, which is about 500 feet long (Hobbs and others, 1965, Plate 4).

3.4.3 Site History
No history is available for this site.

3.4.4 Environmental Conditions

3.4.4.1 Site Features

The Blue Sky was visited by John Kauffman on August 28, 1997. A video segment describing the workings is on the Coeur d'Alene Basin Videotape (Tape 1, index 1:33:10-1:48:00). Documenting photos are Roll K9, frames 14-21.

The mine workings include five adits (Figure 3.4-2), all of which are open or partially open. Three adits are at or near creek level, one is about 150 feet above the creek on the east slope, and another is about 150 feet above the creek on the west slope. None of the adits had water flowing from them.

Adit No. 1, the main tunnel, was driven into the west side of the gulch about 20 feet above creek level. The wooden doors that blocked the portal are open and the adit is accessible (Figure 3.4-3). The adit appeared to be open, although its condition could not be determined with certainty. The remains of an ore bin with two chutes are about 30 feet from the adit. Rails, which split at the portal, extend to each chute. The waste dump, beneath and around the ore bin, has been partly eroded by the creek. The remainder, about 30 feet long by 20 feet wide by 20 feet thick, consists mostly of unoxidized material, although a few oxidized pods are present. An old boiler is in the creek bed below the dump, and a rusted car body is in the creek above the dump. Other
scrap metal is scattered around the site. A pile of timbers and lumber, or possibly the remains of a structure, is located about 60 feet south of the adit on the west side of the creek.

Adit No. 2, also about 20 feet above creek level, was driven into the east side of the gulch directly across from Adit No. 1. The adit is open, although there is some minor sloughing at the portal (Figure 3.4-4). There are no timbers supporting the portal or the rock inside the adit. The waste dump (Figure 3.4-5) is parallel to the drainage. It is about 50 feet long, but only 10 feet wide and 15 feet thick. For the most part the dump has stabilized, with saplings and some brush growing on the surface. Some of the waste rock extends to the creek.

Adit No. 3, the adit shown on the Osburn 7.5-minute quadrangle map, was driven eastward along a shear zone. It is about 150 feet above the creek on the east side of the gulch and slightly to the south of Adits No. 1 and No. 2. The adit is open and is partially hidden by several small fir trees growing a few feet from the portal (Figure 3.4-6). The waste dump is parallel to the valley. It is only about 20 feet long and 5 feet wide at the adit, but forms a thin veneer no more than 5 feet thick that extends at least 50 feet downslope and fans out to about 50 feet across (Figure 3.4-7). This dump can be seen from a few vantage points on the Dobson Pass Road.

Adit No. 4 appears to have been a short prospect adit. It is on the west side of the gulch about 150 feet uphill from, and slightly north of, Adit No. 1. The dump is about 10 feet long and 6 feet wide, with a narrow rib about 4 feet thick downslope extending 20 feet downslope from the portal.

Adit No. 5 is located 100-150 feet south of Adits No. 1 and No. 2 on the east side of the gulch. It has a large opening (about 5 feet by 6 feet; Figure 3.4-8) at creek level and a small opening (about 3.5 feet by 4 feet; Figure 3.4-9) 10 feet north of and 8 feet above the larger. The small opening appears to decline toward the larger opening. It is likely the two converge a short distance inside the adit. The waste dump has been either eroded or reworked by the creek to the extent that it is no longer identifiable.

All of the workings except Adit No. 3 are in relatively dense timber and visible only from close range. Adit No. 3 is on a more open, grassy slope and, as stated previously, the waste dump can be seen from the Dobson Pass Road. The total disturbed area for all the workings is less than 1.5 acres.

3.4.4.2 Sample Locations

3.4.4.2.1 Soil

The waste dumps of Adits No. 1 and No. 2 impinge on the creek. Because only relatively minor amounts of oxidized material were present in each dump, one composite grab sample was collected from the two dumps (K08289701).
<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
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</thead>
<tbody>
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<td>K08289701</td>
<td>Blue Sky, combined Adit No. 1 and Adit No. 2 dumps</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.4.4.2.2 Water

No water samples were collected because Dobson Gulch and all five adits were dry at the time of the field inspection.

3.4.4.2.3 Analytical Results

Soil Samples  (Tables 2.5-3 and 2.5-4)

Compared to background levels (Tables 1.5-3 and 1.5-4) and environmental standards (Table 1.5-5), the composite waste dump sample (K08289701) has elevated levels of lead (7,600 ppm) and zinc (1,100 ppm), and slightly elevated values for arsenic (170 ppm), cadmium (8.1 ppm), and copper (97 ppm). It also has a very high iron content (14.6 percent). In the TCLP for metals screen, the sample shows significant leaching of lead.

3.4.5 Structures

The ore bin at Adit No. 1 was the only structure found at the site. The bin was of log and board construction, about 16 feet long by 10 feet wide, with rails extending from the adit to each ore chute. The chutes extend out over the present creek.

3.4.6 Safety

All of these open adits are potential hazards because the tunnel walls are probably unstable in places and prone to caving or collapse. Air quality conditions are unknown, but “bad air” is always a possibility. Because no maps of the underground workings are available, the possibility of shafts, winzes, raises, and stopes is also a potential hazard.
Figure 3.4-1. Topographic map of the Blue Sky Mine, Shoshone County, Idaho (U.S. Geological Survey Osburn 7.5-minute topographic map).
Figure 3.4-2. Sketch map of the Blue Sky workings.
Figure 3.4-3. Ore chute at the Blue Sky Mine, with Adit No. 1 behind it. Note the open door on the adit. The view is to the west, looking across Dobson Gulch (Roll K9, frame #16).

Figure 3.4-4. Adit No. 2, looking east (Roll K9, frame #18).
Figure 3.4-5. Adit No. 2 waste dump, looking north along the dump surface with Dobson Gulch to the left (Roll K9, frame #19).
Figure 3.4-6. Adit No. 3, looking east (Roll K9, frame #14).
Figure 3.4-7. Looking down the face of the Adit No. 3 dump. The view is to the west (Roll K9, frame #15).
Figure 3.4-8. The larger (5 feet by 6 feet) of two openings at Adit No. 5. The view is to the east (Roll K9, frame #21).
Figure 3.4-9. The smaller of two openings (3.5 feet by 4 feet) at Adit No. 5. This opening appears to be a decline that may connect to the opening shown in Figure 3.4-8. The view is to the east (Roll K9, frame #20).
3.5 NATIONAL MINE (Site No. SP-286)
Alternative names−First National, National Silver, Liston Group.

3.5.1 Site Location and Access (Figure 2.1-1b)

The National Mine is located on the east side of Big Creek along Forest Service Road 2354 near the center of the north edge of section 34, T. 48 N., R. 3 E., on the Polaris Peak 7.5-minute quadrangle (Figure 3.5-1). The site is on Forest Service land, although there is a block of patented claims to the north and east. The mine is called the First National Mine by Hobbs and others (1965, Plate 2, #48).

3.5.2 Geologic Features (Figure 2.2-1a)

The mine is in rocks of the upper Wallace Formation (Hobbs and others, 1965, Plate 2). The character of the vein is not discussed in the report.

3.5.3 Site History

In 1913, when the property was owned by the Liston Mining Company, Ltd., the mine had about 3,000 feet of workings and seven of the twenty-six claims were patented. The mine’s surface plant was destroyed by the great forest fire of 1910 and was subsequently rebuilt. Development work continued until June 1918, when the company ran out of money. The First National Silver Mines, Ltd., which was controlled by some of the same people as the previous company, took over the mine in 1920. In 1922, the mine had two tunnels (2,600 and 900 feet long) and about 3,500 feet of total workings. In 1924, First National opened up a third tunnel. The company continued developing the property until 1928 or 1929, after which only assessment work was done until the company forfeited its charter in 1931. In 1947, the National Silver-Lead Mining Company began reopening the tunnels at the mine. The following year, total development at the property was about 5,300 feet, and the tunnels were 800, 1,800, and 2,700 feet long. National Silver-Lead continued developing the mine until 1953, after which only assessment work was done. Nothing is known of activities at the mine after 1980.

3.5.4 Environmental Conditions

3.5.4.1 Site Features

The National Mine was visited by John Kauffman on August 5, 1997. A video segment describing the property is on the Coeur d’Alene Basin Videotape (Tape 1, index 1:48:00-1:56:20). Documenting photos are Roll K4, frames 10-12.

The adit at the National was driven into the hillside on the east side of Big Creek about 20 feet above the present road level. The adit is caved at the portal but has a small opening that could be enlarged to gain access. Two upright timbers are visible through the brush at the portal (Figure
3.5.2. Additional timbers and cribbing are present behind the uprights in thicker brush. A minor seep trickles from the adit, flows over the dump, and disappears in the ditch alongside the road. Flow rate is probably less than 0.5 gpm. The waste dump is obvious from the road and consists of two levels that merge near the portal (Figure 3.5-3). The lower part forms a ramp up from the road southward to the adit. The upper part is level, extending northward from the adit. Trestle timbers and rail ties protrude through the pile. The total width of the dump is about 25-30 feet. The level upper portion is 3-5 feet wide on top and probably 10-15 feet wide at the base. Overall, the dump is approximately 250 feet long, 25 feet wide, and 20 feet thick. The lower portion has been truncated by erosion from Big Creek and contains a strongly oxidized zone that cuts obliquely up the side of the dump (Figure 3.5-3). Reconstruction of the Forest Service road this year has rechanneled the creek so that the dump no longer directly impinges on the waterway. However, the exposed dump still might be susceptible to erosion during flooding. The disturbed area is less than 1 acre.

3.5.4.2 Sample Locations

3.5.4.2.1 Soil

Because the waste dump has been partially eroded by Big Creek, samples of the oxidized and unoxidized dump were collected. The oxidized sample (K08059704) was taken from the lower portion of the dump along the road. The unoxidized sample (K08059705) was collected from the upper portion.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K08059704</td>
<td>National Mine, oxidized dump</td>
<td>Yes</td>
</tr>
<tr>
<td>K08059705</td>
<td>National Mine, unoxidized dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.5.4.2.2 Water

A water sample was collected from the adit water (K08059701). Upstream readings were taken from Big Creek about 150 feet south of the adit, and the downstream readings were taken about 200 feet downstream from the dump.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K08059701</td>
<td>adit</td>
<td>152μs</td>
<td>49</td>
<td>7.4</td>
<td>&lt;0.5</td>
<td>Yes</td>
</tr>
<tr>
<td>K08059702</td>
<td>upstream, Big Creek</td>
<td>45μs</td>
<td>57</td>
<td>7.7</td>
<td>20 ft. wide, 1 ft. deep</td>
<td>No</td>
</tr>
</tbody>
</table>
Sample No. | Location | Specific Conductivity | Temperature (°F) | pH | Flow (gpm) | Analyzed (Yes/No)
--- | --- | --- | --- | --- | --- | ---
K08059703 | downstream, Big Creek | 46μs | 57 | 7.9 | --- | No

3.5.4.2.3 Analytical Results

Soil Samples (Tables 2.5-3 and 2.5-4)

Compared to background levels (Tables 1.5-3 and 1.5-4) and environmental standards (Table 1.5-5), the oxidized dump sample (K08059704) has elevated values for arsenic (210 ppm) and slightly elevated values for cadmium (2.1 ppm). The unoxidized sample (K08059705) has only very slightly elevated levels of cadmium (2.2 ppm) and copper (26 ppm). In the TCLP for metals screen, the values are below detection limits for all relevant metals in both samples.

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

Adit water from the National (K08059701) is below detection limits in the dissolved metals screen for all metals except copper, which is at the lower limit of the Aquatic Life Chronic range. The total metals screen equals or barely exceeds all standards for cadmium and exceeds the Secondary MCL for iron and manganese. Analysis of a background sample taken on Big Creek (R08069702) exceeds all standards for cadmium in the total metals screen and equals the lower limit of the Aquatic Life Chronic standard for copper in the dissolved metals screen.

3.5.5 Structures

There were no structures present at the site.

3.5.6 Safety

The small opening of the adit could be enlarged sufficiently to allow someone to gain access to the workings. The rock is fractured and prone to caving and collapse. Entry into the adit is the only potential safety hazard at this site.
Figure 3.5-1. Topographic map of the National Mine, Shoshone County, Idaho (U.S. Geological Survey Polaris Peak 7.5-minute topographic map).
Figure 3.5-2. Nearly caved adit hidden by heavy brush at the National Mine. The upright timbers mark the portal of the adit. The view in this photograph is to the east (Roll K4, frame #10).

Figure 3.5-3. Waste dump at the National Mine, with Big Creek and Forest Service Road 2354 in the foreground. The view is to the east (Roll K4, frame #12).
3.6 SILVER STRAND (Site No. SP-54)

3.6.1 Site Location and Access (Figure 2.1-1a)

The Silver Strand property is on Forest Service Road 411 a little over one mile up Lone Cabin Creek from its junction with Burnt Cabin Creek (Figure 3.6-1). The mine is just south of the center of the west edge of section 19, T. 51 N., R. 1 W., on the Spades Mountain 7.5-minute quadrangle. Because of flood damage in the past few years, FS Road 411 has been closed from the bridge over Burnt Cabin Creek to a berm and ditch several hundred feet north of the Silver Strand workings. Otherwise, it is an excellent road. Because the lower section of the road is closed, access from the east is now via FS Road 209 along the North Fork of the Coeur d'Alene River to Honeysuckle Campground at Deception Creek, up FS Road 612 to Five Fingers Saddle, and down FS Road 411 to the mine site. The property can also be reached from the west up Fernan Creek on FS Road 268 to Fernan Saddle, then on FS Road 612 to Five Fingers Saddle, and again down FS Road 411.

3.6.2 Geologic Features (Figure 2.2-1a)

The Silver Strand is on or near the Burnt Cabin fault in rocks mapped by Anderson (1940) as undifferentiated Burke, Revett, and St. Regis formations. Both the Revett and St. Regis formations are present in the vicinity of the mine (Griggs, 1973); available information is not sufficient to determine which unit is the host rock. The adits explore a silicified shear zone that showed high silver values in assays of material from an exposed outcrop (Springer, 1964).

3.6.3 Site History

The Silver Strand Mining Company did exploration work on the property in 1983 and 1984. New Jersey Joint Ventures had a diamond drilling program under way in the summer of 1997. Nothing else is known of the history of the site.

3.6.4 Environmental Conditions

3.6.4.1 Site Features

The Silver Strand was visited by John Kauffman on July 24, 1997. A video segment describing this property is on the Coeur d'Alene Basin Videotape (Tape 2, index 0:01:11-0:15:40). Documenting photos are Roll K2, frame 25, and Roll K3, frames 1-8.

This property is actively being explored by diamond drilling, although no one was present the day of the visit. A representative of New Jersey Joint Ventures later confirmed that a drilling program was under way.
The property contains four adits driven westward into the slope on the west side of Lone Cabin Creek (Figure 3.6-2). The lowermost adit (Adit No. 1) is at road level, and the other adits are located progressively up the slope at about 75-100 foot intervals. Adits No. 1, No. 3, and No. 4 are nearly in line along a N. 80° W. trend; Adit No. 2 is offset slightly to the south. The total area disturbed by the 4 adits and associated dumps is about 5 acres.

At Adit No. 1, an 8-foot-in-diameter culvert has been used as a portal (Figure 3.6-3). It has a steel gate with vertical bars and extends at least 30-40 feet into the hill. At the end of the culvert, the adit is again boarded over. A piece of PVC pipe that extends out from under the culvert apparently drains the adit. Water flowed from the adit at a fairly steady rate of about 5 gpm, but at times surged to about 10 gpm. The cause of this surging is not known. The water flows over some straw bales (placed for erosion control), down the west side of FS Road 411 for several hundred feet, and through the dug-up portion of the road into the creek. A water pump was set up across FS Road 411 from the adit (Figure 3.6-4); the suction hose went to the creek and the discharge hose reached several hundred feet up the slope above the adit. There is no waste dump at Adit No. 1. If there was one, it has been reworked and incorporated into FS Road 411 and into a staging area immediately across Lone Cabin Creek from the adit. A small, relatively recent pile of rock material just south of the portal (Figure 3.6-5) may be waste rock or other material dumped there for some purpose. In any case, a “dump” sample was taken from this small pile.

Adit No. 2 (Figure 3.6-6) is about 75-100 feet uphill from, and slightly south of, Adit No. 1. An access road that switches back from FS Road 411 is only slightly overgrown and showed evidence of recent vehicle use. The adit has a wooden portal and is barricaded with a steel gate about 10-12 feet inside the portal. Inside the adit, the rock appeared to be somewhat caved and unstable. The waste dump is about 150 feet long by 40 feet wide and extends down the steep slope 40-50 feet. The surface of the dump has been covered with a layer of coarse, non-dump rock. A considerable amount of supplies and scrap materials are present around the portal and on the dump. These include several tarpaulins, 55-gallon drums, scrap metal, timbers, buckets of bolts and nails, 5-gallon buckets, etc. One of the drums and several of the buckets were filled with undetermined liquids, possibly diesel and drilling fluids, respectively. A fire extinguisher was hanging on the timbers of the portal.

Adit No. 3 (Figure 3.6-7) is about 50-75 feet above, and slightly north of, Adit No. 2. The timbers of the portal are in fairly good condition and the opening is covered with steel fencing, although there is probably room to crawl between the fencing and the timbers to gain access. Above the portal, the fractured rock of the slope has sloughed somewhat and a pile of rock debris has accumulated in front of the portal. The waste dump is about 120 feet long, 35 feet wide, and 30 feet down the face. Unlike the Adit No. 2 dump, there is no surface covering of coarse rock material. A pile of scrap metal-duct material is located at the north end of the waste dump. A drill collar covered with a rock was found about 50 feet south of the dump on the access road between Adit No. 3 and Adit No. 4. Alongside the access road near the collar was a pile of 2-inch-in-diameter PVC casing.
Adit No. 4 (Figure 3.6-8) is about 75 feet above Adit No. 3 and is in line with Adits No. 1 and No. 3. The unstable slope above the adit has collapsed, leaving only a narrow opening which did not appear to be timbered. The “dump” looks more like a bulldozed drill pad than a waste dump. This leveled area is about 90 feet long by 30 feet wide, with the material extending about 20 feet down the slope. Six cased, vertical drill holes are located on the leveled area in front of the adit. The 4-inch steel casings protrude about 3-4 feet above the surface and have hinged, locked caps. These (and probably the hole on the access road) were apparently part of an in situ leaching test (verbal communication, New Jersey Joint Venture representative, name unknown, July 1997). At the north end of the leveled area is a second dump that extends about 55 feet northward. It is roughly 10 feet wide and 10 feet thick. This dump consists mostly of mineralized rock. It is overgrown with brush and therefore probably older than the other “dump.” It may be the original dump from Adit No. 4 and was later disrupted on the south end by construction of the drill site.

3.6.4.2 Sample Locations

3.6.4.2.1 Soil

One “dump” sample (K07249707) was collected from the small pile of material along FS Road 411 on the south side of Adit No. 1. The pile was about 8 feet in diameter and 3 feet thick.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K07249707</td>
<td>Silver Strand, stockpiled material at Adit No. 1</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.6.4.2.2 Water

Three water samples were collected at this site. Water from Adit No. 1 (K07249704) was collected from the PVC discharge pipe. An upstream sample (K07249705) was taken from Lone Cabin Creek about 100 feet south of Adit No. 1. A downstream sample (K07249706) was taken from the creek about 350 feet north of Adit No. 1 and about 100 feet north of where the adit water enters the creek.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K07249704</td>
<td>Silver Strand, Adit No. 1</td>
<td>54μs</td>
<td>45</td>
<td>8.3</td>
<td>7</td>
<td>Yes</td>
</tr>
<tr>
<td>K07249705</td>
<td>upstream, Lone Cabin Creek</td>
<td>20μs</td>
<td>52</td>
<td>8.2</td>
<td>5 ft. wide, 0.75 ft. deep</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Sample Data

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K07249706</td>
<td>downstream, Lone Cabin Creek</td>
<td>18μs</td>
<td>54</td>
<td>7.8</td>
<td>---</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### 3.6.4.2.3 Analytical Results

**Soil Samples (Tables 2.5-3 and 2.5-4)**

Compared to background levels (Tables 1.5-3 and 1.5-4) and environmental standards (Table 1.5-5), the small pile of material sampled at Adit No. 1 (K07249707) has elevated values of arsenic (2,200 ppm), cadmium (12 ppm), chromium (150 ppm), copper (1,400 ppm), lead (1,900 ppm), and zinc (550 ppm). Iron content (4.6 percent) is slightly above background levels for soils derived from Belt rock units (Table 1.5-4). In the TCLP for metals screen, only cadmium shows significant amounts of leaching.

