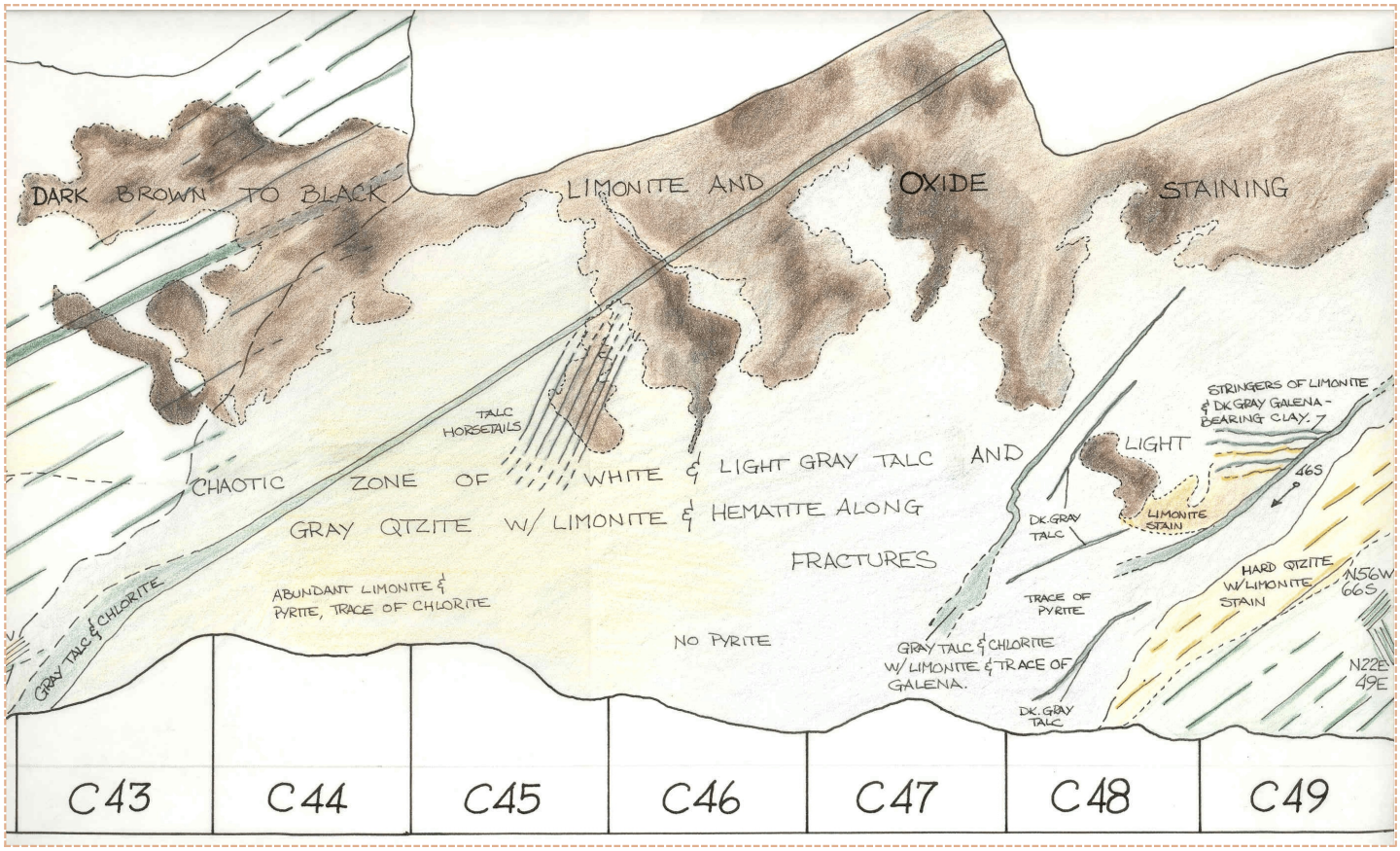
Abandoned-Inactive Mines on Bitterroot National Forest-Administered Land



Map of the Curlew Mine by Rick Schmidt in MBMG mineral property files

Open-File Report
MBMG 484

Phyllis A. Hargrave
Catherine McDonald
Michael D. Kerschen
John J. Metesh
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Prepared for the U.S. Department of Agriculture
Forest Service-Region 1

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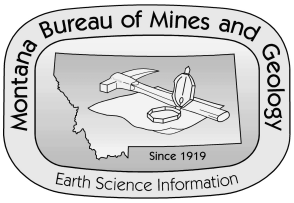

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1.0 INTRODUCTION

To fulfill its obligations under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Northern Region of the U.S. Forest Service (USFS) desires to identify and characterize the abandoned and inactive mines with environmental, health, and/or safety problems that are on or affecting National Forest System lands. The Northern Region of the USFS administers National Forest System lands in Montana and parts of Idaho and North Dakota. Concurrently, the Montana Bureau of Mines and Geology (MBMG) collects and distributes information about the geology, mineral resources, and ground water of Montana. Consequently, the USFS and the MBMG determined that an inventory and preliminary characterization of abandoned and inactive mines in Montana would be beneficial to both agencies and entered into a series of participating agreements to accomplish this work. The first forest inventoried was the Deerlodge National Forest, followed by the Helena National Forest, then the Beaverhead, Kootenai, and Lewis and Clark Forests (table 1). Inventory on the Custer National Forest was in progress at the same time as that for the Gallatin. The Flathead inventory was completed in 2002. The Lolo and Bitterroot National Forests were inventoried last.

Table 1. List of previous mine inventories and open-file report (OFR) numbers.

National Forest-Volume	Drainage(s)	MBMG OFR #
Deerlodge-Volume I	Basin Creek	321
Deerlodge-Volume II	Cataract Creek	344
Deerlodge-Volume III	Flint Creek and Rock Creek	345
Deerlodge-Volume IV	Upper Clark Fork River	346
Deerlodge-Volume V	Jefferson River	347
Helena-Volume I	Upper Missouri River	352
Helena-Volume II	Blackfoot-Little Blackfoot Rivers	368
Beaverhead	Entire Forest	379
Kootenai	Entire Forest	395
Lewis and Clark	Entire Forest	413
Gallatin	Entire Forest	418
Custer	Entire Forest	421
Flathead	Entire Forest	451
Lolo	Entire Forest	476
Bureau of Land Management	Entire State	365

1.1 Project Objectives

In 1992, the USFS and MBMG entered into the first of the agreements to identify and characterize abandoned and inactive mines on or affecting National Forest System lands in Montana. Objectives of the discovery process, as defined by the USFS, were:

1. Utilize a formal, systematic program to identify the "universe" of sites with possible human health, environmental, and/or safety problems that are either on or affecting National Forest System lands.

2. Identify the human health and environmental risks at each site based on site-characterization factors, including screening-level soil and water data that have been obtained and analyzed in accordance with EPA quality-control procedures.

3. Based on site-characterization factors, including screening-level sample data where appropriate, identify those sites that are not affecting National Forest System lands, and 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 database 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, the MBMG objectives also included gathering new information on the economic geology and hydrogeology associated with these abandoned and inactive mines. Enacted by the Legislative Assembly of the State of Montana (Section 75-607, R.C.M., 1947, Amended), the scope and duties of the MBMG include “the collection, compilation, and publication of information on Montana's geology, mining, milling, and smelting operations, and ground-water resources; investigations of Montana geology emphasizing economic mineral resources and ground-water quality and quantity.”

1.2 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.

1.3 Health and Environmental Problems at Mines

Abandoned and inactive mines may host various safety, health, and environmental problems that may include metals that contaminate ground water, surface water, and soils; airborne dust from abandoned tailings impoundments; sedimentation in surface waters from eroding mine and mill waste; unstable waste piles with the potential for catastrophic failure; and physical hazards associated with mine openings and dilapidated structures. Although all problems were examined

at least visually (appendix I–Field Form), the hydrologic environment appears typically to be affected to the greatest extent. Therefore, this investigation focused most heavily on impacts from the mines to surface water and ground water.

Metals are often transported from a mine by water (ground-water or surface-water runoff), either by being dissolved, suspended, or carried as part of the bedload. When sulfides are present, acid can form, which in turn increases the metal solubility. This condition, known as acid mine drainage (AMD), is a significant source of metal releases at many of the mine sites in Montana.

1.3.1 Acid Mine Drainage

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

1) availability of sulfides, especially pyrite,
2) presence of oxygen,
3) water in the atmosphere,
4) availability of leachable metals,
5) availability of water to transport the dissolved constituents, and
6) mine characteristics that affect the other five components.

Most geochemists would add to this list the availability of minerals such as calcite, which can neutralize the acidity. These six components occur not only within the mines but can exist within mine dumps and mill-tailings piles making waste materials the sources of contamination as well.

Acid mine drainage is formed by the oxidation and dissolution of sulfides, particularly pyrite (FeS_2) and pyrrhotite ($Fe_{1-x}S$). Other sulfides play a minor role in acid generation. Oxidation of iron sulfides forms sulfuric acid (H_2SO_4), sulfate ($SO_4^{=}$), and reduced iron (Fe^{2+}). Mining of sulfide-bearing rock exposes the sulfide minerals to atmospheric oxygen and oxygen-bearing water. Consequently, the sulfide minerals are oxidized, and acid mine waters are produced.

The rate-limiting step of acid formation is the oxidation of the reduced iron. This oxidation rate can be greatly increased by iron-oxidizing bacteria (*Thiobacillus ferrooxidans*). The oxidized iron produced by biological activity is able to promote further oxidation and dissolution of pyrite, pyrrhotite, and marcasite (FeS_2, a dimorph of pyrite).

Once formed, the acid can dissolve other sulfide minerals, such as arsenopyrite (FeAsS), chalcopyrite ($CuFeS_2$), galena (PbS), tetrahedrite ($[CuFe]_{12}Sb_4S_{13}$), and sphalerite ([Zn,Fe]S) to produce high concentrations of copper, lead, zinc, and other metals. Aluminum can be leached by the dissolution of aluminosilicates common in soils and waste material found in Montana. The dissolution of any given metal is controlled by the solubility of that metal.

1.3.2 Solubilities of Selected Metals

At a pH above 2.2, ferric hydroxide ($Fe[OH]_3$) precipitates to produce a brown-orange stain in surface waters and forms a similarly colored coating on rocks in affected streams. Other metals, such as copper, lead, cadmium, zinc, and aluminum, if present in the source rock, may co-

precipitate 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 pH less than 4, depending on $SO_4^{=}$ and K^+ activities (Lindsay, 1979). Once the acid conditions are present, the solubility of the metal governs its fate and transport:

Manganese solubility is strongly controlled by the redox state of the water and is limited by several minerals such as pyrolusite and manganite; under reduced conditions, pyrolusite (MnO_2) is dissolved and manganite (MnO[OH]) is precipitated. 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.

Silver solubility is strongly affected by the activities of halides such as Cl^-, F^-, Br^-, and I^-. Redox and pH also affect silver solubility but to a lesser degree. Silver substitutes for other cations in common ore minerals such as tetrahedrite and galena and is found in the less common hydrothermal minerals pyrargyrite (Ag_3SbS_2) and proustite (Ag_3AsS_3).

Arsenic tends to precipitate and adsorb with iron at low pH, and de-sorb or dissolve at higher pH. Thus, once oxidized, arsenic will be present in solution in higher pH waters. At a pH between 3 and 7, the dominant arsenic compound is a monovalent arsenate $H_2AsO_4^-$. Arsenic is abundant in metallic mineral deposits as arsenopyrite (FeAsS), enargite (Cu_3AsS_4), and tennantite ($Cu_{12}As_4S_{13}$), to name a few arsenic minerals.

Cadmium solubility data are limited. In soils, cadmium solubility is controlled by the carbonate species octavite ($CdCO_3$) at a soil pH above 7.5 and by strengite ($Cd_3[PO_4]_2$) at a soil pH below 6. In soils, octavite is the dominant control on solubility of cadmium. In water, at low partial pressures of H_2S, $CdCO_3$ is easily reduced to CdS.

Copper solubility in natural waters is controlled primarily by the carbonate content; malachite ($Cu_2[OH]_2CO_3$) and azurite ($Cu_3[OH]_2[CO_3]_2$) control solubility when CO_3 is available in sufficient concentrations. In soil, copper complexes readily with soil iron to form cupric ferrite. Other compounds in soil such as sulfate and phosphates also may control copper solubility. Copper is present in many ore minerals, including chalcopyrite ($CuFeS_2$), bornite (Cu_5FeS_4), chalcocite (Cu_2S), and tetrahedrite ($Cu_{12}Sb_4S_{13}$).

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 (Hg), and as elemental Hg in human-made deposits where mercury was used in the processing of gold ores.

Lead concentrations in natural waters are controlled by lead carbonate (cerussite), which has an equilibrium concentration of 50 µg/L at a pH between 7.5 and 8.5. As with other metals, concentrations in solution increase with decreasing pH. In sulfate soils with a pH

less than 6, anglesite ($PbSO_4$) controls solubility while cerussite ($PbCO_3$) 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. At a pH greater than 8, the equilibrium concentration of zinc in waters with a high bicarbonate content is less than 100 µg/L. Franklinite, a zinc manganese iron oxide, ([Fe, Zn, Mn] $[Fe, Mn]_2O_4$) may control solubility at pH less than 5 in water and soils, and the solubility is strongly affected by sulfate concentrations. Thus, production of sulfate from AMD may ultimately control solubility of zinc in water affected by mining. Sphalerite (ZnS) is common in mineralized systems.

1.3.3 The Use of pH and SC to Identify Problems

In mine evaluation studies similar to this one, pH and specific conductance (SC) have sometimes been used to distinguish "problem" mine sites from those that have no adverse water-related impacts. The general assumption is that low pH (<6.8) and high SC (variable) indicate a problem, and that neutral or higher pH and low SC indicate no problem.

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

Reliance on SC as an indicator of site conditions also can lead to erroneous conclusions. The SC value of a sample represents 55–75 percent of the total dissolved solids (TDS), depending largely on the concentration of sulfate. Without knowing the sulfate concentration, an estimate of TDS based on SC has about a 25 percent possible-error range. Further, without having a "statistically significant" number of SC data for a study area, it is hard to define what constitutes a high or low SC value.

Thus, a water sample with a near-neutral pH and a moderate SC could be erroneously interpreted to mean that no adverse impacts have occurred when one or more dissolved-metal species may exceed standards. With this in mind, the evaluation of a mine site for adverse impacts on water and soil must include the collection of samples for analysis of trace elements, as well as major cations and anions.

1.4 Methodology

1.4.1 Data Sources

The MBMG began this inventory effort by completing a literature search for all known mines in Montana. Published location(s) of the mines were plotted on USFS maps. From the maps, an inventory was developed of all known mines located on, or that could affect, National Forest System lands in Montana. The following data sources were used:

1) the MILS (mineral industry location system) database [U.S. Bureau of Mines (USBM)],
2) the MRDS (mineral resource data systems) database [U.S. Geological Survey (USGS)] (formerly known as CRIB),
3) published compilations of mines and prospects data,
4) state publications on mineral deposits,
5) USGS publications on the general geology of some quadrangle maps,
6) recent USGS/USBM mineral resource potential studies of proposed wilderness areas,
7) MBMG mineral property files, and
8) CRIB (computerized resource information bank) database [USGS].

During subsequent field visits, the MBMG located numerous mines and prospects for which no previous information exists. Conversely, other mines for which data exists could not be located in the field.

1.4.2 Pre-Field Screening

Field crews visited only sites determined by MBMG to have the potential to release hazardous substances and sites that lacked information to make that determination without a field visit. For problems to exist, a site must have a source of hazardous substances and a method of transport from the site. Most metal mines contain a source for hazardous substances, but the common transport mechanism, water, is not always present. Sites on dry ridgetops were assumed to have no mechanism for water transport, and mines described in the literature as small prospects were considered to have inconsequential hazardous-materials sources; therefore, neither type was visited.