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

Water from Adit No. 1 (K07249704) exceeds both Aquatic Life standards for copper in the dissolved metals screen. The total metals screen exceeds both Aquatic Life standards for copper and all standards for cadmium. The test for arsenic exceeds the Primary MCL. The upstream sample on Lone Cabin Creek (K07249705) is below all standards in both the dissolved and total metals screens. The dissolved metals screen of the sample downstream from Adit No. 1 (K07249706) is at the lower limit of the Aquatic Life Chronic range for copper.

### 3.6.5 Structures

There were no structures at this site.

### 3.6.6 Safety

At Adit No. 3, someone could gain access by crawling between the steel fence and portal timbers. Adit No. 4 has a small opening through which someone could probably crawl. At both adits, the rock is fractured and extremely unstable, with a high potential for collapse. No other potential hazards were identified at this site.
Figure 3.6-1. Topographic map of the Silver Strand Mine, Kootenai County, Idaho (U.S. Geological Survey Spades Mountain 7.5-minute topographic map).
Figure 3.6-2. Sketch map of the Silver Strand Mine.
Figure 3.6-3. Adit No. 1, with 8-foot-in-diameter culvert as the portal. Water from the adit drains through the PVC pipe (in the center of the photograph). Erosion-control straw bales are in the lower foreground (Roll K3, frame #8).
Figure 3.6-4. Looking west at the Adit No. 1 portal. FS Road 411 is in the foreground, with a water pump on the side of the road (Roll K3, frame #6).
Figure 3.6-5. Small pile of "waste" rock sampled at Adit No. 1 (Roll K3, frame #7).

Figure 3.6-6. Looking west at the portal of Adit No. 2 (Roll K2, frame #25).
Figure 3.6-7. Looking west at the Adit No. 3 portal (Roll K3, frame #2).

Figure 3.6-8. Looking west at Adit No. 4 and the six cased drill holes (Roll K3, frame #4).
3.7 SNOWSTORM MINE (Site Nos. WL-361, WL-378, WL-396, and WL-400)
Alternative names—Zenith Silver Mines Corp., Hunter-Snowstorm. Because the various Snowstorm workings occur some distance from each other, they have been given individual location numbers. These are: Snowstorm Apex, WL-361; Snowstorm Nos. 1 and 2, WL-378; Snowstorm No. 3, WL-396; and Snowstorm No. 4, WL-400.

3.7.1 Site Location and Access (Figure 2.1-1d)

The main Snowstorm adit (No. 3) is located just off Forest Service Road 6532 about 1 mile up Daisy Gulch in the SW¼ of the SW¼ of the NW¼ of section 29, T. 48 N., R. 6 E., on the Lookout Pass 7.5-minute quadrangle. Adits No. 1 and No. 2 are about ¼ mile above and north of No. 3 in the NW corner of section 29. Adit No. 4 is below No. 3 about ¼-½ mile in a side tributary to Daisy Gulch in the NW¼ of the SE¼ of section 30 (Figure 3.7-1). These workings are on patented claims owned by Hecla Mining Company but are bordered on the south, east, and west by Forest Service land.

3.7.2 Geologic Features (Figure 2.2-1b)

The workings were driven through Wallace and St. Regis units to northwest-trending veins hosted by the Revett Quartzite (Hobbs and others, 1965, Plate 5).

3.7.3 Site History

According to the USGS/USBM Minerals Yearbooks, in 1905 the Snowstorm Mining Company had developed the Snowstorm Mine by tunnels to a depth of over 1,200 feet. Shipments of siliceous copper- and silver-bearing ore were being made regularly to Butte and Anaconda, Montana, and to Tacoma, Washington. A leaching plant with a capacity of 200 tons-per-day (tpd) was built by lessees, but was not operated much. From 1906 to 1908, production increased each year. The mine had 3 adits; the upper two produced copper carbonate ore for the leaching plant and the lower (No. 3 adit), sulfide ore. In 1907, the leaching plant was greatly improved by adding machinery to grind the disseminated copper carbonate into finer particles. The massive sulfide ore, from a nearly vertical vein 20-75 feet wide, was shipped to the smelters. The disseminated sulfide ore, averaging over 90 percent silica, also went directly to the smelters and was valuable as converter lining. The leaching plant was idle in 1908 because tunnels No. 1 and No. 2, the source of the carbonate ore, were not used. Tunnel No. 3 was the working tunnel and a fourth adit, Tunnel No. 4, was driven 1,491 feet to tap the vein at a depth of 1,700 feet, or 550 feet below the existing workings. In 1909, production was slightly less than in 1908 but greater than that of 1907. The mine produced 7,668,484 pounds of copper and 576,674 ounces of silver. The ore, in demand as smelter flux, contained 4.5 percent copper, 6.2 ounces of silver, and 90 percent silica. The No. 4 crosscut was driven to a total of 3,296 feet but did not encounter the vein. Again, the leaching plant was idle.

During 1910 and 1911 production declined significantly, primarily due to the decrease in demand for silica as converter lining. The leaching plant was abandoned and a 100-tpd concentrator was
in operation by 1912. By 1913, the mill at Larson Siding had been enlarged to 250 tpd, and the mine produced more copper than any other in the state. About one-third of the ore produced was milled and the rest shipped crude to smelters. The mill used ordinary wet gravitational processes. Because of the fine character of the disseminated ore, recovery was only slightly better than 50 percent. In 1914, the Snowstorm was again the largest copper producer in the state.

Snowstorm Mining Company closed the mine in 1915, but a considerable quantity of stored crude ore and concentrates were marketed during the year. A few shipments of ore were reportedly made in 1917. The mill was moved to a property near Troy, Montana. Total production from 1904 to 1915 was over 55,000,000 pounds of copper, 4,000,000 ounces of silver, and gold valued at over $67,000.

In 1925, the Snowstorm Leasing Company shipped nearly 1,000 tons of copper ore to the Anaconda and Tacoma smelters. All of the ore shipped was sulfide. In 1926, a 100-tpd flotation plant was built and operated at the Snowstorm, under lease to the Oregon-Idaho Mining and Concentrating Company. Several thousand tons of ore containing chalcosite, bornite, and chalcopyrite was treated at the facility. In 1927, the mine had about 20,000 tons of reserves assaying 2 ounces silver and 2 percent copper per ton.

Minor production was reported in the 1950s, apparently under the control of Sunshine Mining Company.

3.7.4 Environmental Conditions

3.7.4.1 Site Features

The Snowstorm Mine was visited by Earl Bennett on July 25, 1997. A video segment describing the property is on the Coeur d’Alene Videotape (Tape 2, index 00:15:40-00:40:46). Documenting photos are: Roll B4, frames 8-23; Roll B5, frames 6-11; and Roll B8, frames 14-17. Sites described include the main adit (No. 3), the two higher workings (Nos. 1 and 2), a large dump below the No. 3 called the No. 4, and the old ore stockpile at Larson Siding at the level of the South Fork of the Coeur d’Alene River.

The access road to the No. 3 adit is about ¼ mile long and turns off Forest Service Road 6532. The No. 3 adit is gated and locked, has rails coming out of it, and is marked with a “No Trespassing” sign (Figures 3.7-2, 3.7-3, and 3.7-4). Someone may be able to gain access by going around the portal on the west side of the adit. A considerable amount of water (estimated at several hundred gallons per minute) flows from the adit over the west side of the waste dump (Figure 3.7-5) and is controlled by a culvert where it passes under the main road at the toe of the dump. The water bypassed a plugged culvert at the top of the dump and cut a 2-foot-deep ditch across the mine access road before flowing over the edge of the dump. The adit flow is a major source of water for Daisy Gulch. The large dump at this site (Figure 3.7-6) is about 200 feet thick at the nose and has some scattered scrap iron and other debris. Ore was transported by a
tramway from this level to the mill at Larson Siding. A pile of old timbers along the east side of
the dump is part of the tram station (Figure 3.7-7). A steel cable in the waterway may be from the
old tramway. There is noticeable copper staining on the quartzite boulders in this area. The
disturbed area at this site covers about 1 acre.

The Snowstorm Apex is near the top of the ridge on an outcrop of Revett Quartzite on
Snowstorm Hill. No adit or dump was found, although a trench is present (Figure 3.7-8). The
disturbed area is less than 0.5 acre.

The Snowstorm No. 1 workings are located three-quarters of the way up Snowstorm Hill. From
the very steep access road, there is a good view of I-90 and the Atlas Mine. A trench (or
collapsed adit) and dump are located just east of the road at the No. 1. A small pit (shown as a
shaft on the topographic map) is located just west of the trench. There is also a big pit, or “glory
hole” (Figure 3.7-9), down the hill from the trench and shaft. There are no signs of open adits.
The glory hole is at least 130 feet deep and 200 feet across. There is a considerable amount of
copper-stained quartzite in this area. The big pit also has a short access road to the main road up
the mountain. Approximately 4 acres are disturbed at the No. 1 site.

The No. 2 adit, about 500 feet down the hill from the No. 1, is totally caved and overgrown with
small trees. The dump (Figures 3.7-10 and 3.7-11) is 80 feet thick at the nose and relatively
barren of vegetation. Approximately 1 acre is disturbed at this area.

The only sign of the adit at Snowstorm No. 4 (at an elevation of about 4,000 feet and downhill
from the Snowstorm No. 3) is the remains of a few timbers (Figure 3.7-12). However, the dump
is extensive and is being eroded by the creek in Daisy Gulch (Figure 3.7-13). The dump is
crossed by FS Road 6532 on a switchback curve. The disturbed area covers about 5 acres.

Larson Siding was the site of the Snowstorm Mill, the bottom tram station, and the ore stockpile.
The quartzite, which hosted the ore, was almost as valuable for the silica (used as smelter flux) as
for the contained copper and silver. There is a considerable quantity of Revett Quartzite (Figures
3.7-14 and 3.7-15) on this dump (stockpile) from the old mining operations, as well as new
material added by the Hecla Mining Company from recent underground development work at the
Lucky Friday Mine. Larson was also the site of the Silver Mountain Shaft (Silver Mountain
Project–Hecla and Bunker Hill companies, 1954-1959), which has been reclaimed by Hecla. Only
a few timbers from the shaft headframe are still bolted to bedrock on the east side of the dump
(Figure 3.7-16). The access road (FS Road 6532) to the upper Snowstorm and other mine
workings is on the west side of this dump.

3.7.4.2 Sample Locations

3.7.4.2.1 Soil Samples

No dump samples were collected at this site.
3.7.4.2.2 Water Samples

A water sample (B7259701) was collected from Snowstorm Adit No. 3.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7259701</td>
<td>Snowstorm No. 3 adit</td>
<td>21µs</td>
<td>42</td>
<td>7.1</td>
<td>several hundred (est.)</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.7.4.2.3 Analytical Results

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

The dissolved and total metals screens of adit water from Snowstorm Adit No. 3 (B7259701) exceed both Aquatic Life standards for copper.

3.7.5 Structures

No structures remain at this property.

3.7.6 Safety

Although Adit No. 3 is gated and locked, it may be possible for someone to get in around the west side of the portal. Underground access is the only potential safety problem identified at this site.
Figure 3.7-1. Topographic map of the Snowstorm Mine, Shoshone County, Idaho (U.S. Geological Survey Lookout Pass 7.5-minute topographic map).
Figure 3.7-2. Gated adit at the Snowstorm No. 3. Rails extend out onto the dump, and a large volume of water flows out of the adit toward the left side of the photograph (Roll B4, frame #8).
Figure 3.7-3a. Part 1 of a two-frame panorama, looking west of the Snowstorm No. 3 adit and along the access road. The dump is to left (Roll B4, frame #10).

Figure 3.7-3b. Part 2 of a two-frame panorama, looking northwest toward the Snowstorm No. 3 adit from the access road. The dump is to left (Roll B4, frame #9).
Figure 3.7-4a. Part 1 of a two-frame panorama, looking southwest, of the Snowstorm No. 3 waste dump surface. Interstate 90 can be seen on the hillside across the valley (Roll B4, frame #12).

Figure 3.7-4b. Part 2 of a two-frame panorama, looking west, of the Snowstorm No. 3 waste dump surface (Roll B4, frame #11).
Figure 3.7-5. Water flowing over the west edge of the Snowstorm No. 3 waste dump. Note the abundant scrap metal on the dump surface (Roll B4, frame #14).

Figure 3.7-6. Looking down the face of the Snowstorm No. 3 dump, with water flowing along the right side. The view is to the south (Roll B4, frame #13).
Figure 3.7-7. Remains of an old trestle tower on the east side of the Snowstorm No. 3 dump (Roll B4, frame #15).

Figure 3.7-8. Shallow trench at the Snowstorm Apex (Roll B4, frame #17).
Figure 3.7-9. Large pit at the Snowstorm No. 1 (Roll B4, frame #19).

Figure 3.7-10. Looking west across the surface of the Snowstorm No. 2 dump (Roll B4, frame #22).
Figure 3.7-11. Looking down the face of the Snowstorm No. 2 waste dump (Roll B4, frame #23).

Figure 3.7-12. Remains of the portal timbers at the Snowstorm No. 4 caved adit (Roll B5, frame #6).
Figure 3.7-13. Snowstorm No. 4 waste dump being eroded by the creek in Daisy Gulch (Roll B5, frame #7).

Figure 3.7-14. Stockpiled Revett Quartzite at Larson Siding, site of the former Silver Mountain Shaft (Roll B5, frame #13).
Figure 3.7-15. Close-up of the mounds of Revett Quartzite at Larson Siding (Roll B5, frame #12).

Figure 3.7-16. Timbers from headframe of the old Silver Mountain Shaft. The timbers are bolted to the rock outcrop in the center of the picture. The headframe was on the east side of the stockpiled quartzite at Larson Siding (Roll B5, frame #11).
3.8 SNOWSHOE MINE (Site No. WL-374)

3.8.1 Site Location and Access (Figure 2.1-1d)

The Snowshoe Mine is located slightly more than 1 mile up Gentle Annie Gulch near the center of the south edge of section 19, T. 48 N., R. 6 E., on the Lookout Pass 7.5-minute quadrangle (Figure 3.8-1). The workings appear to be on patented claims bordered by Forest Service land to the south and west. The property has a main adit and dump just north of Forest Service Road 6532, and an upper level reached from a road behind the main adit. A short access road leads from Road FS 6532 to the top of the dump and the main adit.

3.8.2 Geologic Features (Figure 2.2-1b)

Hobbs and others (1965, Plate 5) shows that the workings were driven through St. Regis Formation to veins in the Revett Quartzite. These veins are on strike with those at the Snowstorm Mine.

3.8.3 Site History

The eight claims at the Snowshoe Mine were patented before 1913, and the mine was actively developed over the next few years. By 1922, there were 3,300 feet of workings, including two main tunnels (1,800 feet and 700 feet long) and an 800-foot crosscut. The mine appears to have been idle from 1923 until 1983, when Hecla signed a ten-year agreement to explore the property. The following year, Hecla spent $8,000 on developing the Snowshoe, which could possibly be explored from the Lucky Friday Mine. No other activity has been reported at the mine.

3.8.4 Environmental Conditions

3.8.4.1 Site Features

The Snowshoe Mine was visited by Earl Bennett on July 25, 1997. A video segment describing the property is on the Coeur d’Alene Basin Videotape (Tape 2, index 00:40:46-00:50:08). Documenting photos are Roll B4, frames 24-25; Roll B5, frames 1-2; and Roll B9, frames 1-3.

There is a sign on a tree near the adit noting that this is the Snowshoe Mine. The mine consists of a main lower adit and an upper adit. The main adit is gated and locked, and it has “Keep Out” painted in red across the wooden door (Figure 3.8-2). Like the Snowstorm No. 3, there is a considerable flow of water from this adit (at least 50 gpm). The water flows over and along the west side of the dump, then crosses under the main road (FS Road 6532) in a culvert. This is a major source of water for Gentle Annie Gulch. Part of the dump has been eroded by the adit water (Figure 3.8-3). The dump is 120 feet long, at least 80 feet thick, and has large trees growing on it (Figure 3.8-4). There is little copper staining, but the Revett Quartzite on the dump
contains abundant blebs of sulfides, which are now oxidized and appear as brown spots. The disturbed area covers about 1 acre.

The upper adit has a very steep dump about 90 feet long and 200 feet thick on the nose. Interstate 90, Stevens Peak, and the Lucky Friday tailings ponds are visible from this dump. The dump is, in turn, very visible from many places in the Stevens Peak area to the south. No indication of the adit remains. There are a few prospect pits just west of the dump. A large concrete block was noted on the dump, but its function is unknown. The disturbed area covers about 0.5 acre.

3.8.4.2 Sample Locations

3.8.4.2.1 Soil Samples
No dump samples were collected at this site.

3.8.4.2.2 Water Samples

A water sample (B7259702) was collected from the main adit at the Snowshoe Mine.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7259702</td>
<td>Snowshoe Mine, main adit</td>
<td>17μs</td>
<td>40</td>
<td>7.5</td>
<td>&gt;50</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.8.4.2.3 Analytical Results

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

The adit water sample (B7259702) exceeds the Aquatic Life Chronic value in both the dissolved and total metals screens for cadmium. It is within the range of the Aquatic Life Acute standard for cadmium in the total metals screen. The test for lead is within the range of the Aquatic Life Chronic standard.

3.8.5 Structures
No structures are present at this site.

3.8.6 Safety
No safety hazards were identified at this site.
Figure 3.8-1. Topographic map of the Snowshoe Mine, Shoshone County, Idaho (U.S. Geological Survey 7.5-minute topographic map).
Figure 3.8-2. Main Snowshoe adit, gated and locked. Note the prominent warning signs (Roll B4, frame #24).

Figure 3.8-3. Looking down the face of the dump where the adit water has eroded a gully (Roll B5, frame #1).
Figure 3.8-4. Looking south across the surface of the dump from the main adit (Roll B4, frame #25).
3.9 LUCKY CALUMET MINE (Site No. WL-356)

3.9.1 Site Location and Access (Figure 2.1-1d)

The Lucky Calumet Mine is located up a tributary to Gentle Annie Gulch along Forest Service Road 6532 in the SE¼ of the SW¼ of section 19, T. 48 N., R. 6 E., on the Lookout Pass 7.5-minute quadrangle (Figure 3.9-1). The property is on Forest Service land.

3.9.2 Geologic Features (Figure 2.2-1b)

The Lucky Calumet was driven into rocks of the St. Regis Formation (Hobbs and others, 1965, Plate 5). It is not known if the adits reached the underlying Revett Formation.

3.9.3 Site History

In 1909, the Lucky Calumet was listed as one of the more extensively developed properties in the Hunter mining district. By 1913, there were nine patented claims at the mine and total development was approximately 5,700 feet. Active development by the Lucky Calumet Copper Mining Company continued through 1917. In 1922, the mine had two tunnels (600 and 1,100 feet long), and the total development was given as about 5,000 feet. Development work resumed in 1928. Late in the year, the company consolidated with the Independent Copper Mining & Milling Company to form the Consolidated Independent Calumet Mining Company. The Idaho Mine Inspector noted that the company was working its property through the lower tunnel of the National Copper Mine, which Independent had been doing for several years before the merger. For the next few years, the company continued working on the Independent group, but after 1931, the property was again idle.

3.9.4 Environmental Conditions

3.9.4.1 Site Features

The Lucky Calumet Mine was visited by Earl Bennett on July 25, 1997. A video segment describing the property is on the Coeur d’Alene Basin Videotape (Tape 2, index 00:50:08-00:55:27). Documenting photos are Roll B5, frames 3-5.

The main adit at the Lucky Calumet is caved (Figure 3.9-2), but has a substantial flow of water, similar to that noted at the Snowshoe Mine and the Snowstorm No. 3 level. At the Lucky Calumet, the water also flows through a culvert under the road (Figure 3.9-3). The water from the adit is another major source of water for Gentle Annie Creek. The dump lies on the south side of, and is crossed by, the road (Figure 3.9-4). There is evidence of substantial erosion of this dump by spring flood waters. The dump is several hundred feet thick. Just west of the culvert, the road and dump have been partially washed out, probably by subsurface water undercutting the road. The upper adit was not visited. The disturbed area is about 1.5 acres.
3.9.4.2 Sample Locations

3.9.4.2.1 Soil Samples
No dump samples were collected at this site.

3.9.4.2.2 Water Samples
A water sample (B7259703) was collected from the Lucky Calumet main adit.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature (° F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7259703</td>
<td>Lucky Calumet, main adit</td>
<td>18μS</td>
<td>42</td>
<td>7.3</td>
<td>&gt;25</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.9.4.2.3 Analytical Results

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

The adit water sample (B7259703) is within the range of the Aquatic Life Chronic standard for lead. All other metals are below detection limits.

3.9.5 Structures
No structures are present at this site.

3.9.6 Safety
No safety hazards were identified at this site.
Figure 3.9-1. Topographic map of the Lucky Calumet Mine, Shoshone County, Idaho (U.S. Geological Survey Lookout Pass 7.5-minute topographic map).
Figure 3.9-2. Caved adit at the Lucky Calumet Mine. The water visible at the bottom right of the photograph is coming from the adit (Roll B5, frame #3).

Figure 3.9-3. Culvert carrying water from the Lucky Calumet adit underneath the access road (Roll B5, frame #5).
Figure 3.9-4. Lucky Calumet waste dump, with the access road in the upper right. The dark patch (barely visible) along the left edge of the road is where the road has been washed out, possibly by subsurface water (Roll B5, frame #4).
3.10 NATIONAL COPPER MINE (Site Nos. WL-367 and WL-336)
Alternative name—National Mine, United Copper property, Missoula Prospect (WL-336).

3.10.1 Site Location and Access (Figure 2.1-1d)

The main adit of the National Copper Mine is located about 1 mile up Deadman Gulch and 200 feet below Forest Service Road 6532 in the SE¼ of the SW¼ of section 24, T. 48 N., R. 5 E., on the Mullan 7.5-minute quadrangle (Figure 3.10-1). The middle (Missoula) workings are in the SE¼ of the NE¼ of section 24, in the extreme northeast corner of the Mullan 7.5-minute quadrangle. The upper adit is in the southwest corner of the SW¼ of section 18, T. 48 No., R. 6 E., on the Thompson Pass 7.5-minute quadrangle. The property is owned by Hecla Mining Company and borders other patented claims to the south, west, and north, and Forest Service land to the east.

3.10.2 Geologic Features (Figure 2.2-1b)

The main adit was driven through Wallace and St. Regis units to northwest-trending veins in the Revett Formation (Hobbs and others, 1965, Plate 5). These veins appear to be on strike with those of the Snowstorm, Snowshoe, and Lucky Calumet mines.

3.10.3 Site History

In 1913, the National Copper Mining Company did a considerable amount of development work and planned to build a 500-ton flotation concentration plant. The lode was intercepted at a depth of 1,700 feet and was said to be 70 feet wide and 350 feet long. The ore was low-grade copper similar to that at the Snowstorm. The mill was completed in 1914, and 12,000 tons of low-grade copper sulfide ore was treated. The mill consisted of a Blake crusher, a Simons disk crusher, six Hardinge mills, two sets of rollers, four sets of Callow screens, ten Deister and ten Willfley tables, an Esperanza classifier, an eight-cell Callow flotation plant, and a Dorr thickener.

In 1915, the mine was operated for 150 days and the mill for 50 days. The winze was sunk from the 1,000-foot level to the 1,200-foot level, and several shipments of copper concentrates, which contained gold and silver, were made. In 1916, several thousand tons of low-grade copper ore were treated in the mill and concentrates were shipped to Tacoma. However, the mill was only operated for a short time because further development at depth in the mine was deemed necessary. Again in 1917, several thousand tons of ore were treated and the concentrates sent to Tacoma. The shaft was dewatered and deepened from the 1,200-foot level to the 1,500-foot level. Other development was also done on the winze, raise, and crosscuts. No ore was encountered below the 1,500-foot level because the National vein was truncated by the Snowstorm fault. In 1918, the National property was the most important producer of copper in Shoshone County. Some improvements were made in the mill. A new hoist and electric pumps were installed at the mine, and sinking of the shaft was begun below the 1,500-foot level. Production between 1915 and 1918 was 314.12 ounces gold, 250,639 ounces silver, and
1,849,560 pounds of copper, netting a profit of $59,080. In 1919, the National operated for about six months, and the 500-ton mill concentrated a large quantity of low-grade copper ore. Several thousand tons of concentrate, containing about 40 ounces of silver to the ton and 15 percent copper, was shipped to Tacoma.

In 1923, the Independent Copper Mining & Milling Company did some prospecting from the tunnel of the National Mine. This arrangement with Independent and its successor, the Consolidated Independent Calumet Mining Company, continued until 1931.

3.10.4 Environmental Conditions

3.10.4.1 Site Features

The National Copper Mine was visited by Earl Bennett on July 29, 1997. A video segment describing the property is on the Coeur d'Alene Basin Videotape (Tape 2, index 00:55:27-01:09:55). Documenting photos are Roll B5, frames 14-22, and Roll B6, frames 3-13, 15.

The main adit at the lower workings (Adit No. 1) is secured by a steel door with warning signs (Figure 3.10-2). An aluminum tag from the Idaho Department of Water Quality notes that the water has been tested as a domestic water supply. The flow of a considerable volume of water could be heard in a covered box just outside the adit. In this respect, the mine is similar to the main levels at the Lucky Calumet, Snowshoe, Snowstorm, and Idaho Copper mines, all of which are close to the same elevation. The water flows via a pipeline down the hill about ¼ mile to a junction box where this water and additional water collected from Deadman Gulch is piped to the Lucky Friday Mine. (A sign in a tree [Figure 3.10-3] notes that this is a domestic water supply.) A damaged bridge across the creek at this location shows the ravages of the 1997 spring floods, and the pipeline has been exposed by the flooding (Figure 3.10-4).

High-tension power lines pass directly over the dump at Adit No. 1 and are no more than 50 feet above the dump (Figure 3.10-5). A pickup parked under these lines vibrates from the electrical energy. The dump is large, measuring 150 feet long, 75 feet wide, and 175 feet thick on the nose (Figures 3.10-6 and 3.10-7). There is some iron-stained orange rock on the top of this dump that may have been added after the main dump material.

A road on the front of the dump leads to two smaller adits and dumps on the west side of the East Fork of Deadman Gulch. The first of these adits (Adit No. 2) is just west of the East Fork and is boarded up (Figure 3.10-8). There is a minor amount of water coming from this adit. The dump impinges on the East Fork drainage (Figure 3.10-9). About 100 feet west of Adit No. 2 is another dump (Figure 3.10-10), but the adit (Adit No. 3) for this dump is apparently caved and could not be found. Approximately 5 acres are disturbed at this site.

The middle workings of the National Copper Mine are accessed via a logging road. These workings consist of a lower gated adit (Missoula Adit on Hobbs and others, 1965, Plate 5) and an
upper caved shaft (Missoula Shaft on Hobbs and others, 1965, Plate 5), both on the East Fork of Deadman Gulch. The gate on the lower adit is made of welded tool steel. The adit has a pile of sloughed rock in front of it (Figure 3.10-11), and a small amount of water flows from it that goes into the East Fork. The East Fork flows under the access road in a steel culvert (Figure 3.10-12). A concrete slab (the foundation for a small building) is located just east of the adit. The waste dump for this adit (Figures 3.10-13 and 3.10-14) is 45 feet long, 30 feet wide, and 100 feet thick on the nose. The upper, caved shaft is about 10 feet deep (Figure 3.10-15) and has footings for a hoist (Figure 3.10-16). A seep of water flows into the shaft. The dump measures about 60 feet long, 10 feet wide, and 60 feet thick. It has been modified by construction of the road (Figure 3.10-17). The disturbed area at the middle workings is about 3 acres.

The upper adit at the National Copper Mine (so-called in this report because it is above the Missoula adit and shaft, but the adit may be a separate property) is reached by logging roads. The adit is caved and dry. It has a circular, cone-shaped dump about 40 feet high and 100 feet across at the base (Figure 3.10-18). The disturbed area is less than 0.5 acre.

3.10.4.2 Sample Locations

3.10.4.2.1 Soil Samples

Waste dump samples were collected from the lower workings of the National Copper at Adit No. 2 (B7299702) and at the middle workings (B7299706).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7299702</td>
<td>National Copper, Adit No. 2 dump</td>
<td>Yes</td>
</tr>
<tr>
<td>B7299706</td>
<td>National Copper, middle workings</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.10.4.2.2 Water Samples

Water samples were collected from water flowing from Adit No. 2 (B7299701) at the lower workings and at the adit at the middle workings (B7299705).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7299701</td>
<td>National Copper, Adit No. 2</td>
<td>91 µs</td>
<td>50</td>
<td>7.08</td>
<td>---</td>
<td>Yes</td>
</tr>
<tr>
<td>B7299705</td>
<td>National Copper, middle workings, adit</td>
<td>13 µs</td>
<td>---</td>
<td>8.0</td>
<td>2-3</td>
<td>Yes</td>
</tr>
</tbody>
</table>
3.10.4.2.3 Analytical Results

Soil Samples (Tables 2.5-3 and 2.5-4)

Compared to background levels (Tables 1.5-3 and 1.5-4) and environmental standards (Table 1.5-5), the element screen for the National Copper Adit No. 2 dump sample (B7299702) has somewhat elevated values for lead (640 ppm) and zinc (620 ppm), and slightly elevated values for cadmium (1.8 ppm) and copper (52 ppm). The dump at the middle workings (B7299706) has elevated values for copper (130 ppm) and lead (160 ppm). In the TCLP for metals screen, both samples showed significant leaching for lead.

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

Water from Adit No. 2 (B7299701) is within the range of the Aquatic Life Chronic standards for copper. The total metals screen equals or exceeds all standards for cadmium. The dissolved metals screen of the sample from the middle workings (B7299705) exceeds both Aquatic Life standards for copper and the Aquatic Life Chronic standard for cadmium; the total metals screen exceeds all standards for cadmium and both Aquatic Life standards for copper.

3.10.5 Structures

Concrete footings for the old National Mill remain on the hillside just east of the Lucky Friday Mine. The concrete is now a popular graffiti site (Figure 3.10-19).

3.10.6 Safety

Although steel bars are welded over the adit at the middle workings, they are widely spaced. It might be possible to enter the adit by squeezing through the bars.
Figure 3.10-1. Topographic map of the National Mine, Shoshone County, Idaho (U.S. Geological Survey Mullan, Thompson Pass, Burke, and Lookout Pass 7.5-minute topographic maps).
Figure 3.10-2. Steel doors at the main portal of Adit No. 1 at the National Mine (Roll B5, frame #14).

Figure 3.10-3. Sign that reads "Domestic Water, Do Not Contaminate," which marks the water supply for the Lucky Friday Mine. The water comes from the main (No. 1) adit at the National Copper Mine (Roll B5, frame #22).
Figure 3.10-4. Flood-damaged bridge and erosion around the pipeline that carries the water supply for the Lucky Friday Mine (Roll B5, frame #21).

Figure 3.10-5. Main (No. 1) adit waste dump at the National Copper Mine. The view is from the south end, looking toward the portal, which is beyond the vehicle. Note the overhead transmission lines (Roll B5, frame #15).
Figure 3.10-6. View of the main dump at the National Copper Mine. The view is to the west from the east side of the East Fork of Deadman Gulch (Roll B5, frame #17).

Figure 3.10-7. Looking down the nose of the waste dump of the main adit (No. 1) at the National Copper Mine (Roll B5, frame #16).
Figure 3.10-8. Adit No. 2, just west of the East Fork of Deadman Gulch, at the National Copper Mine (Roll B5, frame #18).

Figure 3.10-9. Waste dump for Adit No. 2 at the National Copper Mine, showing where it is cut by the creek in the East Fork of Deadman Gulch (Roll B5, frame #19).
Figure 3.10-10. Waste dump for Adit No. 3 at the National Copper Mine (Roll B5, frame #20).

Figure 3.10-11. Welded tool-steel gate covering the Missoula Adit at the middle workings of the National Copper Mine (Roll B6, frame #3).
Figure 3.10-12. Culvert which channels water from the East Fork of Deadman Gulch under the access road. The adit at the middle workings of the National Copper Mine is a short distance upstream from this culvert (Roll B6, frame #5).

Figure 3.10-13. Looking down the nose of the lower dump of the adit at the middle workings of the National Copper Mine. A patch of oxidized material extends from the center left to the lower center of the photograph (Roll B6, frame #6).
Figure 3.10-14. Looking down the East Fork of Deadman Gulch from the dump at the Missoula Shaft. The culvert is the same as the one in Figure 3.10-12 (Roll B6, frame #9).

Figure 3.10-15. The Missoula Shaft at the middle workings of the National Copper Mine (Roll B6, frame #7).
Figure 3.10-16. Looking across the surface of the dump at the Missoula Shaft of the National Copper Mine. A concrete slab for the hoist footing is to the right of the tree on the left side of the photograph (Roll B6, frame #8).

Figure 3.10-17. Looking toward the upper (shaft) dump from the lower (adit) dump at the middle workings of the National Copper Mine (Roll B6, frame #4).
Figure 3.10-18. Dump at the upper workings of the National Copper Mine (Roll B6, frame #11).
Figure 3.10-19. Concrete footings for the old National Mill, just east of the Lucky Friday Mine (Roll B6, frame #15).
3.11 COPPER KING MINE (Site Nos. WL-318 and WL-345)
Alternative name—King Group. Site No. WL-318 is the Copper King upper workings, and Site No. WL-345 is the Copper King lower workings.

3.11.1 Site Location and Access (Figure 2.1-1d)

The upper workings of the Copper King Mine are located at the head of Sonora Gulch on the southeast slope just above a small wetland (marked elevation 5349 feet on topographic map). The adits are in the north half of the SW¼ of section 13, T. 48 N., R. 5 E., on the Burke 7.5-minute quadrangle (Figure 3.11-1). Access from Burke is east on State Highway 4 about 1¼ miles to the substation, then up Sonora Gulch about 1¾ miles along an old jeep trail that follows the northeast side of the gulch. The trail is in reasonably good condition, but had downed trees across it at the time of the site visit and was passable only on foot. At an elevation of about 5,480 feet, the mine access road splits from the main Sonora Gulch trail at the bend of the first switchback. The access road continues southward and reaches Adit No. 1 (the Copper King No. 2 tunnel) at a slightly lower elevation of about 5,400 feet. A second, small tunnel (Adit No. 2, which was the Copper King No. 1 tunnel) is located to the east-southeast of the main adit and is uphill from the main adit at an elevation of about 5,750 feet. Although no trail was found to the second adit, it is on a recently logged slope with a logging road about 100 feet above and to the northeast of the tunnel. It was not determined where the logging road originates. The upper workings of the Copper King appear to be on patented claims adjacent to areas of Forest Service land.

The lower workings of the Copper King (the Copper King No. 3 tunnel) are west of the National No. 3 workings in the West Fork of Deadman Gulch. The lower Copper King is in the SW¼ of the NW¼ of section 24, T. 48 N., R. 5 E., on the Mullan 7.5-minute quadrangle (Figure 3.11-1). Forest Service Road 6532 crosses the dump. The lower workings are on patented claims adjacent to several small slivers of Forest Service land.

3.11.2 Geologic Features (Figure 2.2-1b)

According to Hobbs and others (1965, Plate 5), the main adit at the upper workings was driven southeast into beds of the St. Regis Formation and probably into the lower Wallace Formation. The beds strike east-west to northwest and dip moderately to the south or southwest. The smaller adit at the upper workings appears to be driven northeast along the contact of the St. Regis and lower Wallace formations. Milky white quartz-vein fragments on the waste dumps have minor amounts of azurite and malachite.

The adit at the lower workings was driven northward approximately 1 mile, starting in a sliver of St. Regis Formation and passing into the Wallace Formation. Rock attitudes vary considerably but generally strike north-south or northwest and dip moderately to steeply to the southwest or west, with some units overturned (Hobbs and others, 1965, Plate 5).
3.11.3 Site History

In 1918, development at the Copper King disclosed a large body of ore containing silver, copper, and lead. Diamond drilling opened a new ore body at the property in 1923. Hall (1926, p. 2-3) described the mine as follows:

The upper workings consists of numerous open cuts on the vein and the No. 1 and No. 2 tunnels on the Copper King lode. Both tunnels cut the vein on the Lelande side of the divide near the head of Sonora Gulch. The No. 1 tunnel consists of about 250 feet of drift and cross-cut, but has been caved for many years.

No. 2 tunnel, now caved at the portal, gives a depth of 500 feet below the apex of the ridge and consists of 1500 feet of drift and cross-cut and about 125 feet of winze, said to be on the vein. The winze, since I have been connected with the property, has been full of water. On the second floor, 16 feet above the winze, a good showing of high grade copper and lead silver ore, 80 or 90 feet long and from 2 to 4 feet wide, has been exposed. It was to explore this showing that the No. 3 cross-cut was driven.

The No. 3 cross-cut, 4500 feet long and nearly 1000 feet vertically below No. 2 tunnel is driven nearly due north from the Mullan side of the divide. This cross-cut represents the present lower workings and is 375 feet above the National cross-cut about one mile to the east. The first 2500 feet in No. 3 cross-cut passes through what is known as the Wallace shale. The next 1000 feet is in the St. Regis quartzite. At this point a strongly mineralized Revett and Burke quartzite is entered. At a distance of 3650 feet a well defined fault or fault fissure is cut. Strike S.70°E., Dip from 50° to 60° South. For a considerable distance north of this fault the formation (Burke & Revett Quartzite) is more or less mineralized showing stringers and lenses of galena (lead-silver ore), some cutting and others paralleling the bedding planes. Average strike N.20°W. with a general westerly dip.

In 1950, Day Mines, Inc., reported that the mine had three tunnels, two shafts, seven raises, nine drifts, and twenty cross-cuts. Total development was 9,543 lineal feet of workings, consisting of 5,667 feet of cross-cuts, 3,467 feet of drifts, 260 feet of raises, and 140 feet of shafts. The lengths of the tunnels were: No. 1, 40 feet; No. 2, 900 feet; and No. 3, 4,320 feet. The vertical shafts were 100 feet and 40 feet deep. There were eighteen patented claims in the Copper King group.

3.11.4 Environmental Conditions

3.11.4.1 Site Features

The upper workings of the Copper King were visited by John Kauffman on August 20, 1997. No video was taken at this site. Documenting photos are Roll K7, frames 18-25. The lower
workings of the Copper King were visited by Earl Bennett on July 29, 1997. A video segment describing this property is on the Coeur d’Alene Basin Videotape (Tape 2, index 01:09:55-01:19:03). Documenting photos are Roll B5, frames 23-25, and Roll B6, frames 1-2, 14.

Two adits and several small pits were found at the upper workings of the Copper King. Adit No. 1 is the main tunnel (Copper King No. 2 tunnel, as described by Hall, 1926) and has a large waste dump. The adit is caved and its location not easily detectable, although a slight depression on the slope is visible. The waste dump is large and slightly triangular in shape. It is about 90 feet long, ranges from 45 feet wide near the adit to 10 feet wide at the west end, and is 50 feet thick. The base is about 50-60 feet across. Except for patches of grass, wild flowers (weeds), and a few small bushes, the dump is bare (Figure 3.11-2). Surrounding slopes are moderately to densely timbered with conifers (Figure 3.11-3). Some flattened metal stovepipe is scattered on the south side of the dump. A small pile of white vein quartz is located on the southeast end of the dump near the caved adit (Figure 3.11-4).