In addition, the MBMG and the USFS developed screening criteria (table 2) 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 I) 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 to answer the questions. USFS mineral administrators used these criteria to “screen out” several sites using their knowledge of an area.

Mine sites that were not visited were retained in the database along with the data source(s) consulted (appendix II). However, these sites were often viewed from a distance while visiting other sites. In this way, the accuracy of the consulted information was often verified.

Placer mines were not studied as part of this project. Although mercury was used in amalgamation of placer gold, 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 anomalous concentrations of other heavy metals. Limestone and building-stone quarries, gravel pits, and phosphate mines were considered to be free of anomalous concentrations of hazardous substances and were not examined.

Table 2. 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 flood plain 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

If the answers to questions 1 through 6 were <u>all</u> "NO" (based on literature, personal knowledge, or site visit), then the site was not investigated further. Question 7 pertained to physical hazards only and was not a criterion for a site visit.

<u>1.4.3 Field Screening</u>

Sites that could not be eliminated under the screening criteria were visited. All visits were conducted in accordance with a health and safety plan that was developed for each Forest. An MBMG geologist usually made the initial field visit and gathered information on environmental degradation, hazardous mine openings, presence of historical structures, and land ownership. Some site locations were refined using conventional field methods or by Global Positioning System (GPS) data. Each site's location was defined by latitude/longitude and by tract-section-Township-Range as indicated in figure 1.

At sites for which sparse geologic or mining data existed, MBMG geologists characterized the geology, collected samples for geochemical analysis, evaluated the deposit, and described workings and processing facilities present where possible.

Sites with potential environmental problems were studied more extensively. The selection of these sites was made during the initial field visit using the previously developed screening criteria (table 2). In other words, if at least one of the first six screening criteria was met, the site was studied further. All sites visited by MBMG are discussed in the text; the screened out sites are included in appendix II.

On public lands, sites with ground-water discharge, flowing surface water, or contaminated soils (as indicated by impacts on vegetation) were mapped by the geologist using a Brunton compass and tape. The maps show locations of the workings, exposed geology, dumps, tailings, surface water, and geologic sample locations.

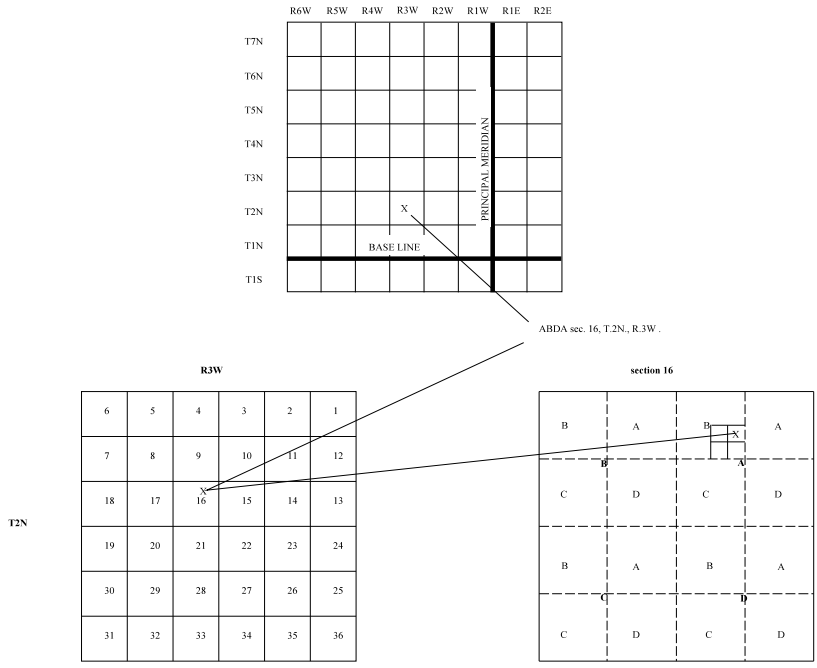

Figure 1. The location of a mine is found using a counterclockwise progression of decreasing quarters of a section of land. The resulting tracts in this case are ABDA.

1.4.4 Field Methods

An MBMG hydrogeologist visited all of the sites that the geologist determined had the potential for environmental problems. A hydrogeologist also visited the sites that only had evidence of seasonal water discharges, possible sedimentation, airborne dust, mine hazards, or stability problems and determined if there was a potential for significant environmental problems. The hydrogeologist then determined whether sampling was warranted and if so, selected soil- and water-sampling locations.

1.4.4.1 Selection of Sample Sites

This project focused on the impact 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 at concentrations that adversely impact the environment.

The hydrogeologist selected and marked water and/or soil sampling locations based on field parameters (SC, pH, Eh, etc.) and observations (erosion and staining of soils/streambeds), and chose sample locations that would provide the best information on the relative impact of the site to surface water and soils. If possible, surface-water sample locations were chosen that were upstream, downstream, and at any discharge points associated with the site. Soil-sample locations were selected in areas where waste material was obviously impacting natural material.

In most cases where applicable, a composite-sample location across a soil/waste mixing area was selected. In addition, all sample sites were located to assess conditions on National Forest System lands; therefore, samples sites were located on National Forest System lands to the extent that ownership boundaries were known.

Because monitoring wells were not installed as part of this investigation, the evaluations of impacts to ground water were based solely upon strategic sampling of surface water and soils. Background water-quality data are restricted to upstream surface-water samples; background soil samples were not collected. Laboratory tests were used to determine the propensity of waste material to release metals and may lend additional insight into possible ground-water contamination at a site.

1.4.4.2 Collection of Water and Soil Samples

Sampling crews collected soil and water samples, and took field measurements (streamflow) in accordance with the following:

Sampling and Analysis Plan (SAP)–These plans are site specific, and they detail the type, location, and number of samples and field measurements to be taken.

Quality Assurance Project Plan (QAPP) (Metesh, 1992)–This plan guides the overall collection, transportation, storage, and analysis of samples, and the collection of field measurements.

MBMG Standard Field Operating Procedures (SOP)–The SOP specifies how field samples and measurements will be taken.

1.4.4.3 Marking and Labeling Sample Sites

Each sample location was plotted on the site map or topographic map; each sample site was given a unique seven-character identifier based on its location, sample type, interval, and relative concentration of dissolved constituents. The characters of the unique sample identifier were defined as follows:

D DA T L I C where:
D: Drainage area–determined from topographic map
DA: Development area (dominant mine)
T: Sample type: T-Tailings, W-Waste Rock, D-Soil, A-Alluvium, L-Slag, S-Surface Water, G-Ground Water
L: Sample location (1-9)
I: Sample interval (default is 0)
C: Sample concentration (High, Medium, Low) determined by the hydrogeologist, based on field parameters.

1.4.4.4 Existing Data

Data collected in previous investigations were neither qualified nor validated under this project. The quality-assurance managers and hydrogeologists determined the usability of such data.

1.4.5 Analytical Methods

The MBMG Analytical Division performed the laboratory analyses and conformed, as applicable, to the following:

> Contract Laboratory Statement of Work, Inorganic Analyses, Multi-media, Multi-concentration. March 1990, SOW 3/90, Document Number ILM02.0, U.S. EPA, Environmental Monitoring and Support Laboratory, Las Vegas, NV.
>
> Method 200.8 Determination of Trace Metals in Water and Waste by Inductively Coupled Plasma and Mass Spectrometry–U.S. EPA.
>
> Method 200.7 Determination of Trace Metals in Water and Waste by Inductively Coupled Plasma and Mass Spectrometry–U.S. EPA.

If a contract laboratory procedure did not exist for a given analysis, the following method was used:

> Test Methods for Evaluating Solid Waste-Physical/Chemical Methods, SW-846, 3rd edition, U.S. EPA, Washington, D.C.
>
> EPA Method 1312 Acid-Rain Simulation Leach Test Procedure-Physical/Chemical Methods, SW-846, 3rd edition, U.S. EPA, Washington, D.C., Appendix G.

All laboratory analyses conformed to the MBMG Laboratory Analytical Protocol (LAP).

1.4.6 Standards

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

1.4.6.1 Soil Standards

There are no federal standards for metal concentrations and other constituents in soils; acceptable limits are often based on human and/or environmental risk assessments for an area. Because no assessments of this kind have been done, metals concentrations in soils were compared to the limits postulated by the EPA and the Montana Department of Health and Environmental Sciences (MDHES) (now Department of Environmental Quality) for sites within the Clark Fork River basin in Montana. The proposed standard for lead in soils is 1,000 mg/kg to

2,000 mg/kg, and for arsenic in residential areas, 80 to 100 mg/kg. The Clark Fork Superfund background levels (Harrington- MDHES, written commun., 1993) are listed in table 3.

Table 3. Clark Fork Superfund background levels (mg/kg) for soils

Reference	As	Cd	Cu	Pb	Zn
U.S. Mean soil	6.7	0.73	24.0	20.0	58
Helena Valley Mean soil	16.5	0.24	16.3	11.5	46.9
Missoula Lake Bed sediments	-	0.2	25.0	34.0	105
Blackfoot River	4.0	<0.1	13.0	-	-
Phytotoxic concentration	100	100	100	1,000 (500)*	500

*A more recent level of 500 mg/kg for lead was provided for state superfund programs (Judy Reese, MDEQ, written commun., 1999). The 1,000 level was an upper limit for lead and not used at Code of Federal Regulations (CFR) sites.

For reference, Reese (written commun., 1999) also provided the Clark Fork Superfund phytotoxicity levels listed in table 4.

Table 4. Various levels of toxicity for lead (ARWWS : Anaconda Regional Water and Waste Standards, a part of the Anaconda National Priorities List)

Source		ppm
ARWWS ecological risk assessment (RA)	low pH<6.5	94 (Natural Resource Damage #)
ARWWS ecological RA	low pH>6.5	179 (Natural Resource Damage #)
ARWWS ecological RA	high pH<6.5	250
ARWWS ecological RA	high pH>6.5	250
Kabata-Pendias & Pendias (1992)		100-400
CH2MHill (1987)		1,000

1.4.6.2 Water-Quality Standards

The Safe Drinking Water Act (SDWA) directs the 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). The maximum contaminant level is defined as “the maximum permissible level of a contaminant in water which is delivered to any user of a public water system” (EPA, 1999). 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 5.

Table 5. Water-quality standards

	PRIMARY MCL[1] (mg/L)	SECONDARY MCL[2] (mg/L)	AQUATIC LIFE ACUTE[3,4] (mg/L)	AQUATIC LIFE CHRONIC[3,5] (mg/L)
Aluminum		0.05-0.2	0.75	0.087
Arsenic	0.01[9]		0.34	0.15
Barium	2			
Cadmium	0.005		0.0043[6]	0.0022[6]
Chromium	0.1		1.7[6,7]	0.21[6,7]
Copper	1.3[8]	1.0	0.013[6]	0.009[6]
Iron		0.3		1
Lead	0.015[8]		0.065[6]	0.0025[6]
Manganese		0.05		
Mercury	0.002		0.0014	0.00077
Nickel			0.47[6]	0.52[6]
Silver		0.1	0.0034[6]	
Zinc		5	0.12[6]	0.12[6]
Chloride		250	860	230
Fluoride	4.0	2.0		
Nitrate (as N)	10			
Sulfate		250		
pH (standard units)		6.5-8.5		6.5-9.0

(1) 40 CFR 141; revised through 7/1/99.
(2) 40 CFR 143; revised through 7/1/99.
(3) Priority Pollutants, EPA Region VIII, April 1999.
(4) Maximum concentration not to be exceeded more than once every 3 years.
(5) 4-day average not to be exceeded more than once every 3 years.
(6) Hardness dependent. Values are calculated at 100 mg/L.
(7) Cr^{+3} species.
(8) Action level, EPA Current Drinking Water Standards, National Primary and Secondary Drinking Water Regulations, April, 1999.
(9) The Safe Drinking Water Act, as amended in 1996, requires EPA to revise the existing drinking water standard for arsenic.

In some state investigations, the standards are applied to samples collected as total-recoverable metals. Because total-recoverable-metals concentrations are difficult if not impossible to reproduce, this investigation used dissolved-metals concentrations.

1.4.7 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 results is presented in appendix III.

The data for this project were integrated with existing data and incorporated into a new MBMG abandoned-inactive mines database. It is designed to be the most complete compilation available for information on the location, geology, production history, mine workings, references,

hydrogeology, and environmental impact of each of Montana's mining properties. The data fields in the current database are compatible with the MBMG geographic information system (GIS) package.

2.0 THE BITTERROOT NATIONAL FOREST

The Bitterroot National Forest (BNF) encompasses 1.6 million acres in southwestern Montana and eastern Idaho. This report focuses on the Montana portion (figure 2). The Forest boundary almost exactly coincides with the Ravalli county boundary and the Bitterroot River drainage. Portions of the Elk City, Butte, Dillon, and Hamilton 1° x 2° quadrangles provide 1:250,000 (250K) scale map coverage of the area. The 250K quadrangle of Elk City includes the Nez Perce Pass and Big Horn Crags 100,000-scale quadrangles; the Butte 250K sheet includes the Philipsburg and Missoula East 100K quadrangles; the Hamilton 250K sheet covers the Missoula West and Hamilton 100K quadrangles; and the Dillon 250K sheet includes the Wisdom 100K quadrangle.

The topography of the Bitterroot National Forest is dominated by the Bitterroot and Sapphire ranges flanking the broad Bitterroot Valley. The Bitterroot Range lies to the west of the Bitterroot Valley. The highest point in the Bitterroot Range is Trapper Peak at 10,157 ft. The Sapphire Range to the east of the valley generally has elevations of 7,000 to 8,000 ft.

The BNF is administratively divided into four ranger districts with the following offices: Stevensville RD in Stevensville, Sula RD in Sula, and the Darby RD and West Fork RD in Darby. The Forest Supervisor's office is in Hamilton and Missoula is the Region 1 Headquarters. Two wilderness areas are in the Montana portion of the Bitterroot National Forest: the Selway-Bitterroot and the Anaconda-Pintlar. These two wilderness area account for nearly one half of the entire Forest.

2.1 History of Mining

Gold was discovered at the head of the Bitterroot River (Hughes Creek ?) as early as the 1860's (McCulloch, 1991) or the 1870's (Sahinen, 1957) and a silver vein was noted on Sweathouse Creek (Pleasant View mining district) in 1871 (MBMG mineral property files).

Organized mining districts in Ravalli County (the majority of the Bitterroot National Forest) include: Curlew (Deep Canyon), Hughes Creek (Alta, Elk Creek, Overwich), Mineral Point, Pleasant View, Slate Creek, and Threemile. Unorganized mining districts include: Burnt Fork Creek, Eightmile, Frog Pond Basin, Stevensville, and Sula. Recorded production extends back to 1904 for placers in Ravalli County and 1906 in the Curlew mining district. There was probably unrecorded, county-wide production before this and production afterward that has not been documented.

Continued production of gold and some tin (in cassiterite) came from Hughes Creek through the 1990's (McCulloch, 1991, 1992, 2001). Exploration in Ravalli County included projects at Blue Joint (Pegasus), Weasel Creek for platinum (AA Mining Corp) and Woods Creek for copper, gold, and platinum (Stronghold Resources) (McCulloch, 1991). Rob Creek and Mine Creek (Montana Logging and Mining Company), in southern Ravalli County, were included in exploration projects in 1991 (McCulloch, 1992). The Larrigon Mine was also the target for an

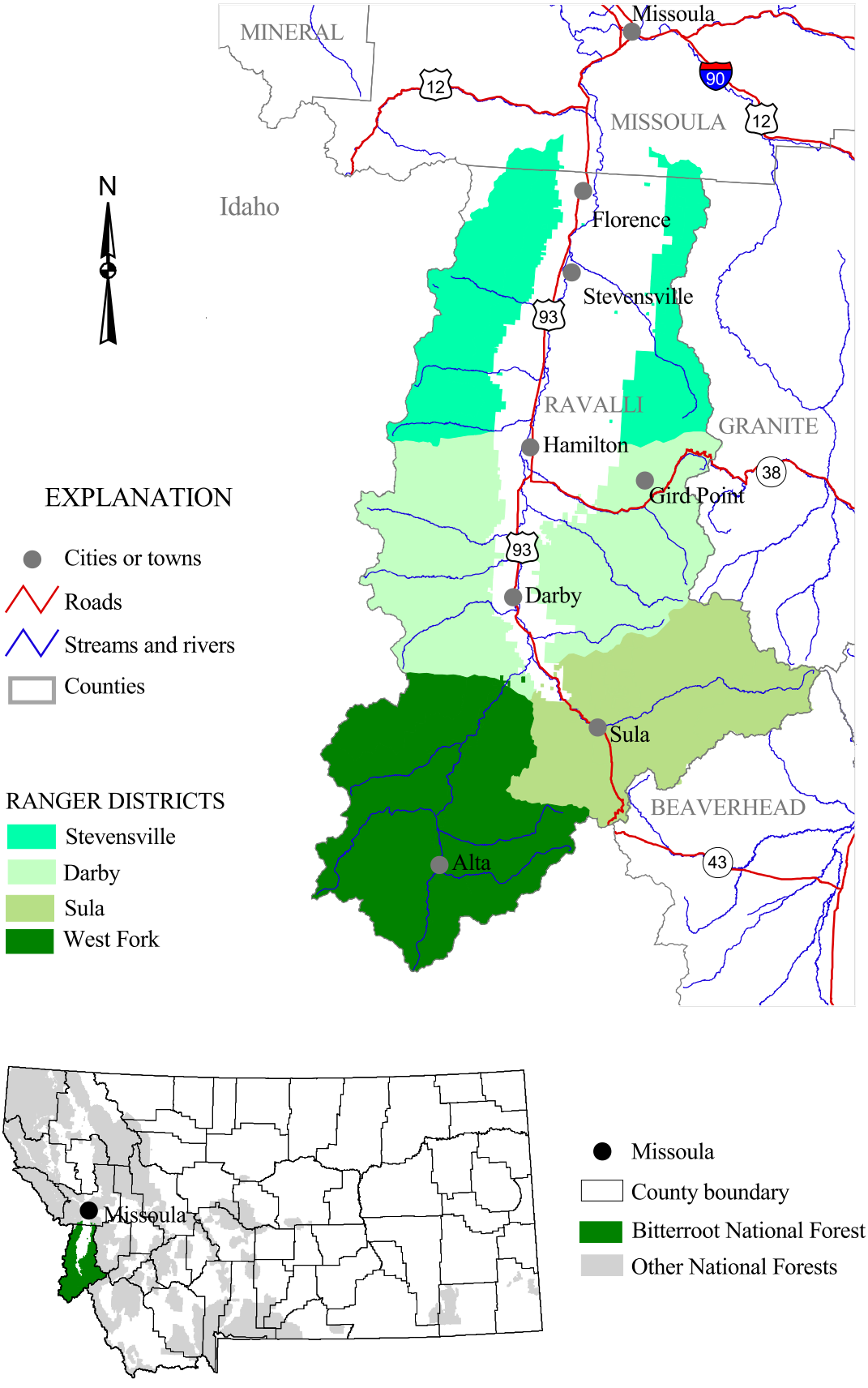

Figure 2. Location map of the Bitterroot National Forest in western Montana.

underground indurated placer on Belt rocks in 1991. Stansbury Mining Company most recently operated the Stansbury Vermiculite Mine in the 1990's.

2.1.1 Production

Production of gold, silver, copper, lead, and zinc from 1904 until 1955 from all of Ravalli County totaled slightly more than a million dollars in value (Sahinen, 1957). An unpublished report from the MBMG mineral property files included production from the years 1904-1966, obviously using Sahinen's figures and updating them (table 6).

Table 6. Estimated production from Ravalli County.

Years	Total value $	Gold (oz)	Silver (oz)	Copper (lb)	Lead (lb)	Zinc (lb)
1904-1955	$1,030,404	13,128	235,969	367,041	688,624	4,114,387
1904-1966	$1,059,199	13,239	249,910	369,941	762,324	4,436,887

Many of the years for which these data were summarized had no production in a particular metal, and for some of the early years, no figures were available even though there may have been production. Nonmetallics such as beryl, fluorospar, and vermiculite are not accounted for here. The unpublished report in the MBMG files estimated the total value of metallic and nonmetallic commodities produced from 1904-1966 was $12,260,000.

According to Sahinen, most production came from the Curlew Mine (private) and most placer production came from the Hughes Creek and Overwich Creek districts (mixed public and private) (table 7).

Table 7. Estimated production from the primary mines in Ravalli County.

Mine	Tons	Gold (oz)	Silver (oz)	Copper (lb)	Lead (lb)	Zinc (lb)
Curlew	69,116	4560.4	194,016	334,359	519,732	3,397,594
Hughes (lode)	442	138.2				
Hughes (placer)		9,236.3	464.7			

Production at the Curlew was estimated to be worth $616,881. Lode mines in Hughes Creek were estimated to have produced $4,643 from 1923 to 1952; placer mines were estimated to have produced $254,100 in gold and silver from 1904 to 1952. The placers, combined with some lodes of Hughes Creek, produced $254,412, mostly from gold, with only $312 of that total from silver.

2.1.2 Milling

Knowledge of the history of milling developments is essential for interpreting mill sites, understanding tailings characteristics, and determining the potential for the presence of hazardous substances. Mills, usually adjacent to the mines, produce two materials: 1) a product that is either the commodity itself or a concentrate that is shipped off site to other facilities for further refinement, and 2) mill waste, which is called tailings.

In the 1800's, almost all mills treated ore by crushing and/or grinding to a fairly coarse size followed by concentration using gravity methods. Polymetallic sulfide ores were concentrated and shipped for smelting (usually to sites off USFS-administered land). Gold was commonly removed from free-milling ores at the mills by mercury amalgamation. Cyanidation arrived in the United States about 1891, and because it resulted in greater recovery rates, it revolutionized gold extraction in many districts. Like amalgamation, cyanidation also worked only on free-milling ores, but it required a finer particle size. About 1910, froth flotation became widely used to concentrate sulfide ores. This process required that the ore be ground and mixed with reagents to liberate the ore-bearing minerals from the barren rock.

Thus, there were two fundamental processes used for ore concentration: gravity and flotation, and three main processes used for metal extraction: amalgamation, cyanidation, and smelting. Each combination of methods produced tailings of different size and composition; each used different chemicals in the process; and each was associated with a different geologic environment.

In the Bitterroot National Forest, three mills were found. The Montana Prince Mine and Mill, Brickley's, and the Larrigon Mine and Mill. No tailings were found at the Montana Prince (Pioneer Technical Services, 1995) and no references could be found as to the type of mill it was. It was on private land in the Frogpond mining district. The Larrigon Mill was visited but it had previously burned, and no further information could be found on it. It was on BNF-administered land northwest of Taylor Creek in the Hughes Creek mining district. Photos of the original mill building are on file in MBMG mineral property files. Another possible mill foundation and some sand-sized tailings were found at the Taylor Creek Mine.

2.2 Geology

The Bitterroot National Forest-administered land includes Cretaceous intrusives associated with the eastern margin of the Idaho Batholith. The extreme northeast side of the valley, in the Sapphire Mountains, and the extreme southern tip of Ravalli County, are dominated by the Precambrian Ravalli Formation (Sahinen, 1957). Precambrian metamorphic schists and gneisses are the oldest rocks in the area. Tertiary dikes follow a northeast trend near the Precambrian/ Cretaceous contact in the Overwich Creek, Slate Creek, and Nez Perce and Blue Joint areas. Badley (1978) described these porphyritic dacite to rhyodacite dikes.

The oldest sedimentary rocks exposed in the Bitterroot National Forest belong to the Ravalli and Missoula Groups of the Proterozoic Belt Supergroup. The mostly fine-grained rocks have been metamorphosed to argillites, siltites, quartzites, and carbonates. The overall thickness of the Belt rocks is about 49,000 feet (Harrison and others, 1992).

The area west of Victor was the subject of four theses in the late 1950's and early 1960's: Groff (1954) described the Kootenai Creek area's petrography, Anderson (1959) described the lower Bass Creek Canyon geology, Chase (1961) described the lower Sweathouse Creek area's geology, and Berg (1964) who described the petrology of the anorthosites of the Bitterroot Range.

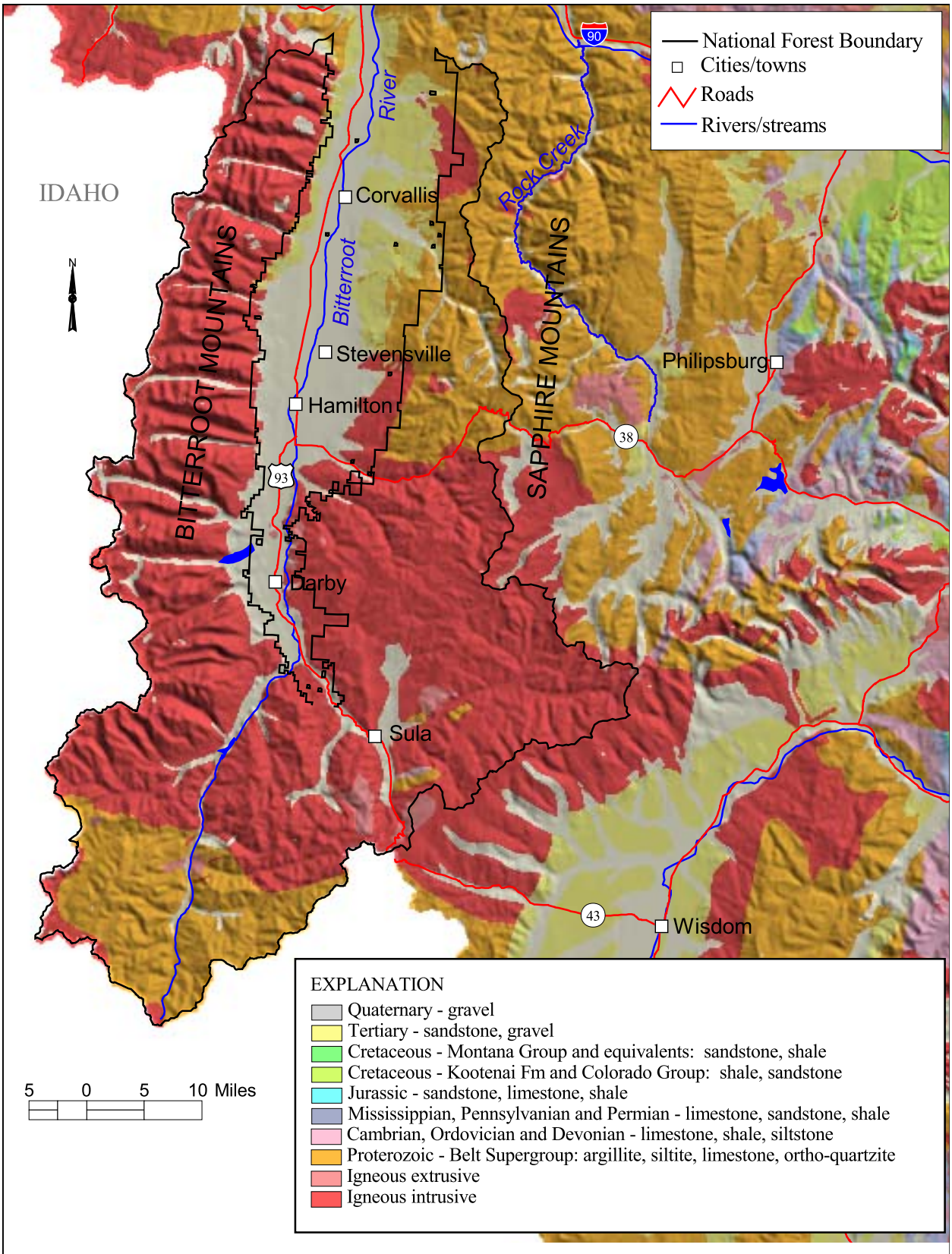

Figure 3. Generalized geologic map of the Bitterroot National Forest (modified from Ross and others, 1955).

2.3 Economic Geology

Most recently, fluorospar was the principal commodity mined in Ravalli County; the majority came from the Crystal Mountain Fluorite Mine. Vermiculite was also produced from the Sansbury Vermiculite Mine on Skalkaho Pass. The Curlew Mine (on private land) and the Overwich-Hughes Creek area yielded the most metal production. Minor amounts of molybdenum, tungsten, iron, and uranium reportedly came from small mines in the county. Nonmetallic products from the area included barite, calcite, clay, sand and gravel, coal, pumicite, quartz, vermiculite, and quartzite building stone (Anon., 1967(?), MBMG mineral property files).

The Pleasant View district is associated with quartz veins in a granitic intrusive. The Cleveland group of mines is hosted by banded Precambrian argillite with quartz-sulfide veins. Burnt Fork mines are also associated with Precambrian argillites; hosts include calcite veins hosting copper and iron oxides. The Overwich and Hughes Creek lode mines are at the contact between granite and limestone. Placers in the area include recent alluvium and possibly "high-level placers" in Eocene gravels. The Mineral Point mining district, in the southern portion of Ravalli County, is also in Precambrian Ravalli Group quartzites and argillites. Shear zones in many of these mines seem to be the conduits that allowed vein materials to be deposited.

2.4 Hydrology and Hydrogeology

The Bitterroot National Forest lies within the Bitterroot River basin which encompasses 1,828,750 acres. The basin HUC code is 17010205. There are five USGS gaging stations on the Bitterroot River and its tributaries (figure 8).

Table 8. USGS stream-gage locations within the Bitterroot River basin.

Gage Location	USGS Station Number	Period of Record (WY)	Drainage Area (sq. miles)	Annual Mean Flow (cfs)
West Fork Bitterroot River near Conner	12342500	1942-2000	317	95.6
East Fork Bitterroot River near Conner	12343400	1957-1971	381	82.7
Bitterroot River near Darby MT	12344000	1938-2000	1,049	280
Skalkaho Creek near Hamilton MT	12346500	1949-1978*	87.8	102
Bitterroot River near Missoula MT	12352500	1898-2000**	2,814	1,064

(*Records from 1949-1952 and 1958-1978. * *Records from 1898-1901, 1903-1904, and 1989 to present.)

Annual precipitation ranges from 12.5 inches in the valleys (Hamilton and Stevensville) to more than 16.21 inches at Sula (Western Regional Climate Center, 2002). Most of the snowfall occurs during the months of December and January with a mean of 9 to 10 inches of snow per month at Sula. To the west of the Bitterroot Valley, in the Bitterroot Mountains, the average annual precipitation ranges from 45 inches per year in the south to more than 80 inches per year to the north (Briar and Dutton, 2000). To the east of the Bitterroot Valley, in the Sapphire Mountains,

the annual precipitation is 25 to 35 inches. The greatest monthly precipitation in the valleys typically occurs in May and June with means of 1.5 and 1.7 inches per month in Stevensville and Hamilton, respectively. Sula receives slightly more precipitation with 2.3 inches average in each month of May and June.

January and July are the coldest and warmest months respectively, with average monthly temperatures at Sula of 9.2° F and 82.2° F, respectively. Stevensville is slightly warmer at a minimum average of 14.8°F in January and a maximum average monthly temperature of 84.5°F in July.