Adit No. 2 (Copper King No. 1 tunnel, as described by Hall, 1926) is relatively small, judging from the size of the waste dump. It probably was driven for prospecting purposes. The adit is caved and is now expressed as a depression or trench in the slope (Figure 3.11-5). Several small conifers are growing in the bottom of the depression. The waste dump (Figure 3.11-6) is about 65 feet long but only 15 feet wide and 20 feet thick. The surface of the dump supports a few small conifers, but the face, or slope, of the dump is bare.

Below the Adit No. 2 dump are at least four small pits. One, 30 feet from the south end of the dump, is about 6 feet long, 5 feet wide, and 3 feet deep. A second pit, 100 feet below (west of) the adit dump, is about 8 feet in diameter by 4 feet deep (Figure 3.11-7). Two small, shallow pits are located 20 feet downslope from the second pit. Other prospect pits may well be in the area. The total disturbed area for all the workings in the vicinity of the upper adits is about 1 acre.

At the lower workings of the Copper King, a small tin-roofed shack by the road is right beside the main adit (Copper King No. 3 tunnel, as described by Hall, 1926), which is caved (Figure 3.11-8). A considerable volume of water from the adit flows through a culvert under the main road and has eroded the waste dump. A large tree has fallen into the eroded cut just below the culvert (Figure 3.11-9). A massive concrete block is also sliding into the creek near the road. The adit water is the main water source for the West Fork of Deadman Gulch. The dump (Figures 3.11-10, 3.11-11 and 3.11-12) measures 75 feet long, 35-40 feet wide, and 90 feet thick, and contains isolated iron-stained lenses. Across the drainage from the shack to the west is what is possibly another caved adit with a minor seep, but the flow is nothing like that from the main adit. The disturbed area at the lower workings is roughly 3 acres.

3.11.4.2 Sample Locations

3.11.4.2.1 Soil Samples

A sample was collected from the main waste dump at the lower (No. 3) adit (B7299704).
### Water Samples

A water sample was collected from the lower (main, or No. 3) adit of the Copper King (B7299703).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7299703</td>
<td>Copper King, lower (No. 3) adit, main dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Analytical Results

#### Soil Samples (Tables 2.5-3 and 2.5-4)

In the element screen, the dump sample from the lower (No. 3) adit (B7299704) has elevated values of copper (1,400 ppm), lead (1,500 ppm), and zinc (1,700), and slightly elevated cadmium (6.6 ppm) when compared to background levels (Tables 1.5-3 and 1.5-4) and environmental standards (Table 1.5-5). In the TCLP for metals screen, the sample shows significant leaching for cadmium and lead.

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

The water sample from the lower (No. 3) adit (B7299703) slightly exceeds the Aquatic Life Chronic standard for copper in the dissolved metals screen and the Aquatic Life Chronic standard for cadmium in the total metals screen.

### 3.11.5 Structures

A small tin-roofed shack is present beside the road at the lower (main, or No. 3) adit.

### 3.11.6 Safety

No physical hazards were identified at this site.
Figure 3.11-1. Topographic map of the Copper King Mine, Shoshone County, Idaho (U.S. Geological Survey Mullan 7.5-minute topographic map).
Figure 3.11-2. Looking east along the north edge of the Adit No. 1 dump at the upper workings of the Copper King Mine (Roll K7, frame #25).

Figure 3.11-3. Small wetland below the north end of the Adit No. 1 waste dump at the upper workings of the Copper King Mine (Roll K7, frame #23).
Figure 3.11-4. Pile of vein material near the caved Adit No. 1 at the upper workings of the Copper King Mine (Roll K7, frame #24).

Figure 3.11-5. Caved Adit No. 2 at the upper workings of the Copper King Mine, looking east-northeast (Roll K7, frame #18).
Figure 3.11-6. Waste dump of Adit No. 2 at the upper workings of the Copper King Mine, looking southeast (Roll K7, frame #19).

Figure 3.11-7. One of the shallow pits below the Adit No. 2 dump at the upper workings of the Copper King Mine. This pit is described in the text as the "second pit" (Roll K7, frame #20).
Figure 3.11-8. Rotted, broken timbers of the caved lower (main, or No. 3) adit at the Copper King Mine (Roll B6, frame #2).

Figure 3.11-9. Erosion along the edge of the access road and the top of the waste dump at the lower (main, or No. 3) adit at the Copper King Mine. Note the large tree that has fallen into the eroded gully (Roll B5, frame #25).
Figure 3.11-10. Main waste dump at the lower (No. 3) adit of the Copper King Mine, looking west (Roll B5, frame #23).

Figure 3.11-11. Nose of the main waste dump at the lower (No. 3) adit of the Copper King Mine, with the West Fork of Deadman Gulch Creek at the base (Roll B5, frame #24).
Figure 3.11-12. West Fork of Deadman Gulch Creek, flowing around the base of the main dump at the lower (No. 3) adit of the Copper King Mine (Roll B6, frame #1).
3.12 REINDEER QUEEN MINE (Site No. WL-460)
Alternative name—Reindeer Copper Queen.

3.12.1 Site Location and Access (Figure 2.1-1d)

The Reindeer Queen Mine is on the East Fork of Willow Creek about 1.5 miles south of Interstate 90 and is just west of the center of section 1, T. 47 N., R. 5 E., Mullan 7.5-minute quadrangle (Figure 3.12-1). Forest Service Trail 165, which is actually a road, leads to the mine. A short spur road crosses the creek from the trail (road) to the mine.

3.12.2 Geologic Features (Figure 2.2-1b)

The Reindeer Queen adit was driven south about 3/4 mile in units of the St. Regis Formation to intercept veins along an east-west trend (Hobbs and others, 1965, Plate 5). These veins may extend several miles to the west to West Willow Peak and several miles to the east into Montana. Along most of the adit length, the bedding strikes east-west and dips shallowly to moderately to the south. Near the veins, the adit crosses the Reindeer Fault and attitudes change from southward dipping to steeply northward dipping.

3.12.3 Site History

In 1909, the Reindeer and Copper Queen properties were mentioned as being among those in the area which had extensive development. Copper ore from the Reindeer Mine was jigged and shipped to the Tacoma smelter in 1910. In 1913, the Reindeer and Copper Queen mines were consolidated, and the new company formed was the Reindeer-Queen Mining Co. The mine had three long tunnels and about 7,000 feet of workings in 1915. In 1916, the Reindeer Queen produced a small shipment of copper ore. After that, according to company reports to the Idaho Inspector of Mines, the company was inactive for several years “on account of the high cost of supplies” during World War I.

Development work resumed in 1924. In 1926, the company reported having a large body of low-grade copper ore in sight. The mine had seven tunnels, one shaft, and one raise; the total length of the workings was about 12,450 feet. After 1928, the company did only assessment work for the next few years. The mine was idle thereafter.

In 1981, Bear Creek Mining Company signed an option agreement with the Reindeer Queen Mining Company and several other companies with property in the area. The company planned deep, “wildcat” testing of the area. Anaconda Minerals Co. acquired the 25,000-acre land package from Bear Creek in 1982 and continued exploration of the area in 1983. As part of this East End exploration project, Anaconda drilled a 3,500-foot-deep hole underground at the Reindeer Queen in 1984. This was one of the deepest holes ever drilled in the district, and a new navi-drilling technology was used that allowed the drill to be guided to its target. The hole yielded a wealth of stratigraphic information. About 25,000 feet of core generated by Anaconda
Minerals' $2 million drilling program was donated to the Idaho Geological Survey and the operating companies in the district. The core was moved to local storage quarters provided by Coeur d'Alene Mines. Later in the year, Anaconda announced it was dropping the entire East End exploration program. The company had been searching for extensions of "Silver Belt" mineralization on some 25,000 acres east of the Placer Creek fault. The program was considered a daring wildcat venture by some and was located in an area with very little geologic information. The project was terminated when Anaconda's parent, ARCO, decided to get out of the metal mining business.

3.12.4 Environmental Conditions

3.12.4.1 Site Features

The Reindeer Queen Mine was visited by Earl Bennett on August 5, 1997. A video segment describing the property is on the Coeur d'Alene Basin Videotape (Tape 2, index 01:19:30-01:23:01). Documenting photos are Roll B7, frames 22-25.

The Reindeer Queen was reopened by the Anaconda Company during the so-called East End Project in the 1980s. The adit (Figures 3.12-2 and 3.12-3) is gated but open. A sign warns, “Stay out, Bad Air.” The adit may be collapsed because it appears to be caved on the surface. Water in the adit is dammed by caved rock at the portal, and the flow is only a few gallons per minute. The water flows out onto the dump (Figure 3.12-4). Ore car rails extend out from the adit onto the dump surface. The dump measures 120 feet long, 30 feet wide, and 60 feet thick on the nose. It impinges on, and has been partially washed into, Willow Creek (Figure 3.12-5). The disturbed area covers about 1 acre.

3.12.4.2 Sample Locations

3.12.4.2.1 Soil Samples

A waste dump sample was collected from the main adit dump (B8059705).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8059705</td>
<td>Reindeer Queen main adit dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.12.4.2.2 Water Samples

A water sample was collected of the discharge from the main adit (B8059704).
<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
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</thead>
<tbody>
<tr>
<td>B8059704</td>
<td>Reindeer Queen main adit</td>
<td>87µs</td>
<td>40</td>
<td>8.0</td>
<td>2</td>
<td>Yes</td>
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</tbody>
</table>

3.12.4.2.3 Analytical Results

Soil Samples (Tables 2.5-3 and 2.5-4)

In the element screen, the Reindeer Queen waste dump (B8059705) has high copper (1,900 ppm) and iron (19 percent) values and slightly elevated levels of arsenic (85 ppm), cadmium (7.7 ppm), and lead (150 ppm) when compared to background levels (Tables 1.5-3 and 1.5-4) and environmental standards (Table 1.5-5). In the TCLP for metals screen, values are below detection limits for all relevant metals.

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

In the dissolved metals screen, the main adit water sample (B8059704) has a copper value slightly above the lower limit of the Aquatic Life Chronic standard. In the total metals screen, cadmium exceeds all standards.

3.12.5 Structures

No structures are present at this site.

3.12.6 Safety

The adit appears to be caved beyond the portal, but if it is not entirely closed off, it could be entered. In that case, unstable rock conditions and/or bad air would be potential hazards.
Figure 3.12-1. Topographic map of the Reindeer Queen Mine, Shoshone County, Idaho (U.S. Geological Survey Mullan 7.5-minute topographic map).
Figure 3.12-2. Reindeer Queen adit. Note the rails on the dump surface in the lower right of the picture (Roll B7, frame #25).
Figure 3.12-3. Close-up of the Reindeer Queen adit, which may be caved. This is indicated by the sloughed surface behind the portal (Roll B7, frame #22).
Figure 3.12-4. Surface of the Reindeer Queen waste dump, showing adit water and rails (Roll B7, frame #24).

Figure 3.12-5. Willow Creek eroding the toe of the Reindeer Queen waste dump (Roll B7, frame #23).
3.13 RED MONARCH MINE (Site No. WL-179)
Alternative name—Delaware Mines Corp.

3.13.1 Site Location and Access (Figure 2.1-1c)

The Red Monarch Mine is located about ½ mile upstream from the mouth of Missoula Gulch, a tributary to Dobson Gulch, in the N½ of the SW¼ of the NE¼ of section 36, T. 49 N., R. 4 E., on the Osburn 7.5-minute quadrangle (Figure 3.13-1). The property is on Forest Service land about 1 mile southeast of Beaver Creek, but the access road from Primary Forest Road 456 (Beaver Creek-Dobson Pass Road) crosses private property along Beaver Creek. The portion of the access road up Missoula Gulch is completely overgrown with trees and brush and is nearly impassible, even on foot. The access road crosses the top of the waste dump and terminates at the adit (Figure 3.13-2).

3.13.2 Geologic Features (Figure 2.2-1b)

The underground workings of the Red Monarch are in argillite and quartzose argillite of the Prichard Formation (Hobbs and others, 1965, Plate 4). The adit extends for about 1 mile in a southerly direction from Missoula Gulch. The southern end of the adit was connected by a winze to the workings of the Rex Mine on the East Fork of Ninemile Creek (Shenon and others, 1954). The Prichard Formation strikes northeast and dips from 10° southeast near the portal to about 60° southeast at the end of the adit. Several northwest-trending veins are crossed by the adit (Hobbs and others, 1965, Plate 4). Little is known of the character of the veins, but Shenon and others (1954) noted that it was difficult to correlate the structures on the upper (Rex) levels with those found in the Red Monarch. Samples taken from the Red Monarch were high only in iron (Shenon and others, 1954).

3.13.3 Site History

Little is known of the early history of the Red Monarch. Reports to the Idaho Inspector of Mines suggest that much of the work on the property was done between 1917 and 1919. In 1919, the property had a 4,410-foot tunnel, 200 feet of raises, and 600 feet of drifts. Early in 1922, the property was acquired by the Rex Consolidated Mining Co., which planned to open the Rex Mine at depth by extending the Red Monarch tunnel under the Rex workings. However, little work was done until the property was acquired by Delaware Mines Corporation in May 1926. At that time, an active development program was started and ore production was credited to lessees working part of the mine. Considerable work was done on the Red Monarch tunnel, some of it by contract workers. In 1928, the company explored the Rex vein from the Red Monarch tunnel. This work continued in 1929, when the Red Monarch tunnel was driven 1,000 feet after a new compressor was installed.

In 1930, Associated Mines Corporation, Ltd., was organized to take over the Red Monarch and Rex properties from Delaware Mines. Stock in the new company was assessable, while Delaware
Mines' stock was not. This reorganization prompted a lawsuit, which ended in September 1932 with an Idaho Supreme Court ruling that the reorganization was illegal. The Court required that the mine and all assets be returned to Delaware Mines Corp. During its tenure at the mine, Associated Mines levied assessments but did no actual work. From 1932 through 1936, the mine was idle.

In 1937, the Red Monarch and Rex properties were leased to Callahan Consolidated Mines Corp. Callahan completed construction of a 100-ton flotation mill in February 1943, presumably at the old Rex millsite on Ninemile Gulch. The company produced ore from the Red Monarch and the Rex (probably mostly from the Rex) from 1943 until June 30, 1946. In 1947, shipments consisted of zinc-lead tailings from the mill. Subsequent activities at the property apparently did not include any work on the Red Monarch tunnel.

3.13.4 Environmental Conditions

3.13.4.1 Site Features

The Red Monarch was visited by John Kauffman on August 27, 1997. A video segment describing the property is on the Coeur d'Alene Basin Videotape (Tape 2, index 1:23:00-1:30:25). Documenting photos are Roll K9, frames 10-12.

The adit at the Red Monarch was driven into the hill on the south side of the creek a few feet above creek level. The open adit (Figure 3.13-3) is about 12 feet by 12 feet square. Water flows from the adit at a rate of about 15-20 gallons per minute and discharges immediately into the creek. The volume of water from the adit nearly equals the volume in the creek above the adit. The upper portion of the dump, immediately in front of the adit on the north side of the creek, is densely covered with brush and a few large, downed trees. The waste dump (Figure 3.13-4) is large, extending out from the adit about 400 feet along the north side of the valley. The width varies from about 10 to 40 feet and the thickness varies from 5 feet near the adit to 60-70 feet at the toe (west) end. Nearly all of the material on the dump is oxidized. Although a few zones of fine material are present, most of the dump consists of coarse rock fragments. The surface of the dump has scattered patches of trees up to 6 inches in diameter. However, the side of the dump that slopes to the creek has no vegetation. The water in the creek often disappears under the rock rubble in the creek bed. A stack of 4- to 6-foot-long timbers, probably rail ties, is piled near the east end of the dump. A small amount of metal pipe, chimney pipe, and other debris is scattered on the side of the dump and in the creek bed.

A short, caved prospect adit with a very small dump was also found about 50-75 feet uphill from the west end of the main waste dump. It is doubtful that this adit was longer than 10-15 feet.
3.13.4.2 Sample Locations

3.13.4.2.1 Soil

An oxidized waste dump sample was taken from a zone of finer material near the center of the side of the main dump (K08279713).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
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</thead>
<tbody>
<tr>
<td>K08279713</td>
<td>Red Monarch, oxidized dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.13.4.2.2 Water

An adit water sample was taken immediately in front of the adit (K08279710). An upstream water sample was collected about 100 feet upstream on Missoula Gulch Creek (K08279711). A downstream water sample was taken from the creek about 150 feet downstream from the toe of the waste dump (K08279712).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature (°F)</th>
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<th>Analyzed (Yes/No)</th>
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<tbody>
<tr>
<td>K08279710</td>
<td>Red Monarch adit</td>
<td>235 µs</td>
<td>50</td>
<td>7.75</td>
<td>15-20</td>
<td>Yes</td>
</tr>
<tr>
<td>K08279711</td>
<td>Missoula Gulch Creek, upstream</td>
<td>30 µs</td>
<td>53</td>
<td>7.85</td>
<td>6 ft. wide, 0.5 ft. deep</td>
<td>Yes</td>
</tr>
<tr>
<td>K08279712</td>
<td>Missoula Gulch Creek, downstream</td>
<td>120 µs</td>
<td>52</td>
<td>7.6</td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.13.4.2.3 Analytical Results

Soil Samples  (Tables 2.5-3 and 2.5-4)

Compared to background levels (Tables 1.5-3 and 1.5-4) and environmental standards (Table 1.5-5), the waste dump sample at the Red Monarch (K08279713) has an elevated level of lead (630 ppm), a somewhat elevated level of arsenic (99 ppm), and slightly elevated levels of cadmium (3.5 ppm), copper (59 ppm), zinc (160 ppm), and iron (4.9 percent) in the element screen. In the TCLP for metals screen, lead showed a significant amount of leaching.

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

The dissolved metals screen for the adit water (K08279710) exceeds all standards for cadmium, both Aquatic life standards for zinc, the Secondary MCL for manganese, and slightly exceeds the
The lower limit of the Aquatic Life Chronic range for copper. The total metals screen for the adit water exceeds all standards for cadmium, the Secondary MCLs for iron and manganese, and both Aquatic Life standards for zinc. The test for lead exceeds the Aquatic Life Chronic standard.

The sample upstream from the adit (K08279711) is below standards for all elements in both the dissolved and total metals screens. The sample downstream below the dump (K08279712) exceeds both Aquatic Life standards for zinc and the Aquatic Life Chronic value for cadmium in the dissolved metals screen. It exceeds both Aquatic Life standards for zinc in the total metals screen.

3.13.5 Structures

Remains of a small collapsed shed are located near the center of the north edge of the waste dump. No other structures were found.

3.13.6 Safety

The open adit is the only major potential safety hazard identified at the Red Monarch. The condition of the underground workings is unknown.
Figure 3.13-1. Topographic map of the Red Monarch Mine, Shoshone County, Idaho (U.S. Geological Survey Osburn 7.5-minute topographic map).
Figure 3.13-3. Open adit at the Red Monarch Mine, looking south. The opening is about 12 feet high and 12 feet wide (Roll K9, frame #10).
Figure 3.13-4. Large, mostly oxidized waste dump at the Red Monarch Mine, looking west. The water in Missoula Gulch Creek (on the left side of the photograph) flows under the rock rubble and reappears below the dump (Roll K9, frame #11).
3.14 PONY GULCH MINE (Site No. WL-125; B8309701)
Alternative names—Pony Lease, Pony Creek Lease, Kennam Property, Kennan, Roberts.

When visited, the number designation WL-125 was not known; therefore it was given the
temporary field designation B8309701 shown above.

3.14.1 Site Location and Access (Figure 2.1-1c)

The Pony Gulch Mine is about 2 miles up Pony Gulch in the SE¼ of the SW¼ of section 13,
T. 49 N., R. 4 E., on the Osburn 7.5-minute quadrangle (Figure 3.14-1). This property is at the
end of the road which exits from the Beaver Creek Road (Primary Forest Route 456) and follows
Pony Gulch, a tributary of Beaver Creek. The mine is on Forest Service land.

3.14.2 Geologic Features (Figure 2.2-1b)

The mine is in the banded dark-gray argillite of the lower Prichard Formation (Hosterman, 1956).
The early work at the site focused on gold, both from placers and from flat-lying quartz veins that
cropped out on both sides of the creek (IGS mineral property files; Hobbs and Reno, 1952). In
the 1950s, interest shifted to the scheelite in the quartz veins. Hobbs and Reno (1952, p. 2-3)
described the geology of the tungsten occurrence:

The country rock in the vicinity of the mine is Prichard slate. Poor surface
exposures make the determination of the general structure difficult, and in the mine
the shearing along the vein zone has nearly obliterated the attitude of the beds.

The tungsten mineral, scheelite, occurs in narrow quartz veins distributed in a
nearly vertical shear zone in the Prichard slate. The shear zone strikes in a general
northwest-southeast direction, crossing Pony Gulch at an angle of about 60
degrees, and is said to extend several thousand feet. The zone dips very steeply to
the northeast. Surface exposures on the vein are limited to the creek bed and
several outcrops on the north slope. A little scheelite is reported from the creek
bed where the shear zone crosses it. Narrow quartz stringers carrying scattered
scheelite crystals occur in slates exposed in the creek bed 100 or more feet west of
the shear zone. None of these occurrences approach commercial grade material.
The 375 foot adit has been driven at creek level into the south wall of the gulch
along the hanging wall of the vein zone. From 200 to 260 feet from the portal, the
drift is widened to approximately 15 feet by slabbing of the west or footwall of the
shear zone. This cut opens a vein or vein zone composed of 5 to 6 feet of sheared
slate containing a number of narrow quartz veins. These veins are quite irregular
in distribution and vary in width from a fraction of an inch to several inches, but
they are prominent in the opening and are exposed for a strike length of about 60
feet. Small amounts of scheelite occur in short crosscuts into the west wall at 280
and 310 feet from the portal.
The veins consist of quartz, carbonates including siderite and ankerite, some sulfides, and scheelite. The scheelite occurs in all the veinlets as scattered coarse crystals or bunches which in places fill the whole width of a 2 inch vein. On the face exposed at the south end of the widened drift, the ore is estimated to contain several percent WO₃; at the north end the grade is estimated at about 1 percent WO₃. Apparently richer bunches may be expected since it is reported by previous operators that five tons of ore was removed from a shallow underhand stope at this locality and was rich enough to ship without concentration. The wide part of the drift and the cross-cuts in the adit are the only exposures of the vein in the mine that contain showings of scheelite.

3.14.3 Site History

The claims of the Pony Gulch Mine were apparently staked over an older property, known as the Fay Templeton. The property was held by the Kennan Mining Company from around 1917, when the company was organized, until the mid-1930s, when control of the mine passed to a partnership between Ed Roberts of Creston, British Columbia, and Reginald John Mellor of Idaho City, Idaho. In 1923, the property had nineteen tunnels, ranging in length form 10 to 350 feet, and one shaft. Kennan Mining confined its operations at the property to assessment work and prospecting.

In 1938, the property was leased to Ben Johnson and J.D. Chapin of Wallace, Idaho, who began reopening the old workings. The company's report to the Idaho Mine Inspector mentioned a water-powered 5-stamp mill at the mine. By 1940, Chapin was the sole lessee and, during that year, he shipped ore containing $40.00 per ton in gold.

By 1952, the property was being leased by Robert D. Skeman and Howard S. Carter, of Kellogg. The partners applied for a Defense Minerals Exploration Administration (DMEA) loan to explore the Pony Gulch property for tungsten. The DMEA project ran from January 2, 1953, to November 30, 1954. No significant amounts of scheelite were found, and the project was terminated after spending about half of the funds originally allocated for the work. Also in 1953, North Idaho Mines, Inc., took over the lease on the property, but that company forfeited its corporate charter two years later.

3.14.4 Environmental Conditions

3.14.4.1 Site Features

The Pony Gulch property was visited by Earl Bennett on August 30, 1997. A video segment describing the property is on the Coeur d'Alene Basin Videotape (Tape 2, index 01:30:35-01:39:30). Documenting photos are Roll B12, frames 1-10.
Workings include one dry adit ("tungsten play") at the end of the Pony Gulch road and a small millsite with three small adits ("gold play") located 100 yards west of the end of the road. The main adit at the end of the road ("tungsten play") looks caved, but is just barely open. There is a double portal with timbers to support the adit and another set of timbers to catch sloughing rock. The dump from this adit is about 85 feet long, 25 feet wide, and 20 feet thick along the Pony Gulch Road. There is a cabin site at the end of the road.

There is a millsite about 100 yards west of the main adit and the end of the road. This was probably a stamp mill (Figures 3.14-2) and may have been the stamp mill mentioned in the 1938 report to the Idaho Inspector of Mines. The road crosses Pony Gulch Creek at this site. There is a small pile of what is probably mill tailings at the base of the concrete mill footings (Figure 3.14-3). The mill building has collapsed. There are three metal tanks (Figure 3.14-4), whose function is unknown, and several wooden bins just west of the mill footings. The millsite sits in front of an outcrop (Figure 3.14-5), and on top of this outcrop are three small, dry adits. One of these (Figure 3.14-6) is just west of the mill and its dump is visible from the millsite. The second adit is right behind the mill (Figure 3.14-7). The third adit is just east of the mill. It is caved and is marked by a small dump.

3.14.4.2 Sample Locations

3.14.4.2.1 Soil Samples

A sample was collected from the pile of tailings at the site of the Pony Gulch mill (B8309702).

<table>
<thead>
<tr>
<th>Sample No</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8309702</td>
<td>Pony Gulch mill tailings</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.14.4.2.2 Water Samples

No water samples were collected at this site.

3.14.4.2.3 Analytical Results

Soil Samples (Tables 2.5-3 and 2.5-4)

Compared to background levels (Tables 1.5-3 and 1.5-4) and environmental standards (Table 1.5-5), the mill tailings sample (B8309702) contains high lead (64,000 ppm), elevated arsenic (250 ppm), and somewhat elevated levels of cadmium (6.6 ppm), copper (250 ppm), and zinc (1,800 ppm) in the element screen. In the TCLP for metals screen, lead showed a significant amount of leaching.
3.14.5 Structures

The foundation of a cabin is located beside the main adit at the end of the Pony Gulch road. The concrete footings and other remains of a small mill are about 100 yards west of the end of the road and main adit.

3.14.6 Safety

The partially open main adit and the adits above the millsite could be potentially hazardous if entered.
Figure 3.14-1. Topographic map of the Pony Gulch Mine, Shoshone County, Idaho (U.S. Geological Survey Osburn 7.5-minute topographic map).
Figure 3.14-2. Remains of the Pony Gulch mill (Roll B12, frame #8).

Figure 3.14-3. Concrete footings for the Pony Gulch mill, with probable mill tailings around the base (Roll B12, frame #7).
Figure 3.14-4. Metal tanks (function unknown) located west of the mill footings (Roll B12, frame #5).

Figure 3.14-5. Outcrop above the collapsed mill (Roll B12, frame #9).
Figure 3.14-6. Westernmost of the three adits above the Pony Gulch mill (Roll B12, frame #1).
Figure 3.14-7. Middle adit above the Pony Gulch mill (Roll B12, frame #2).
3.15 LUCKY BOY PROSPECT (Site No. SP-296)
Alternative name-Silver Seal.

3.15.1 Site Location and Access (Figure 2.1-1b)

The Lucky Boy prospect is located on a tributary drainage on the west side of Big Creek in the NE¼ of the SE½ of section 34, T. 48 N., R. 3 E., near the boundary between sections 33 and 34. It is on the Polaris Peak 7.5-minute quadrangle (Figure 3.15-1). From Forest Service Road 2354, a moderately overgrown jeep trail follows the north side of the tributary drainage and passes the main Lucky Boy workings about ¼-½ mile west of Big Creek. Elevation of the main adit is about 3,350 feet. Additional workings are uphill to the north and northwest. This property is on Forest Service land.

3.15.2 Geologic Features (Figure 2.2-1a)

According to Hobbs and others (1965, Plate 2), the Lucky Boy is in the lower Wallace Formation. These rocks are dolomitic and calcareous quartzite interbedded with argillite. The bedding strikes northwest and dips moderately northeast. No veins are shown on the map.

3.15.3 Site History

In 1930, the property was owned by the Lucky Boy Mines Corporation. Work on the property had started in January of that year. The mine had two tunnels and a total of 95 feet of workings. By 1937, the mine had four tunnels and 2,125 feet of workings.

3.15.4 Environmental Conditions

3.15.4.1 Site Features

The Lucky Boy was visited by Bill Rember on August 7, 1997, and by John Kauffman on August 11, 1997. A video segment describing the property is on the Coeur d’Alene Basin Videotape (Tape 2, index 1:39:30-1:44:00). Documenting photos are Roll R4, frames 13-20, and Roll K5, frames 5-8.

Three adits were located on the north side of the drainage. A possible fourth adit, shown south of the drainage on Hobbs and others’ map (1965, Plate 2), was not found.

The main adit (Adit No. 1) is on the east side of the trail. A few rotted timbers are visible at the portal, but the first 30 feet of the adit have collapsed (Figure 3.15-2). A small opening (about 2 feet by 3 feet) at the end of the caved section still allows access to the adit. The rails on the floor of the adit are visible from the opening (Figure 3.15-3). The waste dump is about 100 feet long, 40 feet wide, and 30 feet thick. It extends down from the trail and across the creek, which flows beneath the base of the dump for nearly the entire length of the dump. Sections of metal flume are strewn on the east end of the dump. Remains of a base camp, presumably active during the mining era, were found beside the creek below the main adit (see “Structures” section below).
Adit No. 2 is about 100 feet uphill from Adit No. 1. It is in fairly thick brush just below an old, overgrown road. Neither the adit nor the dump can be seen from this road because of the dense vegetation. The adit is partly caved but has a small opening (about 2 feet by 3 feet) at the top of the sloughed debris (Figure 3.15-4). The dump is relatively small, only 10 feet long by 10 feet wide by 30 feet down the face. The hillside here is rather steep, so the actual thickness of the dump material is probably only about 10 feet.

Adit No. 3, presumably part of the Lucky Boy, is about 300-400 feet in elevation above and northwest of Adit No. 2. It is along the upper timbered edge of a fairly open grassy hillside that is just south of the nose of a spur ridge separating two tributaries of Big Creek. The adit is partly caved but has an opening that is 3 feet by 4 feet. A few rotted timbers are exposed (Figures 3.15-5 and 3.15-6). The dump is about 30 feet long by 10 feet wide and fans out downslope for about 35 feet (Figure 3.15-7). Actual thickness on the slope is probably only 10-15 feet. It appears that the adit has recently been used by a bear.

The disturbed area, including the three adits, dumps, and base camp, is about 2 acres. However, the base camp area is completely overgrown and should probably not be considered “disturbed”.

### 3.15.4.2 Sample Locations

#### 3.15.4.2.1 Soil

Because the waste dump impinged on the creek, a sample was collected from the side of the dump (R08079706).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R08079706</td>
<td>Lucky Boy waste dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

#### 3.15.4.2.2 Water

Because the creek flowed beneath the dump, a water sample was collected about 50 yards upstream from the dump (R08079704) and another was collected where the water emerged from beneath the dump (R08079705).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature ($^\circ$ F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R08079704</td>
<td>tributary to Big Creek, upstream from dump</td>
<td>70 $\mu$s</td>
<td>42</td>
<td>7.2</td>
<td>1 ft. wide, 0.25 ft. deep</td>
<td>Yes</td>
</tr>
<tr>
<td>R08079705</td>
<td>tributary to Big Creek, downstream from dump</td>
<td>82 $\mu$s</td>
<td>44</td>
<td>7.8</td>
<td>---</td>
<td>Yes</td>
</tr>
</tbody>
</table>
3.15.4.2.3 Analytical Results

Soil Samples (Tables 2.5-3 and 2.5-4)

Compared to background levels (Tables 1.5-3 and 1.5-4) and environmental standards (Table 1.5-5), the Lucky Boy dump sample (R08079706) contains only slightly elevated levels of arsenic (85 ppm), cadmium (2.7 ppm), copper (45 ppm), lead (120 ppm), and zinc (250 ppm) in the element screen. In the TCLP for metals screen, values are below detection limits for all relevant metals.

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

The sample upstream from the adit (R08079704) slightly exceeds the lower limit of the Aquatic Life Chronic standard for copper in the dissolved metals screen. In the total metals screen the sample exceeds both Aquatic Life standards for cadmium. The sample downstream (R08079705) is at the lower limit of the Aquatic Life Chronic standard for copper and barely exceeds the Aquatic Life Chronic standard for cadmium in the dissolved metals screen. This sample exceeds both Aquatic Life standards and equals the Primary MCL for cadmium in the total metals screen.

3.15.5 Structures

A small cabin (Figure 3.15-8), about 6 feet by 8 feet, is located along the north side of the trail 50 yards west of Adit No. 1. The cabin was constructed of hand-hewn cedar planks and logs.

In addition to the cabin, the remains of a base camp were found on a flat area along the creek below the main Lucky Boy adit. Evidence for this camp includes metal bolts or spikes protruding from logs that may have been a foundation, bedsprings, the remains of wood stoves, two possible outhouse pits, a stack of cedar rails 5-6 feet in length, and a variety of scrap metal. The flat area is several hundred feet long and 30-50 feet wide. It is now overgrown with large trees and brush.

3.15.6 Safety

The open or partially open adits present a potential safety hazard. The rock material is expected to be unstable and susceptible to collapse.
Figure 3.15-1. Topographic map of the Lucky Boy Mine, Shoshone County, Idaho (U.S. Geological Survey Polaris Peak 7.5-minute topographic map).
Figure 3.15-2. Collapsed portal of Adit No. 1, looking north. Note the small opening at the head of the caved section (Roll R4, frame #16).
Figure 3.15-3. View inside the opening of Adit No. 1, showing open adit with ore car rails on the floor (Roll R4, frame #17).

Figure 3.15-4. Looking north at Adit No. 2, which is at the top of debris that has sloughed around the opening (Roll K5, frame #5).
Figure 3.15-5. Overview of Adit No. 3, looking north. This small opening is at the top of a pile of sloughed material (Roll K5, frame #7).
Figure 3.15-6. Close-up of the opening into Adit No. 3 (Roll K5, frame #6).

Figure 3.15-7. Looking south down the face of the Adit No. 3 waste dump (Roll K5, frame #8).
Figure 3.15-8. Hand-hewn cedar cabin west of Adit No. 1 (Roll R4, frame #19).
3.16 BEACON LIGHT MINE (Site No. WL-433)

3.16.1 Site Location and Access (Figure 2.1-1d)

The Beacon Light Mine is located south of the Old Mullan Road about 1½-2 miles east of Shoshone Park. It is below and north of Interstate 90 in the NE¼ of the SE¼ of section 33, T. 48 N., R. 6 E., on the Lookout Pass 7.5-minute quadrangle (Figure 3.16-1). According to the National Forest map, the property is on Forest Service land with private land slightly to the west.

3.16.2 Geologic Features (Figure 2.2-1b)

The workings are entirely within units of the St. Regis Formation on the overturned north flank of the Lookout anticline (Hobbs and others, 1965, Plate 5).

3.16.3 Site History

In 1954, there were four adits at the Beacon Light, and the property had been explored for several years. The lower (No. 1) tunnel had about 3,000 feet of workings, and the upper (No. 2) adit had about 2,000 feet of workings. There were two shorter adits above the No. 2 (Fryklund, 1954).

In 1980, Beacon Light Mining Company drilled two exploratory holes on the property. The following year, the company reopened the No. 1 tunnel after it had been caved for over 50 years. Bear Creek Mining Company signed an option agreement with Beacon Light in 1981. In 1983, Anaconda Minerals Company continued exploration of the area around the Beacon Light. In August, diamond drilling and geologic studies were started at the mine. Anaconda dropped its exploration program in the area in 1985.

3.16.4 Environmental Conditions

3.16.4.1 Site Features

The Beacon Light Mine was visited by Earl Bennett and Virginia Gilleran on July 30, 1997. A video segment describing the property is on the Coeur d’Alene Basin Videotape (Tape 2, index 01:44:00-01:48:45). Documenting photos are Roll B6, frames 23-25, and Roll B7, frames 1-2.

The mine has one open adit that is gated and marked with warning signs (Figure 3.16-2). A large dump (Figure 3.16-3) measures about 165 feet long, 100 feet wide, and 50 feet thick on the nose. Water is flowing from the adit at a rate of about 2 gallons per minute and is contained in a wetland on the dump. No water reaches the creek. The dump has no impact on active waterways. There are several buildings at the property that are in fair to good condition and that appear to be maintained. The other workings described by Fryklund (1954) were not found. The disturbed area covers about 1.5 acres.

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3.16.4.2 Sample Locations

3.16.4.2.1 Soil Samples
No dump samples were collected at this site.

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

3.16.5 Structures

Buildings on the property consist of a red metal storage shed (about 6 feet by 8 feet) on the edge of the dump (Figure 3.12-3), a low cabin or workshop (about 20 feet by 30 feet), and an outhouse (Figure 3.12-4). All appear to be maintained to some extent.

3.16.6 Safety

Unauthorized entry into the gated adit is the only potential safety hazard identified at this site.
Figure 3.16-1. Topographic map of the Beacon Light Mine, Shoshone County, Idaho (U.S. Geological Survey Lookout Pass 7.5-minute topographic map).
Figure 3.16-2. Boarded-over adit with "Keep Out" sign at the Beacon Light Mine (Roll B6, frame #23).

Figure 3.16-3. Looking across the surface of the waste dump from the adit, with the red metal storage shed in the center (Roll B6, frame #24).
Figure 3.16-4a. Part 1 of a panorama of the Beacon Light site, with the cabin or workshop (left) and the outhouse (behind the truck) (Roll B7, frame #1).

Figure 3.16-4b. Part 2 of a panorama of the Beacon Light site, with the outhouse (behind the truck) and the adit (in the brush to the far right) (Roll B7, frame #2). The left side of this photograph overlaps the right side of Figure 3.16-4a.
3.17 CARIBOU MINE (Site No. SP-99)

3.17.1 Site Location and Access (Figure 2.1-1a)

The Caribou Mine is located on the south side of Beauty Creek at the mouth of Caribou Creek about 1¼-½ mile south of the last campground on Beauty Creek in the SE¼ of the SE¼ of section 12, T. 49 N., R. 3 W., on the Mt. Coeur d’Alene 7.5-minute quadrangle (Figure 3.17-1). Access is by State Highway 97 (south from Interstate 90) to Beauty Bay, then southeast about 1¼ miles along Beauty Creek on Forest Service Road 438. A well traveled trail leads from FS Road 438 to the mine site. The mine is on one patented claim surrounded by Forest Service land. The claim extends southward into the northeast corner of section 13.

3.17.2 Geologic Features (Figure 2.2-1a)

Anderson (1940, p. 48) noted:

The Caribou property covers the margin of the quartz monzonite stock and the tunnels are driven partly in granitic rock and partly in altered quartzite of the Prichard formation. Several mineralized zones are known on the property, but only one has been explored in the two upper levels; and, although two somewhat mineralized zones were uncovered in No. 3, it is not wholly certain that either one is a continuation of the body on the levels above. The veins have a general northerly trend, but curve widely and, when traced to the north, change strike from northwest to northeast. Their dip is east at steep angles. In places, the fracturing and mineralization appear to follow the quartz monzonite-quartzite contact.

Sulfide minerals include arsenopyrite, pyrrhotite, galena, sphalerite, and minor amounts of chalcopyrite (Anderson, 1940).

3.17.3 Site History

Most of the early work on the property was done by the officers of the Caribou Mining Company. A 75 tons-per-day mill was built in 1923, equipped with a ball mill and Wilfley tables, but more equipment was required to make its operation profitable. A small lot of ore was shipped from the mine in 1926. The mill was sold in 1930 to the Coeur d’Alene-Beauty Bay Mining and Milling Company, which was organized to provide custom flotation milling for all the mines in the Beauty Bay area. No work seems to have been done at the Caribou Mine from 1931 to 1940.