2.5 Abandoned and Inactive Mines on the Bitterroot National Forest

The Bitterroot National Forest (BNF) inventory of abandoned/inactive mines was completed by MBMG during summer and fall of 2001. A total of 137 sites was initially identified in or near the BNF (figure 4) using the USBM MILS (minerals industry location system) database as a basic reference. National Forest Service personnel provided additional information on 10 mine locations. Many entries (105 sites) were screened out because they were either on private land within Forest boundaries, they were placer claims and not the focus of this inventory, or they had inaccurate locations, no references, or the commodity sought had little or no probability of affecting BNF-administered land. Ten locations in which mines were plotted were visited but the mine workings could not be located either because of misinformation or because no workings ever existed. Thirty-two mine sites were visited by MBMG staff, and only one was sampled for environmental concerns. Table 9 summarizes the inventory results for the Bitterroot National Forest. These numbers are accurate to the extent that the database is updated and will change, reflecting current progress in database entry.

Table 9. Summary of Bitterroot National Forest investigation

Total Number of Abandoned/Inactive Mines Sites that were:

PART A-Field Form	
Located in the general area from MILS	137
Added by MBMG from literature or field visits	10
PART B-Field Form (Screening Criteria)	
Screened out by MBMG based on description in literature	105
Unable to locate	10
Visited by MBMG geologist	32
PART C-Field Form	
Sampled (water and/or soil)	1

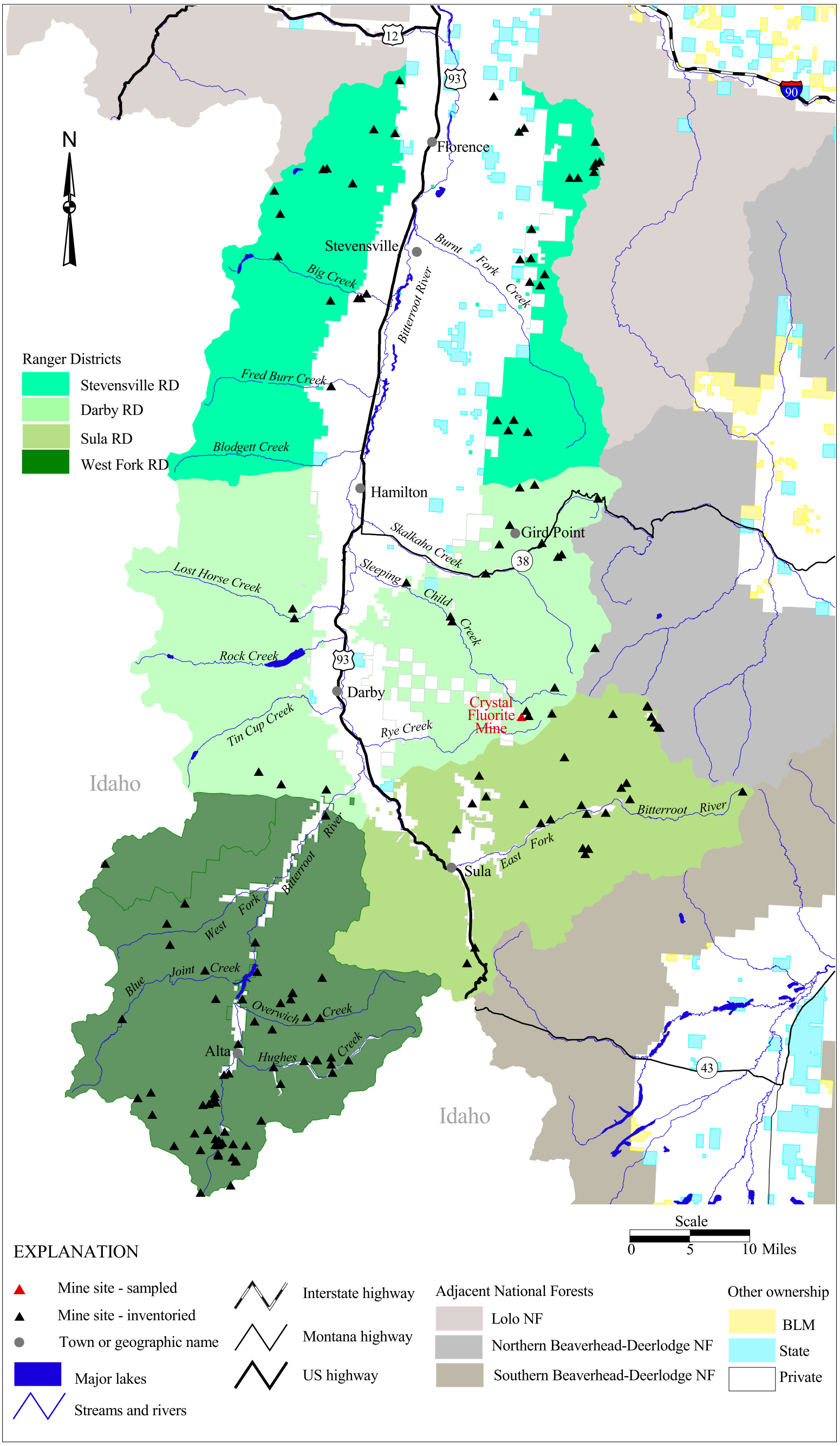

Figure 4. Map of the Bitterroot National Forest-administered land showing mine locations.

Only one mine site on the BNF-administered land was sampled because of a discharging adit. The mine was located in the Darby Ranger District. A summary of the environmental conditions for the mine is presented in the following section. Short descriptions of all the sites visited by MBMG are also included. Those sites that were screened out and not visited are described in appendix II of this volume.

For the purpose of this report, all mines have been organized by Ranger District. Previously in AIM inventories of other Forests, the mines were organized by drainage basin; this was a convenient way to separate the National Forest into manageable areas for assessment of cumulative environmental impacts on the drainages. The Bitterroot drainage basin is so large and the contribution of mining activity was so small that Ranger Districts seemed to be a more logical way to organize the mines into smaller groups for this report.

3.0 DARBY RANGER DISTRICT

A total of 22 sites was identified in the Darby Ranger District (table 10 and figure 5). Most sites represented small nonmetallic claims or exploration projects. The vermiculite mines were some of the larger and more recently worked. The fluorspar mines were also recently operated in this area. Eleven mines were visited or attempts were made to visit them. Only one had a potentially hazardous opening. The entries in bold have a short description in the text of the report and were visited by MBMG staff.

Table 10. Mines and prospects in the Darby Ranger District.

MINE NAME	MBMG ID	OWNER	VISIT	HAZARD	T	R	S	TRACT	24K TOPO	COMMENTS
Bitterroot Valley Stone Quarry	RA002180	NF	N	NE	04N	21W	7		Como Peaks	Screened out: ornamental stone (quartz) quarry.
Crystal Mountain Fluorite	**RA002174**	**M**	**Y**	**Y**	**03N**	**18W**	**18**	**C**	**Bald Top Mountain**	**MBMG sampled 09/05/01; pits with water are private; adit discharge is public.**
Daly Creek Prospects	**RA000159**	**NF**	**Y**	**NE**	**05N**	**18W**	**8**	**D**	**Skalkaho Pass**	**Prospects only, dry, no structures.**
Eagle Rock Mining Co.	RA002066	NF	N	NE	05N	19W	14		Gird Point	Screened out: commodity is quartz crystals; very general location.
Gird's Creek Vermiculite	RA007222	NF	N	NE	05N	19W	1		Gird Point	Screened out: vermiculite; accuracy in MILS was +/- 5 km. At head of Gird Creek, 11 mi E. of Hamilton.
Green Goose & Sunset / Molly Hogen	RA007183	NF	N	NE	04N	18W	24		Kent Peak	Screened out: inaccurate location (+/- 1 km), USBM OFR-MLA 74-83, Banister and others, 1983. A 35-ft adit & 2 pits
Lost Horse Creek	RA002282	NF	N	NE	04N	21W	18		Como Peaks	Screened out: titanium placer.
Lumberjack Group - Crystal Mountain	RA002378	M	N	NE	03N	18W	18		Bald Top Mountain	Duplicate of the Crystal Mine, mostly private.
Molly 1, 2, 3, 4 and 5 Mine	RA002006	NF	Y	NE	05N	18W	15		Skalkaho Pass	Drove by, unable to locate.
Pine Tree	**RA007168**	**NF**	**Y**	**NE**	**05N**	**19W**	**27**		**Gird Point**	**Visited general area; unable to locate; prospect only with a 25 cu yd pit (Walker, 1963, USBM RI 6334).**

MINE NAME	MBMG ID	OWNER	VISIT	HAZARD	T	R	S	TRACT	24K TOPO	COMMENTS
Retirement Claims	**RA002384**	**M**	**Y**	**NE**	**03N**	**18W**	**17**		**Bald Top Mountain**	**Visited general area 09/05/01, private/BNF mixed, open pit fluorite deposit. See Crystal Mountain.**
Sargent Ranch	RA007096	M	N	NE	05N	20W	34		Mountain House	Screened out: Inaccurate location (+/- 1 km) and uranium-thorium occurrence only. May be private.
Skalkaho Vermiculite Deposit	**RA007099**	**NF**	**Y**	**NE**	**06N**	**18W**	**25**		**Burnt Fork Lake**	**Open cuts near top of pass.**
Sleeping Child W-Zr	**RA007093**	**M**	**Y**	**NE**	**03N**	**18W**	**4**		**Kent Peak**	**Visited general area: no workings found; tungsten-zirconium occurrence.**
Sleeping Child Hot Springs	RA002186	P	N	NE	04N	19W	7		Deer Mountain	Screened out: geothermal. Private.
Stansbury Vermiculite - Unnamed	**RA007132**	**NF**	**Y**	**NE**	**06N**	**19W**	**24**		**Willow Mountain**	**Visited by MBMG 10/03/01; large pit being reclaimed.**
Star	RA007252	NF	N	NE	02N	22W	14		Trapper Peak	Screened out: Inaccurate location, gold prospect only, USBM production files only record.
Trapper Ck Claims	**RA006919**	**NF**	**Y**	**NE**	**02N**	**21W**	**19**		**Trapper Peak**	**Unable to locate; visited general area.**
Two Bear Creek	RA000324	NF	N	NE	04N	19W	7		Deer Mountain	Screened out: placer. Commodity was thorium.
Unnamed Location	RA007141	NF	N	NE	05N	18W	16		Skalkaho Pass	Screened out: inaccurate location (+/- 5 km).
Unnamed Location	**RA007277**	**NF**	**Y**	**NE**	**02N**	**21W**	**22**		**Burnt Ridge**	**Visited general area; unable to locate. Commodity was uranium.**
Vermiculite - St Clair Creek Pros.	**RA002402**	**NF**	**Y**	**NE**	**06N**	**18W**	**20**		**Willow Mountain**	**Visited 10/03/01. Vermiculite occurrence. Cabin being used.**

(NF - National Forest, F - Federal, P - Private, S - State, M - Mixed; N - not visited, Y - visited; Y - hazard, NE -not evaluated)

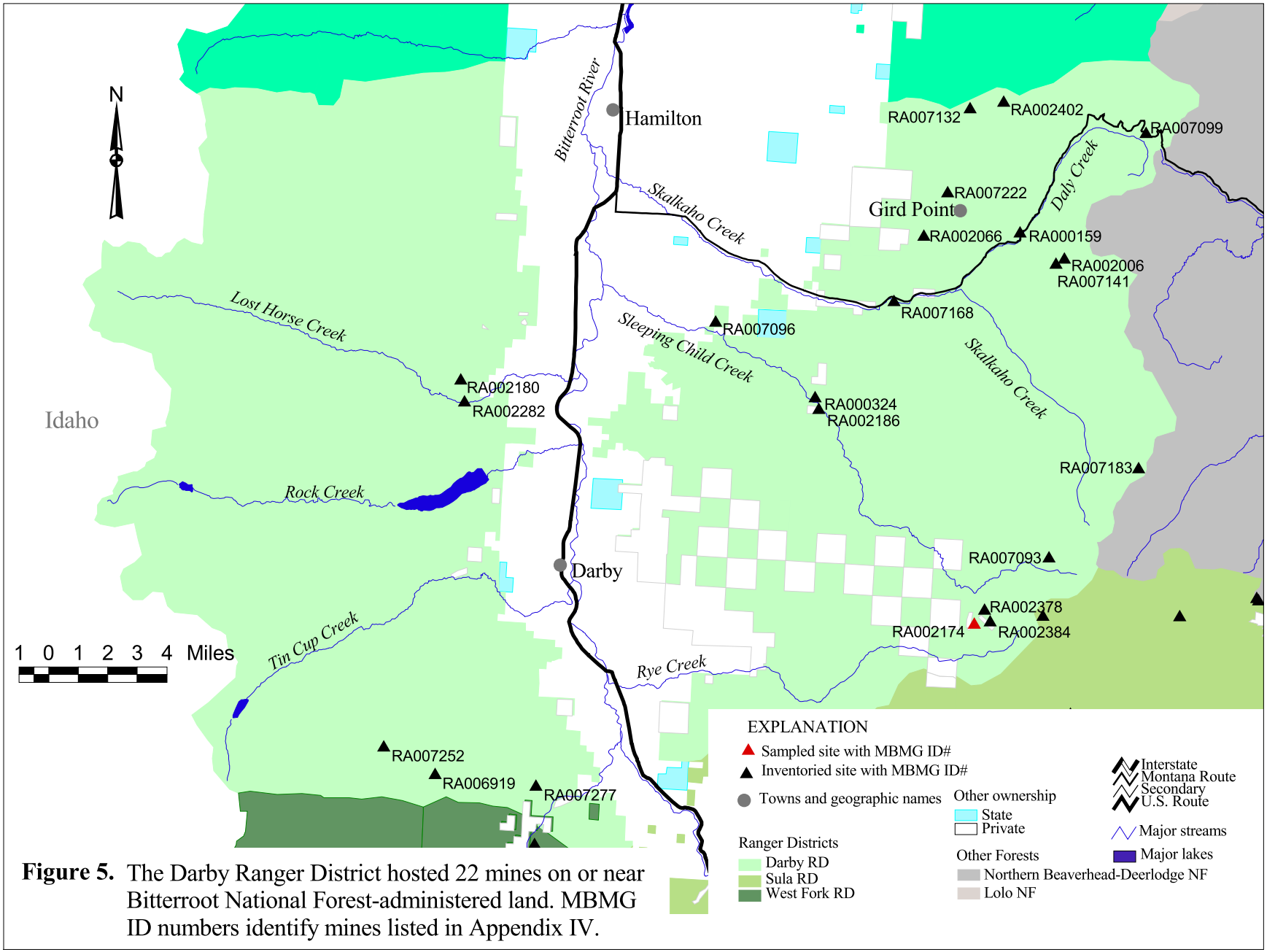

Figure 5. The Darby Ranger District hosted 22 mines on or near Bitterroot National Forest-administered land. MBMG ID numbers identify mines listed in Appendix IV.

3.1 Crystal Mountain Fluorite Mine - unnamed adit (RA002174)

3.1.1 Site Location and Access

The Crystal Mountain Fluorite deposits on private land are less than ⅛ mile to the east of the unnamed adit on Rye Creek that is on BNF-administered land (figure 5). It is assumed that this adit was driven in connection with the fluorite mines. The unnamed adit is marked by an adit symbol on the Bald Top Mountain 7.5-min. quadrangle in tracts CBDC sec. 18, T.3N., R.18W. at an elevation of 6,620 ft. It trends to the east-southeast. The road leading to the site is south of Darby; access is by County Route 91 up Rye Creek turning north on Forest Route 715 and then south on Forest Route 62478.

3.1.2 Site History-Geologic Features

The fluorite occurrence was discovered in 1937 when a Forest Service trail was built over the outcrops. Later, in 1951, the connection was made that the mineral seen at the outcrops was of economic importance. It was identified as high-grade fluorite by the U.S. Bureau of Mines. The main property is comprised of the Retirement claims and the Lumberjack claims (Sahinen, 1957). Commercial shipments began in 1952. The Retirement Group lies near the section line of 17 and 18, T.3N., R.18W. The Lumberjack Group is in tracts CA sec. 18, T.3N., R.18W. The adit sampled is on BNF-administered land and was driven into granite. Mine car tracks and timbers remained on the waste-rock dump at the adit's portal.

3.1.3 Environmental Condition

The Crystal Mountain Mine is a large open cut and several bulldozer trenches. The pits on private land are seasonally filled with standing water. This site to the west consisted of a single adit with a discharge. No adverse environmental effects were noted at the site.

3.1.3.1 Site Feature-Sample Location

The pits with water are private; the adit discharge is on BNF-administered land. It was sampled on 10/05/01. One sample was taken at a small pool created by the adit discharge.

3.1.3.2 Soil

No soil samples were taken. No erosion on BNF-administered land was noted.

3.1.3.3 Water

The adit discharge water was clear and cold. The temperature was about 5.1°C. The field pH measured 5.23 which is below the standard range of 6.5–7.5 standard units. Aluminum

concentration was above the secondary MCL. No other standards were exceeded in the sample of the discharge (table 11). The field conductivity was 113.5 µmhos and the flow was estimated at 1-2 gpm.

Table 11. Crystal Mountain Fluorite unnamed adit water-quality results.

Sample Site	Al	As	Ba	Cd	Cr	Cu	Fe*	Pb	Mn*	Hg*	Ni	Ag	Zn	Cl*	F*	NO_3-N*	SO_4*	pH
RUNS10M - adit discharge	152	<1	10.7	<2	<2	<2	0.01	<2	0.01	<.001	2.39	<1	2.78	<.5	2.64	<.05	18.5	5.23

(* - mg/L, all other concentrations are in µg/L, pH is reported in standard units).

3.1.3.4 Vegetation

No effects to the vegetation were noted. The site was largely vegetated with alders, small lodgepole pines, and willows.

3.1.3.5 Summary of Environmental Conditions

A trickle of water emerged from the adit but the flow rate was less than 2 gpm. The discharge disappeared into the waste-rock dump approximately 200 feet from the adit.

3.1.4 Structures

One small (8 ft by 12 ft) shack in poor condition was near the junction of Route 715 and 62478. No other structures were on BNF-administered ground. At least three other buildings could be seen in the distance at the main Crystal Mountain Fluorite pit but they were on private land.

3.1.5 Safety

The S.80°E.-trending adit is partly open with a 3-ft by 4-ft opening remaining. The interior was open for at least 15 ft but visibility was poor and it may be open farther. The waste-rock dump's size suggests that the adit may have had a total length of about 80 ft.

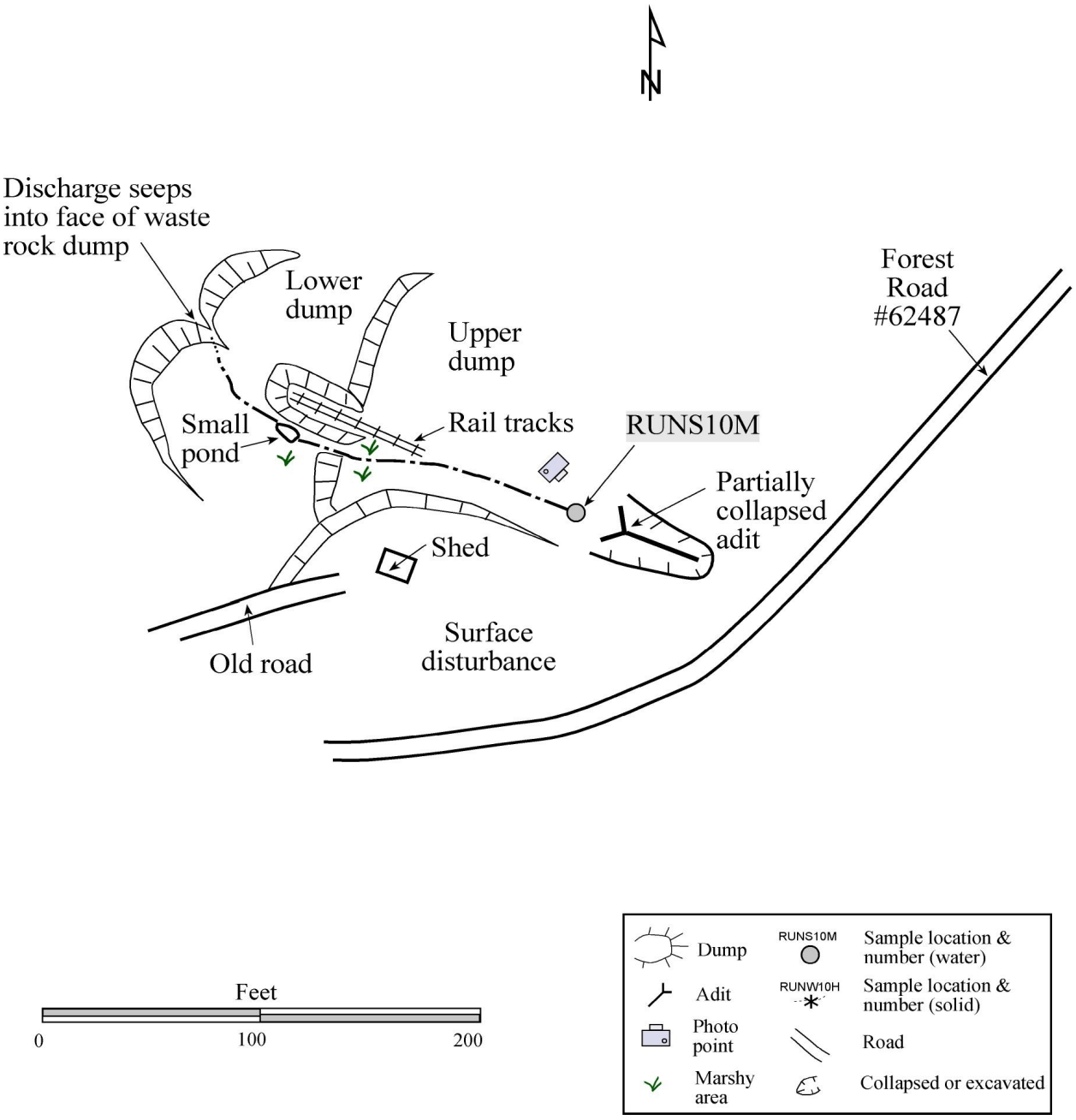

Figure 6. Site map for the Crystal Mountain Fluorite Mine, as visited on 10/05/01.

Figure 6a. The discharge sample (RUNS10M) was collected from a small pool near the adit.

Figure 6b. A small shed remained near the collapsed adit on BNF-administered land.

3.2 Daly Creek Prospects (RA000159)

The Daly Creek Prospects were visited by MBMG staff on 08/22/01. They are marked by three prospect symbols on the Skalkaho Pass 7.5-min quadrangle in sec. 08, T.5N., R.8W. The site is inside the Skalkaho Game Preserve boundary, north of State Highway 38. No environmental problems were noted. There were open bulldozer cuts and an old road that switchbacks up the hillside for 0.4 mile exploring an outcropping of milky white quartz veins. The prospects follow the general trend of the 1- to 2-ft wide, N.75°W.-trending veins.

3.3 Pine Tree (RA007168)

Described as one caved pit (Walker, 1963) from which about 25 cubic yards of scheelite-bearing tungsten ore was mined. The general area was visited on 08/22/01; the pit was not located. About 10 ft of braided cable was found as well as a bowling ball and other trash. The site was described as being 200 yards south of the Skalkaho Road in sec. 27, T.5N., R.19W. on the Gird Point 7.5-min quadrangle.

3.4 Retirement Claims (RA002384)

The Retirement claims are on private, patented land east of Crystal Point and the Lumberjack claims, on the Bald Top Mountain and the Kent Peak 7.5-min quadrangles. They were described as being on either side of the common boundary between secs. 17 and 18.

The general area of BNF-administered land was visited on 09/05/01 by MBMG staff to see if the workings on private land had any effect on BNF land. All workings were on private land and no effects to BNF-administered land were observed.

3.5 Skalkaho Vermiculite Deposit (RA007099)

This site had a very general location in the MILS database; it was in secs. 24, 25, and 26, T.6N., R.18W. Open cuts and trenches were found near the top of the pass about 2 miles east of Skalkaho Falls. It plots in sec. 25, T.6N., R.18W. on the Burnt Fork Lake 7.5-min quadrangle.

3.6 Sleeping Child W-Zr (RA007093)

The general area where this site was plotted on the topographic map was visited on 09/05/01 but no workings were found. The location from MILS was accurate to +/-1 km. It plots in sec. 4, T.3N., R.18W. on the Kent Peak 7.5-min quadrangle. No references were found for the site.

3.7 Stansbury Vermiculite (RA007132)

The Stansbury Vermiculite deposit is a large open pit that was being reclaimed at the time of this inventory (10/03/01). At the time, reclamation involved removing mining waste and recontouring the disturbed area, as well as reclaiming some of the mine road. No environmental problems were noted and no structures remained. It is in sec. 24 and 25, T.6N., R.19W., and lies to the north of St. Clair Creek.

3.8 Trapper Creek Claims (RA006919)

This site was listed as uranium claims, and the location accuracy was +/-100 meters. From the USBM MILS location, the claims plotted on Trapper Creek in sec. 19, T.2N., R.21W., north of Trail 598. It is inside the Selway-Bitterroot Wilderness Area. The area was hiked but no workings were found. An open pit symbol is plotted on the BNF base map, south of the North Fork of Trapper Creek in sec. 18, T.2N., R.21W., but time did not allow the opportunity to visit this site.

3.9 Unnamed location (RA007277)

This site was on the Burnt Ridge 7.5-min topographic map; it plotted in sec. 22, T.2N., R.21W. The general area was visited on 08/28/01 but no workings were found. The location plots in the center of the section and there was an unknown accuracy from the USBM MILS database.

3.10 St. Clair Creek Vermiculite (RA002402)

An unnamed vermiculite occurrence was found near the site of the prospect symbol on the Willow Mountain 7.5-min quadrangle in sec. 20, T.6N., R.18W. It lies to the north of St. Clair Creek and is east of the Stansbury Mine. It was visited on 10/03/01. The working there was either a caved adit or a trench trending N.6°E. There is a cabin at the site with a Forest Service outhouse. The deposits were described as being in a vermiculite-bearing pyroxenite (Sahinen, 1957).

4.0 STEVENSVILLE RANGER DISTRICT

Thirty-two sites were identified on the Stevensville Ranger District (table 12). Nine sites were visited ad are shown in bold in table 12. All other mine sites were screened out. The general locations of the mines are shown in figure 6.

Table 12. Mines and prospects in the Stevensville Ranger District.

MINE NAME	MBMG ID	OWNER	VISIT	HAZARD	T	R	S	TRACT	24K TOPO	COMMENTS
Ambrose Creek	RA002240	M	N	NE	09N	18W	18		Grayhorse Creek	Screened out: inaccurate location (+/- 5 km); titanium placer
Bass Creek Sillimanite	RA007180	NF	N	NE	10N	21W	35		Saint Mary Peak	Screened out: commodity is kyanite, no other references; very general location.
Big Creek	RA008374	P	N	NE	08N	21W	12	C	Victor	Screened out: private, possibly a placer?
BTM	RA007192	NF	N	NE	10N	18W	11	A	Elk Mountain	Screened out: iron prospect, with no references. Access across Plum Creek Timber land.
Claremont	RA002366	P	N	NE	08N	19W	1		Corley Gulch	Screened out: private, outside of Forest boundaries, unlikely to affect Forest.
Cleveland	**RA002354**	**NF**	**Y**	**Y**	**10N**	**18W**	**23**	**ACAB**	**Cleveland Mountain**	**10' to 15' highwall only, all adits caved and dry; visited by MBMG on 05/24/01.**
Cleveland Spring prospect	**RA002991**	**NF**	**Y**	**NE**	**10N**	**18W**	**23**	**A**	**Cleveland Mountain**	**Visited by MBMG 05/24/01; still under snow. Two pits and one trench.**

MINE NAME	MBMG ID	OWNER	VISIT	HAZARD	T	R	S	TRACT	24K TOPO	COMMENTS
Cleveland Summit prospect	**RA002981**	**NF**	**Y**	**NE**	**10N**	**18W**	**13**	**C**	**Cleveland Mountain**	**Visited by MBMG on 05/24/01; pits and trenches only, much still under snow.**
Cliff / Clifft /Silver Dollar group	RA002420	NF	N	Y	10N	21W	28		Saint Joseph Peak	Developed by two adits and a shaft. One adit possibly still open. Screened out.
Curlew	RA002204	P	N	NE	08N	21W	14	AB	Victor	Screened out: private land; road to Big Creek crosses mine dumps, posted no trespassing (08/22/01).
Dominic Group Antimony	RA002060	NF	N	NE	07N	19W	35		Willow Mountain	Screened out: inaccurate location (secs. 35 and 36,T.17N., R.19W.). Commodity is antimony.
Florence	**RA007289**	**NF**	**Y**	**NE**	**07N**	**19W**	**26**		**Willow Mountain**	**Visited general area; unable to locate (heavily timbered).**
Gold Creek	RA006961	NF	N	NE	07N	19W	36		Willow Mountain	Screened out: no references. No information.
Iron Cap	RA002372	S	N	NE	09N	18W	30		Grayhorse Creek	Screened out: State land; iron-quartz occurrence.
Lucky Star Claim	**RA003001**	**NF**	**Y**	**NE**	**10N**	**18W**	**23**	**D**	**Cleveland Mountain**	**Unable to locate. MBMG visited general area on 05/21/01.**
Marion Mine Nos. 1,2,3,4,5	**RA002072**	**NF**	**Y**	**NE**	**07N**	**19W**	**25**		**Willow Mountain**	**Visited by MBMG 10/03/01. Fluorspar occurrence. Dry, collapsed.**
Miller Mine	RA007267	P	N	NE	09N	19W	25		Grayhorse Creek	Screened out: private, barite occurrence. May be prospect marked on topo to south?
New Discovery	RA007186	NF	N	NE	09N	18W	32		Corley Gulch	Screened out:
One Horse	**RA006913**	**NF**	**Y**	**NE**	**10N**	**21W**	**12**		**Carlton Lake**	**Visited general location; unable to locate 2 adits listed in Zilka and Hamilton (1982) .**
Ore Finder Group	RA007301	P	N	NE	07N	21W	4		Victor	Screened out: private. Outside of Forest boundaries.
Placer mine	**RA007126**	**S**	**Y**	**NE**	**10N**	**18W**	**28**		**Cleveland Mountain**	**Visited 05/21/01. Threemile Wildlife Management Area. No effect on BNF-administered land.**
Placer mine	**RA007129**	**NF**	**Y**	**NE**	**10N**	**18W**	**27**		**Cleveland Mountain**	**Visited 05/25/01. Series of small pits and placer rock piles along Forest Route 640.**
Schroeder	MI002622	M	N	NE	11N	20W	20		Carlton Lake	Screened out: quartz crystal locality; no other references.
Smith Mine	RA002042	M	N	NE	08N	21W	14		Victor	Screened out: inaccurate location. Possibly private.
Smuggler's Union (Anna Belle)	RA009112	M	N	NE	10N	19W	2		Davis Point	Reclaimed; no surface water according to Lynne Dickman (USFS).
Starr	RA002360	NF	N	NE	09N	22W	36		Gash Point	Screened out: one adit, one trench according to Zilka and Hamilton (1982); 5 mile hike one way.
Unnamed location	RA007087	NF	N	NE	08N	18W	6		Corley Gulch	Screened out: barite; inaccurate location; no references.
Unnamed location	RA007279	NF	N	NE	10N	21W	28		Saint Mary Peak	Screened out: no references; inaccurate location (+/- 1 km).
Whaley Big Vein / Blue Racer	MI005555	P	N	NE	11N	19W	28		Davis Point	Screened out: private. Outside of BNF boundaries.
Whipperwill Mine	RA002012	P	N	NE	08N	21W	16		Victor	Screened out: inaccurate location; +/- 1 km.
White Cloud	RA002102	P	N	NE	10N	19W	1		Davis Point	Screened out: private land; outside of Bitterroot NF boundary.