At the time of Anderson’s visit in 1937, he noted (Anderson, 1940, p. 48):

The Caribou group comprised 10 unpatented claims on Beauty Creek.... It is owned by the Caribou Mining Company, incorporated July 5, 1918, and has approximately 1,700 feet of workings, principally in the No. 2 and No. 3 tunnels (fig. 2 [Figure 3.17-2]). The property also has a 50-ton, gas-driven, flotation concentrator owned by the Coeur d’Alene-Beauty Bay Mining and Milling
Company, which had been erected to treat all the ore of the Beauty Bay district. The mill was completed in 1931, but both mill and mine have since been idle.

Between 1940 and 1942, a small amount of work was done by contract miners. Total development in 1942 was about 1,800 feet of workings. After World War II, the surviving officers began looking for someone to take over the property. By the early 1960s, the major stockholders (all in their eighties) were increasingly anxious to find another company willing to operate the mine. These efforts do not seem to have been successful (IGS mineral property files).

3.17.4 Environmental Conditions

3.17.4.1 Site Features

The Caribou Mine was visited by Bill Rember on July 22, 1997. A video segment describing the property is on the Coeur d’Alene Basin Videotape (Tape 2, index 1:48:45-1:52:45). Documenting photos are Roll R1, frames 2-8.

Figure 3.17-3 is a sketch map of the Caribou Mine site. The two upper workings described by Anderson (1940), Adits No. 1 and No. 2, are now caved. The portal areas are covered with scree and numerous downed trees. The main tunnel, Adit No. 3, is located about 50 feet above the level of Beauty Creek and is open (Figures 3.17-4 and 3.17-5). The waste dump is about 60 feet long, 10 feet wide, and 15 feet thick, and it extends to the creek (Figure 3.17-6). The toe of the dump has been eroded by floods in Beauty Creek. A minor seep was trickling from the toe of the dump. The site has apparently attracted visitors as evidenced by the abundance of recent garbage scattered on the dump and in the adit. An ore chute and the remains of the flotation mill described by Anderson (1940) are also present (Figure 3.17-7). The ore chute extends from Adit No. 2 to the upper end of the mill. The mill is completely collapsed, but the concrete footings remain on the hillside. At the base of the mill is a standing platform constructed of timbers and planks, which may have been a loading chute for milled ore (Figure 3.17-8). No evidence of tailings was found, suggesting that the flotation mill never operated. However, Anderson indicates that some ore from the Silver Tip Mine, active between 1926 and 1931, “was treated at the custom mill on the Caribou property” (Anderson, 1940, p. 50). The disturbed area covers about 0.5 acre.

3.17.4.2 Sample Locations

3.17.4.2.1 Soil

A waste dump sample was taken from the face of the dump above the area where Beauty Creek has eroded the toe (R72297002).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R72297002</td>
<td>Caribou No. 3 waste dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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3.17.4.2.2 Water

A water sample was collected at the site of the minor seep at the toe of the waste dump (R72297003). A background sample was taken from Caribou Creek above the dump (R72297001).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
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</thead>
<tbody>
<tr>
<td>R72297003</td>
<td>seep from Caribou No. 3 dump</td>
<td>30 μs</td>
<td>58</td>
<td>7.03</td>
<td>seep</td>
<td>Yes</td>
</tr>
<tr>
<td>R72297001</td>
<td>Caribou Creek (background)</td>
<td>35 μs</td>
<td>58</td>
<td>7.35</td>
<td>---</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.17.4.2.3 Analytical Results

Soil Samples (Tables 2.5-3 and 2.5-4)

Compared to background levels (Tables 1.5-3 and 1.5-4) and environmental standards (Table 1.5-5), the element screen for the Caribou Adit No. 3 waste dump (R72297002) has moderately elevated levels of arsenic (190 ppm) and lead (140 ppm), and slightly elevated levels of cadmium (4.6 ppm), copper (53 ppm), and zinc (200 ppm); iron (4.4 percent) is also slightly above the background level. In the TCLP metal screen, cadmium shows a significant amount of leaching.

Water Samples (Tables 2.4-1, 2.4-2, 2.5-1, and 2.5-2)

The seep sample (R72297003) is within the range of the Primary MCL of aluminum in the dissolved metals screen. In the total metals screen, only the Aquatic Life Chronic value of cadmium is exceeded.

Sample R72297001 exceeds the Aquatic Life Chronic standard and is within the range of the Aquatic Life Acute standard for cadmium in the total recoverable metals screen. In the dissolved metals screen, sample R72297001 exceeds the Aquatic Life Chronic standard for cadmium and is within the range of the Aquatic Life Chronic standard for copper.

3.17.5 Structures

The remains of the ore chute and the loading platform are on the slope between Adit No. 2 and Beauty Creek. Concrete footings and lumber debris from the flotation mill are also present.
3.17.6 Safety

The open top of the ore chute below Adit No. 2 is a potential safety hazard, as is the open Adit No. 3. The area is easily accessible and is near several campgrounds on Beauty Creek.
Figure 3.17-1. Topographic map of the Caribou Mine, Kootenai County, Idaho (U.S. Geological Survey Mt. Coeur d'Alene 7.5-minute topographic map).
Figure 3.17-2. Geologic sketch map of the underground workings of the Caribou Mine (Figure 2 from Anderson, 1940). The bedrock is Prichard Formation and quartz monzonite. The strike and dip of the bedding is shown by symbols.
Figure 3.17-3. Sketch map of the Caribou Mine site.

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Figure 3.17-4. Open Adit No. 3 at the Caribou Mine, looking south (Roll R1, frame #5).
Figure 3.17-5. Inside view of Adit No. 3 at the Caribou Mine (Roll R1, frame #6).
Figure 3.17-6. View of the Caribou waste dump from creek level (Roll R1, frame #7).
Figure 3.17-7. Looking uphill at the ore chute (top) and collapsed flotation mill (center) at the Caribou Mine (Roll R1, frame #8).
Figure 3.17-8. Ore loading platform at the base of the mill at the Caribou Mine (Roll R1, frame #9).
3.18 GRAY WOLF MINE (Site No. SP-106)

3.18.1 Site Location and Access (Figure 2.1-1a)

The Gray Wolf property is located about ¼ to ½ mile southeast of the Caribou Mine along Beauty Creek Road (Forest Service Road 438) in the northeast corner of section 13, T. 49 N., R. 3 W., on the Mt. Coeur d'Alene 7.5-minute quadrangle (Figure 3.18-1). Access is south on State Highway 97 from Interstate 90 to Beauty Bay, then southeast along Beauty Creek on FS 438 about 1½ miles. The main workings are on the southwest side of the creek. Additional workings are on the northeast side of the creek above the road (Figure 3.18-2). All workings are on Forest Service land.

3.18.2 Geologic Features (Figure 2.2-1a)

As at the nearby Caribou Mine, the Gray Wolf is located at the margin of a quartz monzonite stock intruding quartzite of the Prichard Formation. Mineralization includes both lead-zinc-pyrrhotite replacement deposits in the quartzite and bismuth-quartz veins in the granitic stock (Anderson, 1940).

Anderson (1940, p. 49-50) described the mines as follows:

The main workings are on the south side of the creek, where an adit has been driven along a large bismuth-quartz vein for 250 feet and then turned to intersect a lead-zinc-pyrrhotite body about 140 feet to the west (fig. 3 [Figure 3.18-3]). The bismuth-quartz vein strikes about N. 65° E. and is as much as 30 feet thick. Its extension across the creek has been prospected by a 20-foot tunnel and the vein has been traced up the slope to the summit of the ridge. The vein is in the quartz monzonite north of the creek, but in the adit it cuts and replaces altered brecciated quartzite of the Prichard formation. In places, the quartz contains widely scattered crystals and grains of bismuth minerals, and here and there small and scattered grains of pyrrhotite, sphalerite, and galena, introduced during a later stage of metallization.

The lead-zinc-pyrrhotite vein has been drifted on for 285 feet. Its strike is about N. 5° E. and dip 75° E. It occupies a relatively narrow zone of fracturing, generally from 2 to 4 feet wide, in which are scattered seams and bands of sulphides 2 to 10 inches thick. In parts of the fracture zone the quartzite is considerably crushed but is only slightly altered and mineralized. Some parts of the zone has thin quartz seams with a little associated sulphide.

Other explored veins lie in the stock north of the creek. These are bismuth-quartz veins which range from 4 to 15 feet wide and are reported to extend up the slope for 2,000 feet. One has been opened by a 45-foot shaft; another by a 60-foot tunnel. There is also a 100-foot tunnel. These veins contain some bismuth
minerals and minor amounts of galena. It is reported that the amount of sulphide declines with increasing distance from the margin of the stock.

3.18.3 Site History

According to Anderson (1940, p. 49):

The Gray Wolf comprises 9 unpatented claims . . . owned by the Gray Wolf Mining Company, incorporated May 18, 1917, and has been developed by one main tunnel with about 990 feet of workings (fig. 3 [Figure 3.18-3]) and by several short tunnels, each on separate veins. This property was active in 1921, 1924, and 1929 . . .

By 1934, the mine had five tunnels, one raise, two crosscuts, and three drifts, for a total of 1,030 feet of workings. The 70-foot shaft, which had been dug in the early 1920s, was no longer listed as part of the mine. Gray Wolf Mining Company forfeited its corporate charter in 1938.

3.18.4 Environmental Conditions

3.18.4.1 Site Features

The Gray Wolf Mine was visited by Bill Rember on July 22, 1997. A video segment describing the property is on the Coeur d’Alene Basin Videotape (Tape 2, index 1:52:45-1:55:40). Documenting photos are Roll R1, frames 9-12.

The main adit at the Gray Wolf is on the southeast side of the creek slightly above creek level (Figure 3.18-4). The adit is open and dry. A Forest Service warning sign is posted at the adit entrance (Figure 3.18-5). A second, very short adit, which is barely visible on Figure 3.18-4, is located about 20 feet above and northwest of the main adit. The waste dump was built parallel to the creek because of the narrow drainage bottom (Figure 3.18-6). The dump is about 130 feet long, 10 feet wide, and 15 feet thick. The dump material appears to be entirely oxidized. Several concrete foundations are present near the main portal, and a piece of boiler plate was found in the creek below the dump.

Another short, open adit and a caved shaft were found on the northeast side of the creek near the road. The adit is about 10 feet above, and 15 feet from, the edge of the road (Figure 3.18-7). The caved shaft, which Anderson (1940) reported to be 45 feet deep, is about 50 feet uphill from the adit and slightly to the east of it. Dumps for both of these openings were probably used as fill for, or destroyed by, construction of the road along Beauty Creek. Several additional workings reported by Anderson were not located.

The total disturbed area for all workings covers less than 0.25 acre.
3.18.4.2 Sample Locations

3.18.4.2.1 Soil

A composite waste dump sample was collected along the face of the dump parallel to Beauty Creek (R72297004). Two samples of the waste dump, BCGW#1 and BCGW#2, were also collected by Jeff Johnson, U.S. Forest Service, on November 12, 1997.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R72297004</td>
<td>Gray Wolf waste dump, main adit</td>
<td>Yes</td>
</tr>
<tr>
<td>BCGW#1</td>
<td>Gray Wolf waste dump, main adit</td>
<td>Yes</td>
</tr>
<tr>
<td>BCGW#2</td>
<td>Gray Wolf waste dump, main adit</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.18.4.2.2 Water

No water samples were collected at this site.

3.18.4.2.3 Analytical Results

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

Compared to background levels (Tables 1.5-3 and 1.5-4) and environmental standards (Table 1.5-5), the element screen for the waste dump (R72297004) has high arsenic (1,000 ppm) and lead (2,300 ppm), elevated copper (170 ppm), and slightly elevated cadmium (5.3 ppm), chromium (51 ppm), zinc (280 ppm), and iron (6.1 percent). In the TCLP for metals screen, the sample showed a significant amount of leaching for lead.

The two samples collected by the U.S. Forest Service had elevated levels of these same elements except cadmium, which was at background levels, and chromium, which was not included in the analytical suite. BCGW#1 contained high arsenic (4,200 ppm) and lead (5,270 ppm), and elevated copper (437 ppm), iron (12.8 percent), and zinc (296 ppm). BCGW#2 contained high arsenic (2,730 ppm) and lead (6,490 ppm), and elevated values of copper (347 ppm), iron (8.49 percent), and zinc (533 ppm).

3.18.5 Structures

No structures were found at this site. Concrete foundations near the main adit probably supported engines, compressors, or other equipment.
3.18.6 Safety

The open main adit presents the greatest potential hazard. The other open adits are relatively short and are less of a safety concern. However, the workings are all easily accessible, and several campgrounds are nearby on Beauty Creek.
Figure 3.18-1. Topographic map of the Gray Wolf Mine, Kootenai County, Idaho (U.S. Geological Survey Mt. Coeur d'Alene 7.5-minute topographic map).
Figure 3.18-2. Sketch map of the Gray Wolf Mine site.
Figure 3.18-3. Sketch map of the underground workings of the main adit at the Gray Wolf Mine. The bedrock is Prichard Formation (Figure 3 from Anderson, 1940).
Figure 3.18-4. Main adit (lower center) and short adit (upper right, above the main adit) (Roll R1, frame #10).

Figure 3.18-5. Close-up of the main adit, showing the U.S. Forest Service warning sign (Roll R1, frame #11).
Figure 3.18-6. Main adit dump at the Gray Wolf Mine, looking southwest with Beauty Creek in the foreground (Roll R1, frame #12).
Figure 3.18-7. Adit on the northeast side of Forest Service Road 438, with the edge of the road in the foreground (Roll R1, frame #13).
3.19 SILVER TIP MINE (Site No. SP-111)

3.19.1 Site Location and Access (Figure 2.1-1a)

The Silver Tip Mine is located about ¼ mile up Varnum Creek from its confluence with Beauty Creek in the SW¼ of the SE¼ of section 18, T. 49 N., R. 2 W. It is on the Mt. Coeur d’Alene 7.5-minute quadrangle (Figure 3.19-1). The mine is reached by following Forest Service Road 438 up Beauty Creek to Varnum Creek. An old road that goes up Varnum Creek is passable for only a short distance. However, it can be followed on foot to the mine site. This property is on Forest Service land.

3.19.2 Geologic Features (Figure 2.2-1a)

Anderson (1940, p. 50-51) described the geology and mineralization of the Silver Tip as follows:

The claims cover several mineralized fracture zones of general northerly trend, but only two of them have been explored underground. Those fracture zones cut the rather highly metamorphosed impure quartzites of the Prichard formation in the vicinity of several long, narrow rhyolite and granite porphyry dikes. The deposits are typical of the lead-zinc-pyrrhotite replacement bodies in the Beauty Bay district and occur along fracture zones of considerable width and persistence, although the width of the more highly mineralized parts rarely exceeds 6 feet. The principal body, the Silver Tip, strikes about N. 5° W. The Black Bear vein about 200 yards down stream has a similar strike, but one a short distance up stream from the Silver Tip strikes about N. 10° to 15° E. Each of them shows considerable curvature along the strike. Their dip is steeply west.

The Silver Tip has been explored by an adit drift on the south side of the creek (fig. 4 [Figure 3.19-2]) for a distance of about 210 feet, and to a depth of 125 feet from the drift level by an inclined shaft in 125 feet from the portal. On the drift level the vein dips 30° to 35° W., but steepens with depth, the incline passing into the hanging wall 65 feet below. The vein is from 3-1/2 to 4 feet thick from the portal to the shaft; but near the shaft the thickness increases to 5 feet and a few feet beyond to 10 feet. It decreases to 4 feet, however, near the face. The hanging wall of the vein is prominent but the footwall is ill-defined. The entire ore body is rather heavily mineralized with pyrrhotite, in places as scattered bunches, in others as narrow bands. Sphalerite and galena are found in appreciable quantity only near the inclined shaft in a shoot perhaps less than 30 feet in stope length. Since the incline was filled with water, relations below could not be determined.

A crosscut from the face of the Silver Tip drift exposed the second mineralized body 50 feet to the east. At this point, the second vein is about 3 feet thick, strikes slightly west of north, and dips 60° W. (fig. 4 [Figure 3.19-2]). It is composed largely of massive pyrrhotite. The same mineralized fracture zone is explored
more extensively by adit drift on the north side of the creek (fig. 4 [Figure 3.19-2]), where it appears to be as much as 8 feet thick for the first 100 feet but narrows to about 3 feet the second hundred and then passes into the wall or appears along the drift with scattered, thin seams and nests of sulphides. It has considerable pyrrhotite over the portal, but the sulphide content decreases very considerably away from the portal, and much of the tunnel is through barren rock. North of the creek the vein changes its strike from north to northeast.

The Black Bear body is exposed in two short tunnels on each side of the creek. The vein is 3 to 4 feet thick and contains some lead and zinc in addition to considerable pyrrhotite.

Some of the ore mined on the property remains on the dump and in the ore bin below. This ore consists largely of massive sulphides shading into the altered country rock and is made up mostly of pyrrhotite, somewhat lesser amounts of pyrite and arsenopyrite, and smaller but variable amounts of sphalerite and galena. Some of the galena appears as clean veinlets cutting the other sulphides. The arsenopyrite is present in two generations, the second with a little late drussy quartz. Thin sections show that the country rock has been rather thoroughly sericitized, and then cut and replaced by sulphides or by quartz and sulphides together.

3.19.3 Site History

According to Anderson (1940, p. 50):

The Silver Tip Group comprises 16 unpatented claims on Varnum Creek... owned by the Silver Tip Mining Association and is one of the more extensively developed properties in the Beauty Bay district. The development consists of two main tunnels on opposite sides of the creek (fig. 4 [Figure 3.19-2]) in one of which an inclined shaft on the ore has been sunk to a depth of 125 feet. The property was more or less continuously active from 1926 to 1931 but since 1931 has been idle. Some ore was stope during its period of activity and treated at the custom mill on the Caribou property.

In 1928, the company noted that it was producing milling ore valued at $20.02 per ton, which was being piled on the dump until a road was built to the property. By 1930, both tunnels were about 400 feet long, and the internal shaft was at least 100 feet deep (IGS mineral property files).

3.19.4 Environmental Conditions

3.19.4.1 Site Features

The Silver Tip Mine was visited by Bill Rember on July 22, 1997. A video segment describing the property is on the Coeur d’Alene Basin Videotape (Tape 2, index 1:55:40-1:59:45). Documenting photos are Roll R1, frames 14-16.
The mine has two major sets of workings (Figure 3.19-3). Adit No. 1 was driven northward on the north side of Varnum Creek (Figure 3.19-4), and Adit No. 2 was driven southward on the south side of the creek. Both adits are open, and water is coming from Adit No. 1. Remnants of a trestle that was constructed to transport waste rock from the adit on the north side of the creek to the dump area were found. The waste rock from both adits has been deposited for a distance of about 500 feet along the south side of the creek. Although long, the dump is only 15 feet wide and 15 feet thick. The creek flows along the base of the dump for nearly its entire length, and some dump material has been eroded by the creek. A metal culvert, about 20 feet long by 4 feet in diameter, has been positioned in the creek relatively recently to prevent further erosion of the dump. A large number of rails, old flumes, and the remains of an old track are scattered around the area. A considerable amount of iron (probably from pyrrhotite) is present in the dump material, and the upper 2 feet of the dump is cemented with iron oxide (Figure 3.19-5). A boulder of iron-cemented dump material is in the creek (Figure 3.19-6). The total disturbed area at this site covers about 0.5 acre.