MINE NAME	MBMG ID	OWNER	VISIT	HAZARD	T	R	S	TRACT	24K TOPO	COMMENTS
Wild Maple	RA007102	M	N	NE	10N	20W	8		Carlton Lake	Screened out: inaccurate location (+/- 1 km); no other references.

(NF - National Forest, F - Federal, P - Private, S - State, M - Mixed; N - not visited, Y - visited; Y - hazard, NE -not evaluated)

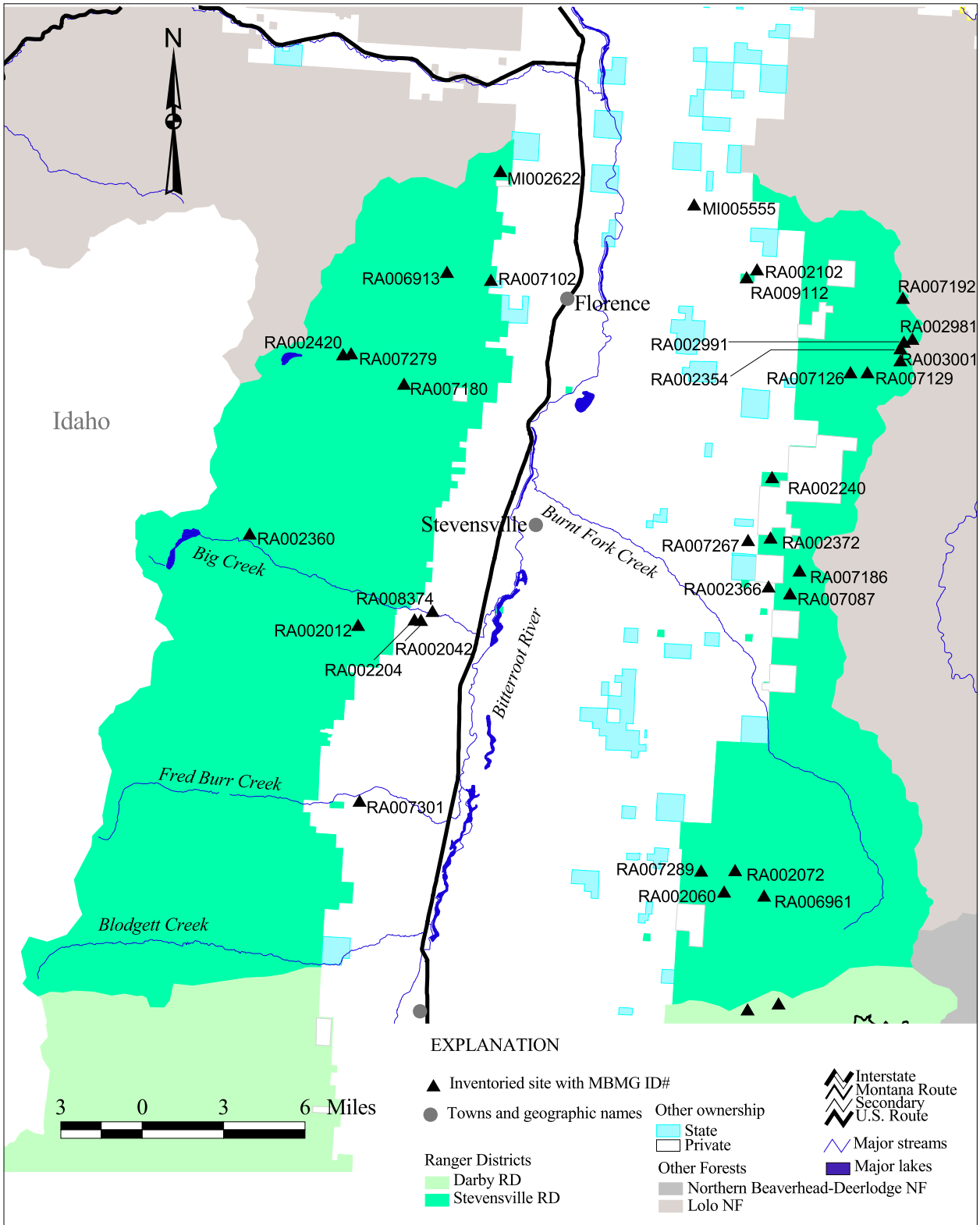

Figure 7. The Stevensville Ranger District hosted 32 mines on or near Bitterroot National Forest-administered land. MBMG ID numbers identify mines listed in Appendix IV and the locations are from the MBMG AIM database.

4.1 Cleveland Mountain mines (RA002354, RA002991, RA002981)

These mines were grouped because they are all in the same vicinity and there are no identifiable boundaries separating them. They are located east of the Threemile Wildlife Management area and west of the Granite and Ravalli County divide. Forest Route 1310 was closed at the time of the visit, so the last mile and a half had to be hiked. The area was visited while there was still some snow on the ground (5/24/01).

One 10-ft highwall was found at the Cleveland Mine but all the adits had caved. The larger of the three caved adits was possibly 100 ft in original length and another appeared to have been greater than 50-60 ft originally. Trenches and pits were scattered through the forest adjacent to the main workings. All the adits trended N.45° to 55°E. Large chunks of quartz vein on the waste-rock dumps contain <5 percent sulfides and oxides. Sahinen (1957) described the geology as "blocky, banded blue-grey argillite with some quartz containing specks of limonite, specular hematite, and magnetite". Close (1982) described the Cleveland as "one trench and three caved adits" that extended along a "northeast-trending fracture zone with quartz veins and pods in quartzite and argillite".

Along the ridge, numerous small pits had been dug for exploration (these may have been the "Ellen M. Claims" and the Cleveland Summit prospect). Twenty-six separate pits and trenches were counted along about ½ mile stretch of the Cooney Summit / Cleveland Summit trail from its intersection with the Welcome Creek Trail. No environmental concerns were noted. The typical prospect was about 10 ft by 5 ft by 3 ft. The Cleveland Spring prospect was not located with certainty, but it was described as "two pits and one trench" (Close, 1982).

4.2 Florence (RA007289)

The general area for which the Florence site was plotted was visited but the mine could not be located. The area was heavily timbered.

4.3 Lucky Star Claim (RA003001)

The Lucky Star Claim plotted in sec. 23, T.10N., R.18W. on the Cleveland Mountain 7.5-min quadrangle, about a quarter of a mile south of the Cleveland Mine. The general area where the mine was supposed to be was searched on 05/21/01, but no workings could be found. Close (1982) described the workings at the Lucky Star as "two caved adits" that followed a "northeast-trending silicified zone in quartzite and argillite".

4.4 Marion Mines Nos. 1, 2, 3, 4, 5 (RA002072)

The Marion Mine(s) were visited on 10/3/01 by MBMG staff. No environmental concerns were noted. A general location of T.7N., R.18W. was found in Lawson (1975 and 1976), but this was determined to be incorrect. The status at the time was listed as "unknown" and then "developing", respectively. The MILS database stated that the mine was in sec. 25, T.7N., R.19W. The commodity was listed as fluorspar/fluorine.

An adit symbol labeled as "mine" was shown east of Gold Creek on the Willow Mountain 7.5-min. quadrangle. It is about 1¼ mile directly to the northwest of the Willow Mountain peak. A sloughed adit was found in a roadcut; the waste-rock dump was on the opposite side of the road from the adit. The waste rock contained white, granular massive quartz with a few clear crystals. Some possible fluorite crystals were found. The original adit trended N.85°E. A sawn-lumber cabin in fair condition was at the junction of the road to the mine and the road to the lookout.

4.5 One Horse (RA006913)

MBMG staff visited the general area where the One Horse Mine plotted as described in Zilka and Hamilton (1982): sec. 12, T.10N., R.21W. on the Carleton Lake 7.5-min quadrangle. They were unable to locate the workings. Access to the area was by hiking 4 miles round trip. The location plots less than 1,500 ft outside the Selway-Bitterroot Wilderness boundary. Zilka and Hamilton (1982) described the workings as "2 adits, several pits" in "shear zones with sulfides".

4.6 Placer mines (RA007126 and RA007129)

These mines were inventoried on 05/25/01 by MBMG staff because the placers were on the way to the Cleveland Mine. A series of pits less than 4 ft deep were found along Forest Route 640. Small placer spoils piles were located along the creek. The placers had no visible effects to BNF-administered land; in fact, there was very little evidence remaining of the placer activity. Some small holes had been hand dug recently, probably to test for gold.

5.0 SULA RANGER DISTRICT

The sites are listed in table 13; sites shown in bold were visited by MBMG staff and are briefly summarized below. There were 29 sites identified in the Sula Ranger District, but none had environmental problems.

Table 13. Mines and prospects in the Sula Ranger District.

MINE NAME	MBMG ID	OWNER	VISIT	HAZARD	T	R	S	TRACT	24K TOPO	COMMENTS
Airedale prospect	RA007481	NF	N	NE	03N	17W	11	BCCD	Whetstone Ridge	Screened out: prospect only. Visited general area.
Art L. Wildey	RA007174	NF	N	NE	01N	18W	1		Schultz Saddle	Screened out: no information, may be same as Logger (Bugle Ridge) Claims?
Bertie Lord Creek	RA000649	NF	N	NE	02N	18W	24		Jennings Camp Creek	Screened out: placer, general location from Holt (1964).
Broken File prospect	RA002438	S	N	NE	02N	19W	32		French Basin	Screened out: State land; +/- 1 km accuracy; beryllium occurrence.
Bugle	RA007108	NF	N	NE	01N	18W	1		Schultz Saddle	Screened out: duplicate of Logger (Bugle Ridge) Group?
Cameron Creek placer	RA002294	P	N	NE	02N	19W	21		French Basin	Screened out: titanium placer; very general location; test pits only.
Echo Gulch	RA001096	M	N	NE	02N	17W	15		Lick Creek	Screened out: placer; general location; Fe-thorium-Ti-zirconium.
Gallogly Hot Spring / Medicine	RA002198	NF	N	NE	01S	19W	15	BCCC	Lost Trail Pass	Screened out: geothermal.
Gold Leaf (duplicate (?) of sec. 14)	**RA002426**	**NF**	**Y**	**NE**	**03N**	**17W**	**17**	**BADA**	**Whetstone Ridge**	**Visited by MBMG - Lonn; 8/92**

MINE NAME	MBMG ID	OWNER	VISIT	HAZARD	T	R	S	TRACT	24K TOPO	COMMENTS
Guide Creek	RA000916	NF	N	NE	02N	18W	28		Jennings Camp Creek	Screened out: placer, general location from Holt (1964). Titanium-thorium.
Hart Creek	RA000336	S	N	NE	02N	19W	10		French Basin	Screened out: titanium/thorium placer. Also in sec. 15.
Hidden Lake tungsten	RA007090	NF	N	NE	02N	15W	7	CBBD	Kelly Lake	Screened out: tungsten.
Jennings Camp Creek	RA000908	NF	N	NE	02N	18W	27		Jennings Camp Creek	Screened out: placer. General location from Holt (1964). Titanium-thorium.
Logger (Bugle Ridge) Group	RA002000	NF	N	NE	01N	17W	6	CBBD	Schultz Saddle	Screened out: same as Logger No. 1 claim. Explored in the 1970's.
Logger No. 1 claim	**RA007135**	**NF**	**Y**	**NE**	**01N**	**17W**	**6**	**CBBD**	**Schultz Saddle**	**Visited by MBMG 10/01/01; shallow open pit on ridgetop explored quartz vein.**
Lucky Strike	RA007171	NF	N	NE	02N	18W	19		French Basin	Screened out: State land; beryllium occurrence; +/- 1 km.
Lutz Mine Clu / Gold Leaf	**RA008065**	**P**	**Y**	**Y**	**03N**	**17W**	**14**	**DBCA**	**Whetstone Ridge**	**Site visited by MBMG geologist Jeff Lonn; summer 1992.**
Lyman Creek	RA000332	M	N	NE	02N	19W	14		French Basin	Screened out: placer.
Martin Creek	RA001535	NF	N	NE	02N	17W	9		Lick Creek	Screened out: placer, general location. Commodity was titanium-thorium.
Mayflower prospect	RA002432	NF	N	NE	03N	17W	10	ADDA	Whetstone Ridge	Screened out: prospect only; visited general area.
Meadow Creek	RA000597	NF	N	NE	02N	18W	24		Jennings Camp Creek	Screened out: placer. General location from Holt (1964). Fe-Ti-thorium-zirconium.
Montana Prince Mine and Mill	**RA008064**	**M**	**Y**	**Y**	**03N**	**17W**	**14**	**BACD**	**Whetstone Ridge**	**Site visited by MBMG geologist Jeff Lonn; summer 1992.**
Moose Creek	RA001343	NF	N	NE	02N	17W	9		Lick Creek	Screened out: placer, general location from Holt (1964). Fe-Ti-thorium-zirconium.
Needle Creek	RA001338	M	N	NE	02N	17W	15		Lick Creek	Screened out: placer, general location from Holt (1964). Titanium-thorium.
Sleeping Child (A)	RA007303	NF	N	NE	03N	18W	16		Kent Peak	Screened out: commodity is quartz crystals; no references except CRIB.
Sleeping Child (B)	RA007305	NF	N	NE	03N	18W	34		Jennings Camp Creek	Screened out: commodity is quartz crystal; no other references.
Unnamed prospect	RA007970	NF	N	NE	03N	17W	14	DDDC	Whetstone Ridge	Screened out: unnamed prospect. Visited general area.
Unnamed prospect	RA007971	M	N	NE	03N	17W	24	BBBB	Whetstone Ridge	Screened out: unnamed prospect.
Wind Dancer / Windy Dancer	**RA009110**	**NF**	**Y**	**Y**	**01S**	**19W**	**21**	**DBCD**	**Lost Trail Pass**	**Visited 10/01/01. Dry. No water. No structures. Partly open adit; 4 ft wide by 2.5 ft high.**

(NF - National Forest, F - Federal, P - Private, S - State, M - Mixed; N - not visited, Y - visited; Y - hazard, NE -not evaluated)

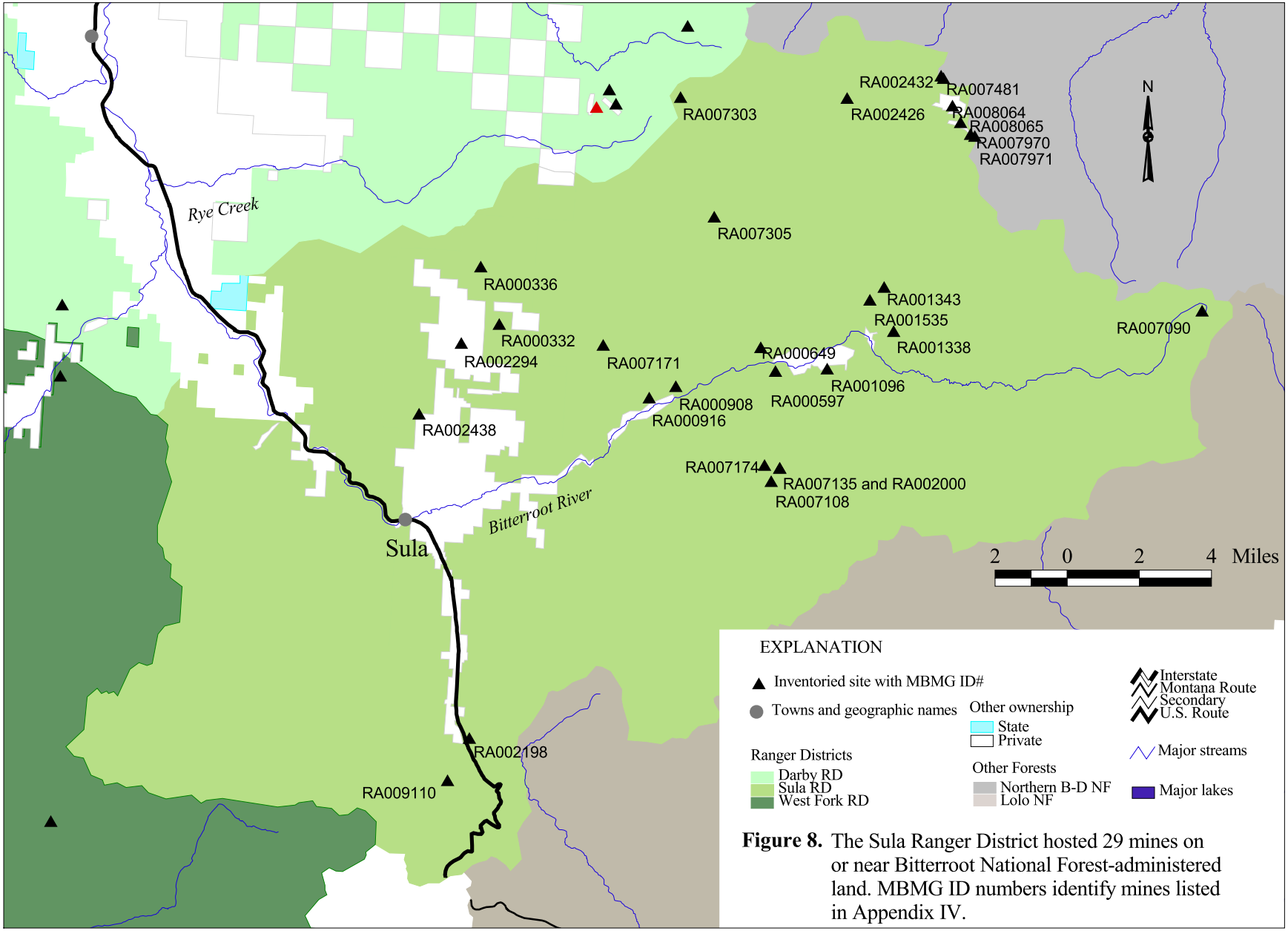

Figure 8. The Sula Ranger District hosted 29 mines on or near Bitterroot National Forest-administered land. MBMG ID numbers identify mines listed in Appendix IV.

5.1 Logger No. 1 Claim (RA007135)

A quartz outcrop was explored by a shallow open pit on the ridge. The site was visited on 10/01/01 by MBMG staff. No environmental problems were noted. Close and others (1982) described the geology as "pegmatitic quartz vein in granite". It is located on the Schultz Saddle 7.5-min quadrangle in tracts CBBD sec. 6, T.1N., R.17W. The open pit exposed a 2-ft-wide quartz vein with muscovite mica in the quartz and with drusy surfaces on the milky white quartz. The pit is 8-10 ft deep and 80 ft wide. The sides of the pit are sloughed.

5.2 Lutz / Gold Leaf / Clu (RA008065)

The Gold Leaf Mine, also known as the Lutz and the Clu mines, consisted of three patented claims: Golden Leaf, Gold Leaf Extension, and the Gold Leaf No. 1. It was considered a gold-silver occurrence with shipments in 1910 and 1940. Ten tons of ore yielded 7 oz of gold and 31 oz of silver. Mineralization included quartz, pyrite, and galena. Sahinen (1957) described 1,600 ft of workings including an adit crosscut and drifting in granodiorite. The vein strikes S.79°E., and dips 59°NE.; it varies in width from a few inches to 3 ft. Banister and others (1983) described the workings aw consisting of two adits, the lower one was 2,000 ft total length and the upper one was 875 ft long.

According to McCulloch (pers. commun., 2003) who worked in the area in 1979, the mine had ore in pods; large pyrite cubes were up to 2 in. on a side. Faults and cross faults were exposed by the two levels of workings along with structural deformation. There was no discharge but the workings were flooded with up to 2 ft of water inside.

5.3 Montana Prince (RA008064)

The workings as described in Sahinen (1957) consisted of a long adit trending N.85°E., in granodiorite (or quartz monzonite). Mineralization included quartz, pyrite, and sphalerite. No production records were found. The adit was inaccessible at the time that Sahinen visited the area. The mine is located in secs. 11 and 14, T.3.N, R.17W. Banister and others (1983) described the main northeast-trending adit as originally 1,500 ft long and that it cut 5 veins. In addition, the original workings included two other caved shafts (62-ft and 75-ft deep), a short caved 35-ft adit, and 32 other pits and trenches. All workings are shown on patented land; there are thirteen patented claims total. Claim names include the Uppercu, Shepard (or Shepherd), Victoria and Victoria Extension, Grand View, Montana Prince, Thor, Ella Kay (or K.), Savage, Cuba, King Tut, Smallwood and Smallwood Extension.

According to McCulloch (pers. commun., 2003), the Smallwood shaft was full of water but did not discharge when he visited the area in 1979. There was one discharging adit but all disturbance was on private land.

Pioneer Technical Services (1995) described one discharging adit at the site; the flow was 1 gpm, the pH was 7.54 and the SC was 120 µmhos/cm. No water-quality exceedences were found in the adit discharge or in a seep that was sampled at the toe of the waste-rock dump. The manganese concentration in the seep at the toe of the dump was three times higher than that of the adit discharge although they were still below any exceedence levels.

5.4 Wind(y) Dancer (RA009110)

Information on the Windy Dancer Mine was obtained from the Stevensville Ranger District files. It is in sec. 21, T.1S., R.19W. on the Lost Trail Pass quadrangle. One open adit exists as a hazard at the site to the east of the West Fork of Camp Creek along Forest Route 729. The opening was 4 ft wide by 2.5 ft high, and was partly collapsed. The adit trended S.60°E. The site was dry with no water; it also had no structures.

6.0 WEST FORK RANGER DISTRICT

A total of 64 mines was identified in the West Fork Ranger District (table 14). There were no environmental concerns observed at the mines in this watershed. Sites visited by MBMG are shown in bold in table 14 and are briefly described in the text. The general locations of the mines are shown in figure 8.

Table 14. Mines and prospects in the West Fork Ranger District.

MINE NAME	MBMG ID	OWNER	VISIT	HAZARD	T	R	S	TRACT	24K TOPO	COMMENTS
Ace Mine	RA007295	NF	N	NE	03S	22W	32		Alta	Screened out: reported silver mine - probably just a prospect.
Beaver Creek Adit	**RA009111**	**NF**	**Y**	**NE**	**04S**	**23W**			**Horse Creek Pass**	**Unable to locate.**
Beaver Creek Columbite Deposit	RA007207	NF	N	NE	04S	22W	4		Alta	Screened out: columbite occurrence only. No references.
Blue Joint Placer	RA006922	NF	N	NE	02S	23W	19		Bare Cone	Screened out: placer, several prospect pits and trenches (Benham, 1981).
Blue Nose Mine	**RA002078**	**NF**	**Y**	**NE**	**04S**	**22W**	**29**		**Shoup**	**Bulldozer trenches exploring ridge.**
Chicago Placer	RA006928	M	N	NE	02S	22W	9		Alta	Screened out: placer deposit. Several small prospect pits and one trench (Benham, 1981)
Clay Pit	**RA007156**	**M**	**Y**	**NE**	**01S**	**22W**	**35**		**Painted Rocks Lake**	**Visited 08/23/01; bulldozer scrapes behind cabins; mixed private and BNF.**
Clay Pit	**RA007159**	**S**	**Y**	**NE**	**02S**	**22W**	**10**		**Painted Rocks Lake**	**Visited 08/23/01; State land; clay pit.**
Clay Pit	**RA007165**	**NF**	**Y**	**NE**	**01S**	**22W**	**23**		**Painted Rocks Lake**	**Visited 08/23/01. No effects to forest.**
Columbite	RA002390	NF	N	NE	04S	22W	9		Alta	Screened out: columbium-niobium occurrence only.
Copper Canyon Mine	**RA002030**	**NF**	**Y**	**NE**	**03S**	**22W**	**20**	**AACA**	**Alta**	**Visited 09/13/01; see Lucky Strike shaft.**
Copper Queen	**RA002396**	**NF**	**Y**	**NE**	**03S**	**22W**	**28**	**DCAD**	**Alta**	**Visited by MBMG 09/12/01. Collapsed shaft and three collapsed adits; dry.**
Crandall Creek / Chrandall Creek	RA007297	M	N	NE	03S	21W	7		Henderson Ridge	Screened out: placer, part of Hughes Creek placer, private.
Darkstar Group / Sheep Creek Adits	**RA002096**	**NF**	**Y**	**Y**	**04S**	**22W**	**3**		**Alta**	**Visited by MBMG 09/12/01. Dry.**
Highland Mine	**RA002210**	**NF**	**Y**	**NE**	**02S**	**21W**	**7**		**Piquett Mountain**	**Bulldozer trenches exploring quartz veins. Visit 10/02/01.**
High-level Placers (Hughes Creek) 1	RA007263	NF	N	NE	03S	21W	6		Henderson Ridge	Viewed from road, lots of trees; no obvious disturbed area.
High-level Placers (Hughes Creek) 2	RA007261	NF	N	NE	02S	21W	35		Henderson Ridge	Site has been reclaimed by USFS, placer, dry. No access.
Hughes Creek Placer	RA007258	M	N	NE	02S	21W	36		Henderson Ridge	Screened out: private. Placer upstream from Burrell Creek. May be recent work.
Hughes Gulch Placer	**RA002216**	**P**	**Y**	**NE**	**03S**	**21W**	**2**		**Henderson Ridge**	**11 acres reclaimed by USFS 1996, placer. Tailings extent marked on topo.**
Hughs Creek Placer	RA006937	NF	N	NE	03S	21W	33		Henderson Ridge	Screened out: duplicate of many Hughes Creek placers.
J & I Group	RA000173	NF	N	NE	4S	22W	4	B	Alta	Placer on Beaver Creek.

MINE NAME	MBMG ID	OWNER	VISIT	HAZARD	T	R	S	TRACT	24K TOPO	COMMENTS
Jackie Mine	RA007117	NF	N	NE	04S	22W	2		Alta	Screened out: inaccurate location, no references, tin/tantalum mine.
Jew Mountain Prospect	RA000178	NF	N	NE	02S	21W	8		Piquett Mountain	Prospect only, not in the original MILS database.
Larrigon Mine	**RA002222**	**NF**	**Y**	**NE**	**02S**	**21W**	**34**		**Henderson Ridge**	**Visited by MBMG 09/12/01. Remains of old burned mill site; no obvious workings. Active.**
Last Chance	RA006901	M	N	NE	02S	22W	27		Painted Rocks Lake	Screened out: no references; inaccurate location.
LBJ, PIC and PER Groups	RA006934	NF	N	NE	02S	22W	8		Painted Rocks Lake	Screened out: general location.
Little Joe Prospect	RA007299	NF	N	NE	01S	23W	2		Mount Jerusalem	Screened out: uranium occurrence only. No references except CRIB.
Lucky Joe Mine	RA007162	P	N	NE	03S	22W	9		Alta	Screened out: uranium occurrence. 30-ft open adit in 1971 (Berg, 1977).
Lucky Strike Shaft	**RA007120**	**NF**	**Y**	**NE**	**03S**	**22W**	**21**		**Alta**	**Visited by MBMG 09/13/01. Reclaimed by USFS.**
Montana Star Mine	RA007198	NF	N	NE	02S	21W	5		Piquett Mountain	Screened out: may be same as Slate Creek prospect; same general location, no references.
Murry Grant Claims	RA007195	NF	N	NE	04S	22W	4		Alta	Screened out: no references; Pb-Cu-Au-Ag occurrence only.
Nez Pearce #1 /Thunderhead?	RA007189	NF	N	NE	01S	23W	22		Bare Cone	Unable to locate; trail no longer maintained; prospects only?; may be same as Thunderhead barite.
Overwich Creek adits	RA000250	NF	N	Y	02S	22W	24		Piquett Mountain	Reported to be adits either in this drainage or the next one to the east; south of Overwich Creek.
Placer	RA002456	NF	N	NE	02S	21W	35		Henderson Ridge	Screened out: placer, general location.
Puff Ball No. 1-17	RA007204	NF	N	NE	03S	22W	33		Alta	Screened out: rare earth occurrence only; no references; unknown accuracy.
Rocky Point No. 5	RA007084	NF	N	NE	03S	23W	19		Horse Creek Pass	Screened out: barite occurrence; several dozer scrapes in the hillside (Benham, 1981).
Sheep Creek columbite deposits	**RA002312**	**NF**	**Y**	**NE**	**04S**	**22W**	**4**		**Alta**	**Duplicate of Dark Star Group?**
Shook	RA002444	NF	N	NE	03S	22W	20		Alta	Screened out: commodity is barium. Inaccurate location.
Slate Creek Prospect	**RA002018**	**NF**	**Y**	**Y**	**02S**	**21W**	**6**		**Piquett Mountain**	**One open adit 200 ft south of inclined shaft. Visit 10/20/01.**
Star / Gold Talc / Brickley's Mine	**RA008304**	**NF**	**Y**	**NE**	**02S**	**22W**	**23**	**A**	**Painted Rocks Lake**	**Three collapsed adits, prospects. Visited 10/4/01.**
Taylor Creek Mine - Open Pit	**RA007153**	**NF**	**Y**	**Y**	**02S**	**21W**	**34**		**Henderson Ridge**	**Open-pit; disturbed area ~5 acres. Dry. Considered active in 2001.**
Tirebiter #5 & #6	RA007150	NF	N	NE	04S	22W	10		Shoup	Screened out: location inaccurate (+/- 5 km in MILS); near prospect symbol on ridge.
Titanium Occurrence	RA001994	NF	N	NE	04S	22W	4		Alta	Screened out: titanium occurrence only.
Titanium Occurrence	RA007138	NF	N	NE	04S	22W	8		Alta	Screened out: rare earth occurrence only. CRIB is the only reference.
Titanium Occurrence	RA007273	NF	N	NE	03S	23W	21		Horse Creek Pass	Screened out: titanium occurrence; general location
Titanium Occurrence	RA007293	NF	N	NE	03S	22W	31		Alta	Screened out: titanium-REE-iron occurrence only. CRIB is only reference.
Unnamed carbonate bands	RA002342	NF	N	NE	04S	22W	10		Alta	Screened out: aeschynite crystals, columbium-niobium occurrence only. Carbonate.
Unnamed location	RA002450	NF	N	NE	02S	21W	15		Piquett Mountain	Screened out: inaccurate location; fluorspar occurrence only.
Unnamed location	RA007147	NF	N	NE	04S	22W	10		Alta	Screened out: inaccurate location.