3.19.4.2 Sample Locations

3.19.4.2.1 Soil

A waste dump sample was collected from the face of the dump parallel to Varnum Creek (R72297008). Four samples of the waste dump (BCST#1, BCST#2, BCST#3, and BCST#4) were also collected by Jeff Johnson, U.S. Forest Service, on November 12, 1997. BCST#1 was collected from the dark red, hard iron-cemented material near the portal. BCST#2 was collected from orange-yellow, slightly iron-cemented material near the portal. BCST#3 was taken from a red, orange, and yellow iron-cemented mass about 120 feet downstream from the portal at the head of the 48-inch diameter culvert. BCST#4 was taken from an undercut shelf of iron-cemented material where the stream crosses the access road (trail) about 350-400 feet downstream from the portal.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R72297008</td>
<td>Silver Tip waste dump, composite</td>
<td>Yes</td>
</tr>
<tr>
<td>BCST#1</td>
<td>Silver Tip waste dump</td>
<td>Yes</td>
</tr>
<tr>
<td>BCST#2</td>
<td>Silver Tip waste dump</td>
<td>Yes</td>
</tr>
<tr>
<td>BCST#3</td>
<td>Silver Tip waste dump</td>
<td>Yes</td>
</tr>
<tr>
<td>BCST#4</td>
<td>Silver Tip waste dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.19.4.2.2 Water

A water sample was collected from the water flowing from Adit No. 1 (R72297007). Because water from Adit No. 1 flows into Varnum Creek, both upstream (R72297006) and downstream (R72297005) samples were collected from Varnum Creek.
### Analytical Results

#### Soil Samples (Table 2.5-3 and 2.5-4)

Compared to background levels (Tables 1.5-3 and 1.5-4) and environmental standards (Table 1.5-5), the Silver Tip waste dump (R72297008) is high in arsenic (2,500 ppm) and lead (1,100 ppm), and has somewhat elevated levels of cadmium (7.1 ppm), copper (130 ppm), zinc (420 ppm), and iron (7.7 percent) in the element screen. In the TCLP for metals screen, values are below detection limits for all relevant metals.

All of the samples collected by the U.S. Forest Service were high in arsenic, cadmium, copper, iron, lead, and zinc, with sample BCST#1 having by far the highest values: arsenic (64,500 ppm), cadmium (108 ppm), copper (5,330 ppm), iron (28 percent), lead (13,800 ppm), and zinc (11,300 ppm). This sample probably represents residual ore-grade material on the waste dump.

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

The water sample from Adit No. 1 (R72297007) exceeds both Aquatic Life standards for cadmium and zinc, the Aquatic Life Chronic standard for copper, and the Secondary MCLs for iron, aluminum, and manganese in the dissolved metals screen. The total metals screen exceeds all standards for cadmium, both Aquatic Life standards for zinc, and the Secondary MCLs for iron and manganese. Both the upstream (R72297006) and downstream (R72297005) samples slightly exceed the Aquatic Life Chronic value for cadmium in both the dissolved and total metals screens, are within the range of the Aquatic Life Chronic standard for copper in the dissolved metals screen, and are at the lower limit of the Aquatic Life Acute standard for cadmium in the total metals screen.

### Structures

No structures were found at this site, although the remains of a trestle that extended from Adit No. 1 across Varnum Creek to the waste dump are present.
3.19.6 Safety

The open adits are a potential safety hazard because of unknown underground conditions. Anderson (1940) reports that the south side adit contains an inclined shaft. If this section of the south adit is accessible, the shaft would present a very serious hazard.
Figure 3.19-1. Topographic map of the Silver Tip Mine, Kootenai County, Idaho (U.S. Geological Survey Mt. Coeur d'Alene 7.5-minute topographic map).
Figure 3.19-2. Sketch map of the underground workings of the Silver Tip Mine. The bedrock is Prichard Formation (Figure 4 from Anderson, 1940).
Figure 3.19-3. Sketch map of the Silver Tip Mine site.
Figure 3.19-4. Silver Tip Adit No. 1 on the north side of Varnum Creek (Roll R1, frame #14).
Figure 3.19-5. Oxidized and iron-cemented waste dump at the Silver Tip Mine (Roll R1, frame #15).
Figure 3.19-6. Iron-cemented boulder in Varnum Creek. This boulder is made up of material from the Silver Tip waste dump (Roll R1, frame #16).
3.20 BLUE GOOSE GROUP (Site No. SP-93)

3.20.1 Site Location and Access (Figure 2.1-1a)

The Blue Goose Group is located about ¼ mile up the South Fork of Cedar Creek in the SW¼ of the SE¼ of section 3, T. 49 N., R. 2 W., on the Lane 7.5-minute quadrangle (Figure 3.20-1). The property can be reached from Interstate 90 by walking up the South Fork of Cedar Creek from its confluence with Cedar Creek. The old road that follows the west side of the creek is nearly impassible because of downed trees from the ice storm of 1996. The property is on Forest Service land.

3.20.2 Geologic Features (Figure 2.2-1a)

The adit was driven along a shear zone in the Prichard Formation. In addition to Prichard rocks, the dump contains occasional pieces of quartz and biotite diabase.

3.20.3 Site History

In 1940, the Blue Goose Group Mining Company controlled 90 unpatented claims. Development consisted of one 267-foot tunnel. The property was sold to Associated Metals, Inc., in 1941. After doing little or no work, Associated Metals defaulted on its payments and the property reverted to Blue Goose in 1949. At that time, the tunnel was 543 feet long and a vertical shaft was 26 feet deep. (In later years, the company reported the tunnel was 546 feet long and the shaft 20 feet deep.) Blue Goose forfeited its corporate charter in 1958.

3.20.4 Environmental Conditions

3.20.4.1 Site Features

The Blue Goose Group was visited by Bill Rember on July 31, 1997. A video segment describing the property is on the Coeur d'Alene Basin Videotape (Tape 3, index 0:01:10-0:05:35). Documenting photos are Roll R2, frame 25, and Roll R3, frames 1-4.

The old access road comes in above the Blue Goose workings. The road crosses above the caved adit (Figure 3.20-2), which was driven northeastward into the slope on the east side of the creek. Several collapsed timbers are visible in the brush at the caved portal (Figure 3.20-3). Belt pulleys and an old engine on skids are located just south of the caved adit (Figure 3.20-4). The waste dump extends north from the adit, parallel to the creek, for about 150 feet. It is 20 feet wide and 15 feet thick. The dump appears to cover an old channel of the creek, which now flows along the west side of the dump. A minor seep flows from the base of the dump. Scrap metal, including an old Chevy hood, is scattered around the site. A small amount of recent garbage is also present. The disturbed area covers less than 0.5 acre.
3.20.4.2 Sample Locations

3.20.4.2.1 Soil

A sample was collected from the face of the dump (R07319704) along its length parallel to the South Fork of Cedar Creek.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
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</thead>
<tbody>
<tr>
<td>R07319704</td>
<td>Blue Goose waste dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.20.4.2.2 Water

A water sample was collected from the seep coming from the base of the dump (R07319702). Although no adit water was present, samples were collected from the South Fork of Cedar Creek upstream from the adit (R07319701) and downstream from the adit and the waste dump (R07139703).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R07319701</td>
<td>upstream, South Fork of Cedar Creek</td>
<td>38μs</td>
<td>60</td>
<td>7.5</td>
<td>4 ft. wide, 0.75 ft. deep</td>
<td>No</td>
</tr>
<tr>
<td>R07319702</td>
<td>seep from Blue Goose waste dump</td>
<td>56μs</td>
<td>64</td>
<td>7.00</td>
<td>---</td>
<td>Yes</td>
</tr>
<tr>
<td>R07139703</td>
<td>downstream, South Fork of Cedar Creek</td>
<td>39μs</td>
<td>60</td>
<td>7.23</td>
<td>---</td>
<td>No</td>
</tr>
</tbody>
</table>

3.20.4.2.3 Analytical Results

Soil Samples  (Table 2.5-3 and 2.5)

Compared to background levels (Tables 1.5-3 and 1.5-4) and environmental standards (Table 1.5-5), the Blue Goose waste dump (R07319704) has slightly elevated levels of arsenic (83 ppm), cadmium (3.3 ppm), copper (48 ppm), lead (82 ppm), and iron (3.9 percent) in the element screen. In the TCLP for metals screen, values are below detection limits for all relevant metals.

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

The seep from the waste dump (R07319702) is below all water quality standards in the dissolved metals screen but exceeds all standards for cadmium in the total metals screen.
3.20.5 Structures

The remains of an old cabin (Figure 3.20-4) are on the west side of the South Fork of Cedar Creek across from the north end of the waste dump. One end of the building is upright, but the remainder has collapsed, in large part because trees have fallen onto the building.

3.20.6 Safety

No serious safety problems were identified at this site.
Figure 3.20-1. Topographic map of the Blue Goose Mine, Kootenai County, Idaho (U.S. Geological Survey Lane 7.5-minute topographic map).
Figure 3.20-2. Sketch map of the Blue Goose Mine site.
Figure 3.20-3. Caved adit with collapsed portal timbers (lower left) and part of the waste dump (upper right) at the Blue Goose Mine (Roll R3, frame #1).

Figure 3.20-4. Old engine on skids near the Blue Goose adit, with a belt pulley in the foreground (Roll R3, frame #2).
Figure 3.20-5. Remains of a cabin at the Blue Goose Mine (Roll R3, frame #3).
3.21 CHARLES DICKENS MINE (Site No. SP-119)

Alternative names—Dickens Consolidated; Dickens; Old Charles Dickens; Silver Crescent, Inc.

3.21.1 Site Location and Access (Figure 2.1-1a)

The Charles Dickens Mine is located at the end of the main road that goes up Moon Gulch (Forest Service Roads 930 and 1599) just south of the center of section 25, T. 49 N., R. 3 E., on the Kellogg East 7.5-minute quadrangle (Figure 3.21-1). There is a locked gate across the road about ½ mile south of the mill. An exit from the main Moon Gulch road goes to the mill. The road ends at the north end of the property. From there, an access road leads to a shaft and a burned hoist house. There are five mill tailings impoundments south of the mine that parallel the Moon Gulch road. This property is on Forest Service land.

3.21.2 Geologic Features (Figure 2.2-1a)

The Charles Dickens is in thick-bedded argillite and quartzose argillite of the Prichard Formation (Hobbs and others, 1965, Plate 3).

3.21.3 Site History

The following historical sketch of the Charles Dickens is from McNary (1995, p. 23-25)\(^1\): Mitchell and Bennett (1983, table 7) compiled production figures for individual mines in the Coeur d'Alene Mining District from 1884 to 1980. They reported that from 1902 through 1930, the Charles Dickens mine produced 4,604 tons of ore that yielded 16,022 oz Ag, 734,921 lb Pb, 78,971 lb Zn, 31,239 lb Cu, and 31 oz Au. The Silver Crescent had no recorded production between 1911 and 1926. After the two mines were incorporated as one property in 1935, development work was done, but no additional production was reported. The mill operated in the 1940’s as a custom mill, processing ore from various mines and tailings impoundments throughout the Coeur d'Alene Mining District; however, production figures from this period are incomplete.

The first reference to the Charles Dickens Mine was by Bell (1908, p. 180), who reported that a mill was constructed at the property in 1907 and that several carloads of rich concentrates [Pb?] were shipped. Gerry (1909, p. 432) reports that in 1908, the Charles Dickens Mine was the largest shipper in the Evolution district. In January 1908, the 100-ton concentrator was destroyed by fire. It was replaced by a 150-ton plant, which operated for a short time; however, by the end of the year, the property was sold for debts (Gerry, 1909, p. 432).

\(^1\)Citation punctuation corrected from the original.
Thereafter, the Charles Dickens Mine and 150-ton mill operated intermittently (1912, 1913, 1916, 1917, and 1918) (Gerry, 1913-1920). Ag-Pb and Pb-Zn ores were concentrated to yield a Pb concentrate containing lesser amounts of Au, Cu, and Ag. The equipment consisted of one crusher, two sets of rolls, one ball mill, one hydraulic classifier, five tables, and four jigs. The mill was operated by electric power (Gerry, 1927, p. 20).

After 1907, there was no further reference to the Charles Dickens Mine in the State Mine Inspectors' reports until 1926. On March 25, 1925, the property was incorporated as the Dickens Consolidated Mines Co. Workings consisted of a vertical shaft. Mining equipment included a 900-ft³ Sullivan compressor and an air-driven hoist. During the year, the mine plant was completely rehabilitated, a new head frame was constructed, and the shaft was deepened to about 400 ft, at which point a crosscut reportedly intercepted a new ore vein.

In 1927, the shaft at Charles Dickens Mine was deepened from 400 ft to 500 ft and considerable crosscutting and drifting were done on each level. A large, electrically driven hoist was also installed.

In 1928, the new 150-tons per day flotation mill was constructed at the Charles Dickens Mine to replace the mill that was built in 1908. The shaft was sunk from the No. 5 (500 ft) to the No. 7 (700 ft) level, and considerable developmental work was performed on both levels. About 300 tons of Pb concentrate was produced and marketed (Gerry, 1930, p. 676).

By 1929, total development at the Charles Dickens Mine was about 7,000 ft, and about 30 workers were employed. In May, a fire destroyed the hoist house (including the hoist) and the compressor. New buildings were constructed and the machinery was rebuilt; however, only a small amount of development work was done, and the mill operated for only a few days in November and December. Pb concentrates were shipped to the smelter at East Helena, MT, and one carload of Pb concentrates produced late in 1929 was shipped to Bradley, ID, for smelting (Gerry and Miller, 1931, p. 646). Zn concentrates were sent to the Sullivan Zn plant at Silver King, ID. All operations were suspended in December 1929 (Gerry and Miller, 1931, p. 398; Campbell, 1930, p. 215).

A small amount of diamond drilling was reportedly done on the 600-ft level of the Charles Dickens Mine early in 1930 (Campbell, 1931, p. 221). From 1930 to 1937, the mine was idle. On March 1, 1935, the name was changed to the Dickens Mining Co., which consisted of the Dickens Group of 24 unpatented claims (Campbell, 1936, p. 242).
According to the Idaho State Inspector of Mines reports, the property later known as the Silver Crescent was incorporated on October 19, 1911, as the Placer Creek Silver-Lead Mining & Milling Co. As of 1921, development on the property consisted of a 1,400-ft-long adit. On August 11, 1922, the name was changed to the Silver Crescent Mining Co. In 1922, development consisted primarily of one 2,000-ft-long adit; about 200 ft of development was done during that year. In 1923, development was principally by a 150-ft-long adit, and about 70 feet of development was done (Campbell, 1921-1924).

In 1924, development at the Silver Crescent was by two adits: the No. 1, which was 80 ft long, and the No. 2, which is 130 ft long. About 70 feet of developmental work was done during the year. In 1925, a third adit about 125 ft long was driven, and 60 ft of development work done. Very little work was done in 1926, at which time total development consisted of five adits. The principal adit was 1,000 ft long (Campbell, 1925-1927). No production was reported from the Silver Crescent workings during the period 1911-1926. From 1926-1937, the Silver Crescent was idle.

In 1937, both the Dickens Mining Co. and the Silver Crescent Mining Co. were consolidated and incorporated under the name Silver Crescent, Inc. During the year, 1,200 ft of development work was done, the Dickens Mine was dewatered, and 70 ft of the shaft was rebuilt. The flotation mill was completely repaired and overhauled, and operations began in late April. About 15 men were employed at the mine (Campbell, 1938, pp. 250-251).

In 1938, about 2,500 ft of development work was done, bringing the total length of workings to 11,700 ft. This consisted of six adits (the No. 1, 150 ft long; the No. 2, 350 ft long; the No. 3, 2,000 ft long; the No. 4, 3,000 feet long; the No. 5, 3,200 feet long; and the No. 6, 3,000 feet long). Mining equipment included an Allis Chalmers, 6-ft, 150-hp, double-drum hoist; a Sullivan compressor; and miscellaneous equipment and buildings (Campbell, 1939, p. 226).

No reports were filed with the State Mine Inspector for 1939 and 1940. According to Woodward and Luff (1941, p. 349), the Silver Crescent mill treated 10,750 tons of Ag ore from the Silver Dollar Mining Co. property in 1940. In 1941, 1,349 ft of development work was done (Campbell, 1942, p. 230). According to Rice (1993, personal communication), attempts were made in the early 1940's to dewater the shaft and other underground workings; however, these attempts apparently met with little success.

In 1943, the mill was leased to E. G. Smith, who operated it intermittently for a few years as a custom mill (Rice, 1993, personal communication; Campbell, 1944, p. 213). In 1945, tailings from the Osburn dump were processed at the mill
(Needham and Luff, 1947, p. 374). Garrett, Doyle, and Randall leased the Silver Crescent flotation mill in 1947 and treated about 42,200 tons of Zn-Pb tailings that had been deposited on the Pastore farm, 2.5 miles west of Wallace (Needham and Luff, 1949, p. 1,412).

In the spring of 1948, the shaft was dewatered and underground levels opened for examination (McDowell, 1948, p. 210). About 3,880 tons of Pb ore from the Western Union Mine dump was treated at the mill (Needham and Luff, 1950, p. 1,506). In 1950, about 400 ft of diamond drilling was done from a station on the 600-ft level (McDowell, 1951, p. 225).

From 1950 until 1963, the mine and mill were apparently inactive. According to the Idaho State Inspector of Mines report for 1963-1964, the Silver Crescent was leased under a development contract to Pacific Minerals, Inc. In the 68th Annual Report of the Mining Industry of Idaho for 1969-1970 (the last time the Silver Crescent is mentioned), the property is listed as inactive.

Most of the equipment has been removed from the mine and mill site; the headframe has collapsed over the shaft; and all workings are now caved. The hoist house remains essentially intact and still contains the equipment that was probably installed in the late 1920's. All other buildings are either gone or in advanced states of dilapidation. According to the Mineral Survey Plat (No. 3314), the original mill was located west of, and downslope from, the mine shaft shown on plate I [omitted]. Except for the piles of jig tailings mixed with waste rock north of the dump, no trace of this mill exists at the mine today.

In summary, the mining history of the Silver Crescent and Charles Dickens Mines suggests that only the Charles Dickens Mine produced ore. According to Earl Siler (1992, personal communication), development work was done at the adit on the west side of the road opposite to the lower tailings in the 1980's. This adit is probably one of the original Silver Crescent workings. Because the USBM study was concerned primarily with characterization of the mill tailings, no attempt was made to locate and map any of the mine workings, except for the old workings north of the mill.

Most of the flotation tailings were deposited from 1940 to 1950 and do not represent any of the ore from the Charles Dickens Mine, which did not produce after 1929. These tailings are probably mostly reprocessed stream-side tailings from Osburn flats and other areas along the South Fork Coeur D'Alene River upstream from Osburn.

The mill was salvaged by the U.S. Forest Service in 1996.
3.21.4 Environmental Conditions

3.21.4.1 Site Features

This mine was visited by Earl Bennett on July 17, 1997. A video segment describing the property is on the Coeur d’Alene Basin Videotape (Tape 3, index 0:05:35-0:35:10). Documenting photos are Roll B1, frames 14-20, and Roll B16, frames 7-9.

Figure 3.21-2 is a sketch map of the surface features at the Charles Dickens. A shaft (Figure 3.21-3) and an old double drum hoist (Figure 3.21-4), which has been burned, are located on top of the waste dump (Figure 3.21-5). The shaft is filled with old timbers from the collapsed headframe, but how secure these are is uncertain; they could collapse into the shaft. The hoist sits on a concrete pad, which is all that is left of the hoist house. The dump measures about 400 feet long, 60 feet wide at the widest portion, and is about 100 feet thick. There are several yellow and red oxidized zones in the dump (Figure 3.21-6), which probably contains sulfides. There may also be jig tails under the waste dump.

The flotation mill and buildings (Figures 3.21-7 and 3.21-8) at the site were salvaged last year under supervision of the Forest Service. The property was studied extensively by the U.S. Bureau of Mines in 1992-1994 as a test case for evaluating environmental hazards at an old mine site. The tailings ponds are now the Forest Service repository for tailings and mine waste from other mines in the area. These wastes will be added to the existing tailings ponds at the Charles Dickens. All that is left of the mill and the three buildings that were on the south end of the dump are concrete footings and pads and an ore bin that was at the top of the mill (Figure 3.21-9). The remains of an old water tower are also above the mill.

On the north end of the property are the foundations for two more buildings. The access road goes by the buildings, climbs about 200 feet uphill, and crosses the waste dump to reach the hoist house.

Moon Creek is in a buried flume or culvert where it goes by the mill and mine. The creek is also flumed and covered just north of the mine and was probably used for water power at one time.

There are a series of five mill tailings ponds in the active waterway of Moon Creek just south of the mill (Figures 3.21-10 and 3.21-11). Each of the impoundments is separated from the others by dams or armored berms which are vegetated with trees and brush. Moon Creek flows down the east side of the first two tailings impoundments (Nos. 5 and 4), then crosses the tailings site between ponds No. 3 and No. 4 and flows on the west side of tailings impoundments Nos. 3, 2, and 1. Where the creek cuts between tailings impoundments No. 3 and No. 4, the berm has been armored on both sides of the creek. However, this has not been effective in stopping erosion (Figure 3.21-12). Pond No. 3 is 100 feet across and 2 feet deep. Pond No. 4 is more yellow than the other dumps. Pond No. 5 is on the south end of the mill and building complex.
The total disturbed area for the mine, mill, and tailings impoundments is about 20-25 acres.

3.21.4.2 Sample Locations

3.21.4.2.1 Soil Samples

Sample B7179701 was collected from an oxidized zone near the base of the waste dump (possibly old jig tailings). Sample B7179702 was collected above the notch where the stream has eroded the tailings on the east side of Pond No. 4.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7179701</td>
<td>Charles Dickens, waste dump</td>
<td>Yes</td>
</tr>
<tr>
<td>B7179702</td>
<td>Charles Dickens, tailings pond No. 4</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.21.4.2.2 Water Samples

Sample B7179703 was collected from Moon Creek above the wooden and concrete flumes on the north end of the mine property. Sample B7179705 was collected from below the southernmost tailings impoundment (Pond No. 1).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature (° F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7179703</td>
<td>upstream, Moon Creek</td>
<td>48μs</td>
<td>60</td>
<td>7.3</td>
<td>3 ft. wide, 0.3 ft. deep</td>
<td>Yes</td>
</tr>
<tr>
<td>B7179705</td>
<td>downstream, Moon Creek</td>
<td>73μs</td>
<td>58</td>
<td>7.2</td>
<td>---</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.21.4.2.3 Analytical Results

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

Compared to background levels (Tables 1.5-3 and 1.5-4) and environmental standards (Table 1.5-5), the sample of possible jig tailings (B7179701) has very high arsenic (1,300 ppm), cadmium (110 ppm), copper (1,400 ppm), lead (11,000 ppm), zinc (16,000 ppm), and iron (11.0 percent) in the element screen. Sample B7179702 (tailings pond No. 4) is high in arsenic (960 ppm), copper (390 ppm), lead (8,600 ppm), and zinc (1,000 ppm), with slightly elevated levels of cadmium and iron in the element screen.
In the TCLP for metals screen, sample B7179701 shows significant leaching for cadmium and lead. Sample B7179702 shows significant leaching for lead.

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

The upstream water sample (B7179703) is below all standards in the dissolved metals screen but exceeds all standards for cadmium in the total metals screen. The downstream sample (B7179705) slightly exceeds the Aquatic Life Chronic standard for cadmium and both Aquatic Life standards for zinc in the dissolved metals screen. It exceeds both Aquatic Life standards for cadmium and zinc and equals the Primary MCL for cadmium in the total metals screen. The test for lead is just above the lower limit for the Aquatic Life Chronic standard.

3.21.5 Structures

Remains of several structures are present at this site and are described above under “Site Features.” Pictures of the mill before salvage are shown in Figures 3.21-7 and 3.21-8.

3.21.6 Safety

The shaft could pose a safety hazard, if the timbers plugging it are not stable and the shaft is not completely caved.
Figure 3.21-1. Topographic map of the Charles Dickens Mine, millsite, and tailings impoundments, Shoshone County, Idaho (U.S. Geological Survey Kellogg East 7.5-minute topographic map).
Figure 3.21-2. Sketch map of the surface features at the Charles Dickens Mine.
Figure 3.21-3. Collapsed timbers over the shaft at the Charles Dickens Mine, with the concrete footings for the headframe to the right (Roll B1, frame #15).

Figure 3.21-4. Concrete foundation and burned hoist drums at the shaft of the Charles Dickens Mine (Roll B1, frame #16).
Figure 3.21-5. Charles Dickens waste dump, as viewed from the Moon Gulch Road (Roll B1, frame #18).

Figure 3.21-6. Base of the waste dump and site of Sample B7179701 (center of frame) at the Charles Dickens Mine (Roll B1, frame #19).
Figure 3.21-7. Mill buildings at the Charles Dickens Mine, prior to salvage (Earl H. Bennett, 1995 photograph).

Figure 3.21-8. Mill buildings and storage shed at the Charles Dickens Mine, prior to salvage (Earl H. Bennett, 1995 photograph).
Figure 3.21-9. Remains of the Charles Dickens mill after salvage (Roll B1, frame #17).
Figure 3.21-10. View down Moon Gulch, showing the mill tailings ponds from above the millsite (Roll B1, frame #14).
Figure 3.21-11. Aerial view of the Charles Dickens waste dump (bottom right), millsite (lower center), and mill tailings impoundments on Moon Creek (center), looking southwest (Roll B16, frame #9).

Figure 3.21-12. Erosion on tailings pond No. 4 (site of Sample B7179702) at the Charles Dickens Mine (Roll B1, frame #20).
3.22 CHICAGO-LONDON MINE (Site No. WL-120)—Update

The Chicago-London mine and tailings site at the mouth of Paragon Gulch (Figure 3.22-1) was visited by Earl Bennett last year and revisited by Bennett on August 30, 1997. The purpose of this visit was to reexamine the hole in the access road to the mine noted in last year’s report (Figure 3.22-2 and 3.22-3). The hole is probably caused by a stope from the old mine that has worked its way to the surface. The hole (Figures 3.22-4, 3.22-5, and 3.22-6) now covers the entire width of the road. It is about 5 times larger than last year and is getting larger. It is at least an estimated 100 feet deep. There are what look like timbers in the upper part of the hole. When covered with snow, the cave-in poses a serious threat to cross-country skiers or snowmobile operators who may use this road. A video segment of this most recent visit is on the Coeur d’Alene Basin Videotape (Tape 3, index 00:35:10-00:38:20).
Figure 3.22-1. Topographic map of the Chicago-London Mine, Shoshone County, Idaho (U.S. Geological Survey Thompson Pass 7.5-minute topographic map).
Figure 3.22-2. Hole in the road at the Chicago-London Mine in Paragon Gulch as it appeared in 1996 (Roll 559693, frame #8).

Figure 3.22-3. Close-up of the hole in the road at the Chicago-London Mine in Paragon Gulch as it appeared in 1996 (Roll 559693, frame #9).
Figure 3.22-4. Hole in the road at the Chicago-London Mine in Paragon Gulch (Roll B11, frame #18).

Figure 3.22-5. Hole in the road at the Chicago-London Mine in Paragon Gulch (Roll B11, frame #20).
Figure 3.22-6. Hole in the road at the Chicago-London Mine in Paragon Gulch (Roll B11, frame #19).
3.23 CEDAR MOUNTAIN LODE GROUP (Site No. SP-33)
Alternative names—Cedar Mountain; K07229701 (field card designation).

3.23.1 Site Location and Access (Figure 2.1-1a)

The Cedar Mountain Lode Group consists of two main adits located in the SE½ of the NE¼ of section 5, T. 52 N., R. 2 W., on the Bayview 7.5-minute quadrangle (Figure 3.23-1). The workings are on the northeast side of Cedar Mountain. The mine site borders or is on Forest Service land. Recent (late 1980s or early 1990s) correspondence with the owners of the Cedar Mountain Lode Group is on file at the U.S. Forest Service Wallace District Office (Carl Ritche, personal communication).

There are two routes to the property. On the north, the owners constructed an access road to the property, presumably gated, southward from the south end of the Good Hope Road. On the south, the property can be reached via a gated road that goes northeast from Cedar Saddle and switches back toward the northwest to get to the upper adit. This southerly access road is somewhat overgrown with brush and is not passable by vehicle.

3.23.2 Geologic Features (Figure 2.2-1a)

The mine is in the upper Wallace Formation near the contact with Cretaceous or Tertiary granitic rocks (Griggs, 1973).

3.23.3 Site History

The U.S. Forest Service Wallace District Office in Silverton has a file on this property.

3.23.4 Environmental Conditions

3.23.4.1 Site Features

The site was visited by John Kauffman on July 22, 1997. A video segment describing the property is on the Coeur d’Alene Basin Videotape (Tape 4, index 0:--:--). Documenting photos are Roll K1, frames 23-25, and Roll K2, frames 1-4.

Two adits were located at the property, both with indications of relatively recent activity (within the last 10-15 years). The upper adit (Adit No. 1) is on the north-facing slope about ½ mile east-northeast of Cedar Saddle at an elevation of about 3,500 feet. The lower adit (Adit No. 2) is approximately 1,000 feet northwest of Adit No. 1 at an elevation of about 3,300 feet. (Note: near the end of the video segment of this property, the upper adit is wrongly identified as Adit No. 2).

The portal of Adit No. 1, although fairly old, is in relatively good condition and is closed off with a padlocked iron-mesh gate with a “Keep Out” sign (Figure 3.23-2). The adit appears open
beyond the gate. A minor trickle of water flows from the adit and through a small wooden flume (Figure 3.23-3) under the top surface of the waste dump. The water discharges from the flume and disappears almost immediately into the coarse rock of the dump. No seeps were found below the dump. Flow rate is estimated at less than 0.1 gallon per minute. The waste dump (Figure 3.23-4) is 85 feet long, 25 feet wide, and about 70 feet down the face. Because of the steepness of the slope, the actual thickness of the dump is considerably less than 70 feet. The eastern portion of the dump is unoxidized and fairly coarse. The western portion is oxidized on the surface, but this may be a thin veneer over unoxidized material. There is only a minor amount of scrap metal associated with this adit. One tank-like metal object, possibly a boiler, is located against the hillside just west of the portal. Approximately 1 acre is disturbed at this site.

The portal at Adit No. 2 is also in relatively good condition and is blocked off with an iron-mesh gate. Several “Keep Out” signs are posted (Figure 3.23-5). The adit appears to be open beyond the gate. Water is flowing from the adit at an estimated rate of 3 gallons per minute. The water flows onto the access road and follows it westward about 100 feet before turning northward and disappearing into brush on the north side of the access road. Ore car rails extend out from the portal across the access road and curve eastward along the top of a wooden chute or slide. The top of the slide (Figure 3.23-6) is about 15 feet above the main level of the waste dump for Adit No. 2. The flat area in front of the portal and the part of the access road that crosses it are also most likely on waste rock. Only the part below the base of the ore chute was included in the dump measurements for this adit. The surface of the dump is somewhat irregular and has been reworked by a bulldozer, but in general the dump is 75 feet long, 25 feet wide, and roughly 30 feet thick. For the most part, this dump consists of barren, unoxidized waste rock. However, at the base of the ore chute is a pile of rubble containing mostly mineralized rock. This may have been the area where ore was loaded and shipped. There is a considerable amount of scrap metal, old machinery, ore car rails, stacks of timbers, and other wooden and metal debris around this adit and on the dump. A blower with an electric motor (Figure 3.23-7) was noted on the west side of the portal. A rectangular cargo or freight-storage container and a small shack (Figure 3.23-7) are also west of the portal. Several other metal tanks and containers are along the access road east of the portal (Figure 3.23-8). A number of timbers and rails are stacked across the access road north of the portal, and an overturned ore car is on the dump below the ore chute. The disturbed area at Adit No. 2 covers about 1-2 acres.

About ¼ mile above Adit No. 2 along the access road from Cedar Saddle is a small area where ore appears to have been stockpiled. The pile contains strongly mineralized vein material and massive sulfides.

Other bulldozer cuts along the access road between the two adits may have been exploration cuts, or they may have simply been staging areas or turnarounds for equipment. If both workings and the associated access roads and cuts are considered, the disturbed area at this site is probably 3-5 acres. The adits and waste dumps, however, account for only about 2-2.5 acres.
3.23.4.2 Sample Locations

3.23.4.2.1 Soil
No dump samples were collected because neither dump impinged on the drainage.

3.23.4.2.2 Water

Water samples were collected from both adits. Sample K07229702 was taken outside the portal of the upper adit. Sample K07229703 was taken outside the portal of the lower adit.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K07229702</td>
<td>Cedar Mountain Lode Group, Adit No. 1 (upper)</td>
<td>200 μs</td>
<td>52</td>
<td>7.7</td>
<td>0.1</td>
<td>Yes</td>
</tr>
<tr>
<td>K07229703</td>
<td>Cedar Mountain Lode Group, Adit No. 2 (lower)</td>
<td>84 μs</td>
<td>45</td>
<td>8.2</td>
<td>3</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.23.4.2.3 Analytical Results

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

The water sample from Adit No. 1 (K07229702) has the highest arsenic value (0.380 ppm) of all water samples collected during the 1997 field season and exceeds the Primary MCL as well as both Aquatic Life standards for arsenic. Both the dissolved and total metals screens exceed all standards for cadmium and both Aquatic Life standards for zinc, and the dissolved metals screen exceeds the Aquatic Life Chronic standard for copper. The water sample from Adit No. 2 (K07229703) has the second highest arsenic value (0.260 ppm), which exceeds the Primary MCL and Aquatic Life Chronic standards. The total metals screen exceeds the Aquatic Life Chronic standard and is at the lower limit of the Aquatic Life Acute standard for cadmium.

3.23.5 Structures

A small storage shed (Figure 3.23-7), which measures about 8 feet by 10 feet and has a metal roof, is located 100-125 feet west of the Adit No. 2 portal on the south side of the access road. A second freight or cargo storage container is about 50 feet west of Adit No. 2. Metal tanks east of this adit may have been used for fuel or water storage.
3.23.6 Safety

When the site was visited, the portals appeared to be fairly well secured with padlocked iron-mesh gates. Unless tampered with, the adits present no safety problems. Although the arsenic values in both samples of adit water are high, the water does not appear to reach any streams before disappearing into the ground. The streams in the drainages in the vicinity of the mine are intermittent, and the nearest perennial stream, Sage Creek, is about 1 mile north of the workings. Because of the relatively minor amount of water discharging from the adits, the high arsenic levels should pose minimal health and safety concerns.
Figure 3.23-1. Topographic map of the Cedar Mountain Lode Group, Kootenai County, Idaho (U.S. Geological Survey Bayview 7.5-minute topographic map).
Figure 3.23-2. Portal of Adit No. 1 (the upper adit) at the Cedar Mountain Lode Group, looking south (Roll K1, frame #23).

Figure 3.23-3. Wooden flume under the surface of the No. 1 waste dump at the Cedar Mountain Lode Group, showing the trickle of water from Adit No. 1 (Roll K1, frame #25).
Figure 3.23-4. Waste dump of Adit No. 1 at the Cedar Mountain Lode Group, looking west. The oxidized portion is at the far end and the unoxidized portion is in the foreground (Roll K1, frame #24).

Figure 3.23-5. Portal of Adit No. 2 (the lower adit) at the Cedar Mountain Lode Group, looking south (Roll K2, frame #1).
Figure 3.23-6. Looking north at the top of the wooden slide above the lower portion of the No. 2 waste dump at the Cedar Mountain Lode Group. A broken rubber-tired hopper is on the dump below the slide (Roll K2, frame #4).

Figure 3.23-7. Looking west from in front of Adit No. 2 at the Cedar Mountain Lode Group. An electric blower is beside the portal, a container storage box is at the right center, and a small storage shed is in the background to the right (Roll K2, frame #2).
Figure 3.23-8. Looking east from in front of the Adit No. 2 portal at the Cedar Mountain Lode Group. An upright metal tank is to the right and a flat metal container is at the left edge of the photograph (Roll K2, frame #3).
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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>MINE PRODUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commodity(s)</td>
</tr>
<tr>
<td>Production (ounces)</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>MILL PRODUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commodity(s)</td>
</tr>
<tr>
<td>Production (ounces)</td>
</tr>
</tbody>
</table>
3. HYDROLOGY

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

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

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

________________________________________________________________________

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

________________________________________________________________________

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

________________________________________________________________________

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

5. SAFETY RISKS

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

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

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

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

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

**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=gravel and <2", COBBLE=2"-6", BOULD=6"+

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

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

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

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

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

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

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8. SAMPLES

Take samples only on National Forest lands.

<table>
<thead>
<tr>
<th>TABLE 3 - WATER SAMPLES FROM MINE SITE DISCHARGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Number</td>
</tr>
<tr>
<td>Date sample taken</td>
</tr>
<tr>
<td>Sampler (Initials)</td>
</tr>
<tr>
<td>Discharging From</td>
</tr>
<tr>
<td>Feature Number</td>
</tr>
<tr>
<td>Indicators of Metal Release</td>
</tr>
<tr>
<td>Indicators of Sedimentation</td>
</tr>
<tr>
<td>Distance to stream (ft)</td>
</tr>
<tr>
<td>Sample Latitude</td>
</tr>
<tr>
<td>Sample Longitude</td>
</tr>
<tr>
<td>Field pH</td>
</tr>
<tr>
<td>Field SC</td>
</tr>
<tr>
<td>Flow (gpm)</td>
</tr>
<tr>
<td>Method of measurement</td>
</tr>
<tr>
<td>Photo Number</td>
</tr>
</tbody>
</table>

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

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

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

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

---

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

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

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

**Method of Measurement:** EST= Estimate, BUCK= Bucket and time, METER= Flow meter
<table>
<thead>
<tr>
<th>TABLE 5 - WASTE SAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Number</td>
</tr>
<tr>
<td>Date of sample</td>
</tr>
<tr>
<td>Sampler (Initials)</td>
</tr>
<tr>
<td>Sample Type</td>
</tr>
<tr>
<td>Waste Type</td>
</tr>
<tr>
<td>Feature Number</td>
</tr>
<tr>
<td>Sample Latitude</td>
</tr>
<tr>
<td>Sample Longitude</td>
</tr>
<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:** Highwall
- **PLACER:** Placer or hydraulic deposit
- **POND:** Settling pond or lagoon sludge
- **ORE:** Ore Stockpile
- **HEAP:** Heap Leach

**Feature Number:** Corresponding number from Table 2 *(Waste Number)*
<table>
<thead>
<tr>
<th>Sample Number</th>
<th>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
9. HAZARDOUS WASTES/MATERIALS

<table>
<thead>
<tr>
<th>Waste Number</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Containment</td>
<td></td>
</tr>
<tr>
<td>Condition of Containment</td>
<td></td>
</tr>
<tr>
<td>Contents</td>
<td></td>
</tr>
<tr>
<td>Estimated Quantity of Waste</td>
<td></td>
</tr>
</tbody>
</table>

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

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

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

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

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

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

For structures on or partially on National forest lands.

<table>
<thead>
<tr>
<th>Type</th>
<th></th>
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<tbody>
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</table>

<table>
<thead>
<tr>
<th>Number</th>
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<table>
<thead>
<tr>
<th>Condition</th>
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</table>

<table>
<thead>
<tr>
<th>Photo Number</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</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)

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12. SITE MAP

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

Owner(s) of patented land
Name: ________________________________
Address: ________________________________
Telephone Number: ________________________________

Claimant(s)
Name: ________________________________
Address: ________________________________
Telephone Number: ________________________________

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

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

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

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

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

Other sources of information (MILs #, MRDS #, other sampling data, etc):
________________________________________
Appendix B
Database Fields
NEWLOC- WA 1
ORANGENUM- 451
MAPLOC- 1
DEPOSIT- Eagle Creek Mine
MRDSREC- 0160790528
MILSRREF- PERIODPROD
ORE
COMMOD
REFERENCE- Au
LATITUDE
LONGITUDE- 474325
1154916
HARDFILE- N
MLA
NAME- EAGLE CREEK MINE
SEC- 33
SUBSEC- NESE
TWN- 051 N
RNG- 005 E
DDMMSS- 474325
DDMMSS- 1154904
OPTYP- SURFAC
STATUS- PAST PRO
COMMO1
COMMO2
COMMO3
COMMO4
COMMO5
MAPNAME- BURKE
QUAD- WALLACE
POP- 1KM
TOE- M
YFC
MPF
SITENAME
DISTRICT
COUNTY
SECUQUAD
SECUQUADSCL
UTMNORTH
UTMEAST
UTMZONE
COMMODIT
LAT
LON
TOWN
SECTION
RANGE
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 $\pm 30\%$ 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