MINE NAME	MBMG ID	OWNER	VISIT	HAZARD	T	R	S	TRACT	24K TOPO	COMMENTS
Unnamed location	RA007271	NF	N	NE	03S	22W	20		Alta	Screened out: inaccurate location (in three sections), no references.
Unnamed location	RA007287	NF	N	NE	04S	22W	4		Alta	Screened out: REE occurrence only, no references, unknown accuracy.
Unnamed location	RA007291	NF	N	NE	01S	21W	34		Piquett Mountain	Screened out: no references except CRIB; inaccurate location.
Unnamed sample location	RA002462	NF	N	NE	04S	22W	9		Alta	Screened out: calcium-columbium-niobium occurrence only.
Unnamed warm springs	RA002192	NF	N	NE	01S	22W	31		Painted Rocks Lake	Screened out: geothermal; inaccurate location. Could be on Blue Joint Creek in sec. 6.
Violet Group	RA002090	NF	N	NE	04S	22W	22		Shoup	Screened out: very general location (secs. 22, 28, 29,T.4S., R.22W.).
W Fork-Bitterroot River	RA007265	NF	N	NE	03S	22W	25		Alta	Screened out: barite occurrence. Inaccurate location.
Washington	**RA007255**	**NF**	**Y**	**NE**	**02S**	**21W**	**34**		**Piquett Mountain**	**Visited general location in MILS; unable to locate. May be in the Overwich mining district.**
Watchtower 1-9	**RA006907**	**NF**	**Y**	**NE**	**01S**	**23W**	**10**		**Mount Jerusalem**	**Visited 09/06/01. Found 3 cabins but no workings.**
Windyridge	RA006916	NF	N	NE	01N	23W	24		Watchtower Peak	Screened out: one pit / surface workings only (Zilka and Hamilton, 1982). Remote location.
Woods Creek Barite No. 1	RA007281	NF	N	NE	03S	23W	16		Horse Creek Pass	Screened out: barite occurrence, described as two dozer scrapes in Benham, 1981).
Woods Creek Copper Mine	**RA002084**	**NF**	**Y**	**Y**	**03S**	**22W**	**17**	**DDCA**	**Alta**	**Visited by MBMG 09/13/01. One open adit.**
Woods Creek Iron Deposit	RA002324	NF	N	NE	03S	22W	17		Alta	Screened out: iron-silica-quartzite occurrence. Kelly (1967) MS thesis.
Woods Creek Iron Mine	RA001988	NF	N	NE	03S	22W	20		Alta	Screened out: iron deposit, prospect pits and trenches only.
Woodtick No.1	RA007307	NF	N	NE	02S	21W	16		Piquett Mountain	Screened out: inaccurate location; CRIB is only reference.

(NF - National Forest, F - Federal, P - Private, S - State, M - Mixed; N - not visited, Y - visited; Y - hazard, NE -not evaluated)

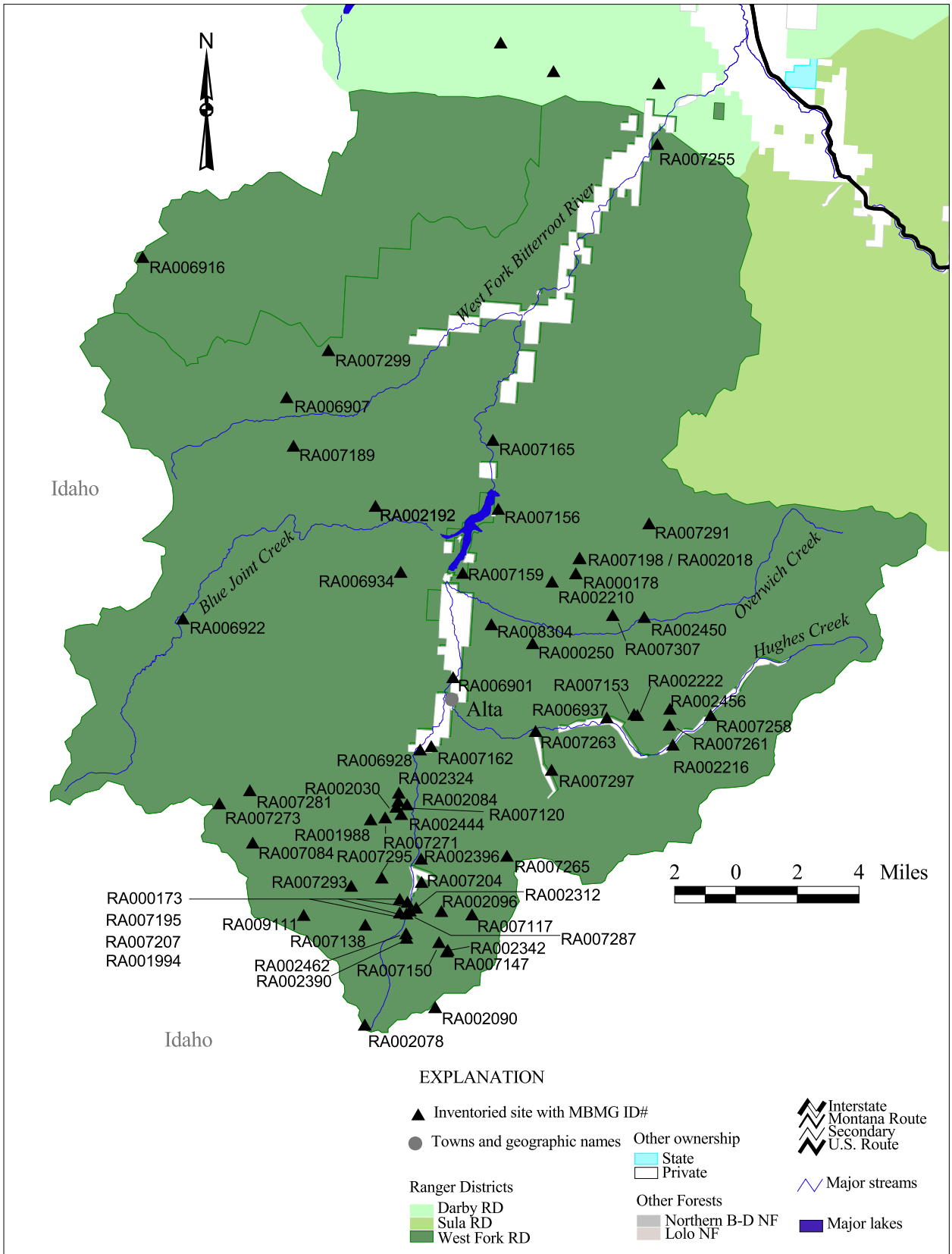

Figure 9. The West Fork Ranger District hosted 64 mines on or near Bitterroot National Forest-administered land. MBMG ID identify mines listed in Appendix IV.

6.1 Beaver Creek Adit (RA009111)

This site is on the Horse Creek Pass 7.5-min. quadrangle. It was an unnamed site with no other information on it. It was caved and dry.

6.2 Blue Nose Mine (RA002078)

The Blue Nose Mine was visited by MBMG staff on 10/04/01. It was described as "inactive" in 1974 (Lawson, 1975). In 1972, 1973, and 1974, the assessment work was done by Hazel Morgan, and Clarence and Ocia Bullock of Hamilton (MBMG mineral property files).

The mine is in the Mineral Hill mining district and is a molybdenum occurrence. The workings include prospects along the Montana-Idaho border. Two of the prospects are marked on the Shoup 7.5-min quadrangle. An iron-stained quartz vein, trending N.72°E. and dipping 46°SE., is exposed in a mica schist. Only trace sulfides (pyrite) were found. This may be a part of the Violet Group.

6.3 Clay Pits (RA007156, RA007159, and RA007165)

These sites were visited by MBMG staff in 2001 but were only small pits and posed no environmental concerns to BNF-administered land.

6.4 Copper Canyon and/or Shook Mine (RA002030)

This site was visited on 09/13/01 by MBMG staff. No environmental concerns were noted. One shaft on the Copper Canyon No. 1 claim is in tracts AACA sec. 20, T.3S., R.22W. It is shown on a USFS sketch map of the area and also on a figure in Sahinen (1957). A second shaft as described in Sahinen (1957) is in sec. 21 on the Silvertip No. 2 claim. It is described separately in this report as the Lucky Strike shaft. The Shook claim is in tract B, sec. 21, T.3S., R.22W. according to MBMG mineral property files.

Two adits were also associated with the Copper Canyon property (Sahinen, 1957). One was located to the north and west of the Lucky Strike and almost due north of the main shaft at the Copper Canyon. It was partly collapsed with a 3-ft by 3-ft opening and dry. It was open at least 20 ft and the size of the waste-rock dump suggested that it may be 60-80 ft total length. There were two prospect pits on either side of the adits. The second adit described in Sahinen, to the east of the Copper Canyon shaft, was not located. It may be the working represented by the prospect symbol on the Alta 7.5-min quadrangle. A map in the MBMG mineral property files shows the geology of the workings to be a N.45°W.-trending shear zone in argillite with mineralization consisting of malachite, bornite, and chalcopyrite.

6.5 Copper Queen (RA002396)

The Copper Queen Mine is located in tracts DCAD sec. 28, T.3S., R.22W. on the Alta 7.5-min quadrangle. It was visited on 9/12/01; a collapsed shaft, a pit 15 by 20 ft wide by 8 ft deep, and 3 collapsed adits were found. The mineralization was described as "malachite-bearing quartzitic schist" (Berg, 1977). No environmental concerns were noted. An undeveloped campsite was next to the mine. One adit trends S.10°E. and exposes a 2-4 in. vein in gray schist that strikes N.65°E., with a 60°SE. dip. The hole remaining at the shaft measured 25 ft by 25 ft wide by 10 ft

deep. It was not considered hazardous. Malachite coated pieces of the schist are present on the waste-rock dump. Another possible collapsed adit was found; it may have been a trench. It was 25 ft long and trended S.15°W.

6.6 Darkstar Group/ Sheep Creek Columbite Deposit (RA002096 and RA002312)

This site was visited 09/12/01. It is located at the confluence of West Fork Bitterroot River and Sheep Creek in sec. 3, T.4S., R.22W. Claim names included the Darkstar Group and the Columbine Group. There are three adits: No. 1 had a 1-ft-high by 2-ft-wide opening, 2-ft-wide carbonate vein in amphibolite, and was dry; No. 2 trended N.85°E., and was completely caved; and No. 3 was partly open with a 2-ft-high by 3-ft-wide opening, also dry. The country rock is amphibolite with trace sulfide (pyrite-chalcopyrite).

The commodities were rare-earth elements and metals, specifically columbium (now known as niobium), cerium, lanthanum, neodymium, and strontium. The host rocks are a metamorphic complex including gneisses, schists, and amphibolites, including carbonate layers in the amphibolite. The columbium (niobium)-bearing minerals are columbite and fersmite (Hess, 1960).

6.7 Highland Mine (RA002210)

The Highland Mine is described in Lawson (1975, 1976) as a copper, gold, silver, and lead occurrence “developing” in the Overwich mining district, in sec. 7, T.2S., R.21W. Prospects marked on the Piquett Mountain 7.5-min quadrangle may represent the mine. This area was visited on 10/02/01. Bulldozer trenches explored quartz veins in the area. No environmental concerns were noted.

6.8 Hughes Gulch Placers (RA002216)

The Hughes Gulch (or Creek) placers were recently the target of mining activity (McCulloch, 2001) and a portion of them (about 11 acres) was reclaimed by the USFS. The general area was visited because the MBMG geologists were in the area; no negative environmental effects were noted.

6.9 Larrigon Mine (RA002222)

The Larrigon Mine was visited by MBMG on 9/12/01. It is located in the Taylor Creek drainage, in close proximity to the Taylor Creek Mine. The remains of the workings include three cabins, a wooden ore chute, and part of a foundation, possibly from an old mill. A waste-rock pile near the base of the slope may have been from underground workings, although no adits or other openings were observed. A small pile of sandy material near the mill may be tailings. The pile was about 12 to 15 feet from Taylor Creek and is isolated from the drainage by the road.

Unpublished material in the MBMG mineral property files indicates the Larrigon was discovered in 1918 (Anon, [n.d.], MBMG files). The Larrigon was discovered by Raymond Larrigon and was sold by him in 1950. He drove underground workings and processed ore in a mill onsite. In 1959, it was bought by the Larrigon Mining Company. A (new) mill was built in 1960 by this company and their mining included mainly bulldozer excavations. A photo in MBMG mineral property files shows the mill in 1977; it was described as a 50-ton gravity and amalgamation

plant. A map in the MBMG files shows the adits and prospects on the Washington claim; two adits are shown about 50 ft to the northwest of the mill. Other claims in the area included: the Lost Cabin, Eurrecochea, Viscaya, and Larraui.

6.10 Lucky Strike Shaft (RA007120)

The Lucky Strike shaft was visited on 09/13/01 and had been reclaimed by the Forest Service (Dickman, pers. comm., 2001). The site was adjacent to and north of a sharp curve on Forest Route 5665 in tracts BBAB sec. 21, T.3S., R.22W. and the slope had been re-graded and seeded. It was also known as the Silvertip #2 Claim as shown on a USFS sketch map. A trench was found about 500 ft up the ridge to the northwest of the reclaimed shaft.

6.11 Slate Creek Prospect (RA002018)

The prospect was visited on 10/02/01 by MBMG staff. It is located on a ridge west of a small northward-flowing tributary to Slate Creek in sec. 6, T.2S., R.21W. It was accessed, however, from the Overwich Creek side and was at the end of the logging/mining road. There was an open adit, an inclined shaft, and a 10-ft highwall. The N.34°W.-trending adit was the larger working, about 200 ft to the south of and downhill from the inclined shaft. The portal was 5 ft by 4 ft. The 1- to 2-ft wide vein at the inclined shaft strikes N.20°E. and dips 77°. Both were dry and no environmental problems were noted. Air hoses had been strung across the hillside to the prospect.

Walker (1963) described the Slate Creek prospects as a 15-ft incline and a 135-ft-long adit. It is in a contact zone of the Idaho batholith with Belt quartzite roof pendants. Minerals present include scheelite, galena, and chalcopyrite in the contact metamorphosed zone (Walker, 1963). The ores were considered primarily lead producing (Young and others, 1962) with additional minerals identified as covellite, magnetite, pyargyrite, and tetrahedrite. A file in the MBMG mineral property files states that the deposit trends N.25°E., and dips 70°W., and contains argentiferous galena, chalcopyrite, and scheelite. A shaft of unknown depth was described as flooded to within 4 ft of the surface. An adit that may be 120 ft in length intersects veins of the shaft at approximately 100 ft depth below the collar.

6.12 Star/Gold Talc/Brickley (RA008304)

One collapsed adit trending S.40°E. and a trench were found downhill from the road. Uphill from the road, a short collapsed adit had a trend of S.30°E. The country rock is argillite-quartzite and 1 to 4 in. pieces of white quartz vein were on the waste-rock dump. It was visited on 10/04/01. No environmental concerns were noted; there were just a few boards near the adit entrance.

6.13 Taylor Creek Mine (RA007153)

This mine is a large open pit on a hillside in iron-stained, Precambrian Belt, banded argillites and quartzites. It was visited 09/12/01. The area was considered active and had a valid mine permit with the Forest Service. The surrounding area was examined only quickly for any pre-existing problems. The Taylor Creek Mine is upslope from the Larrigon Mine described above.

6.14 Washington (RA007255)

According to the USBM MILS database, the mine is located in sec. 34, T.2N., R.12W. MBMG visited this site on 08/23/01 and no workings were found. However, this location could be wrong. Sahinen (1957) described a "Washington" Mine in the Overwich mining district about 10 miles to the south of this location. Based on this information, the location may actually be in sec. 34, T.2S., R.21W. MBMG did not verify this possibility.

6.15 Watchtower 1-9 (RA006907)

This location was visited on 09/06/01 and three old cabin structures were located but no workings or indications of mining were found. Two of the structures were foundations; the third structure was four-logs high. All were considered to be in poor condition. The site is about 1,500 ft past the end of the road up Watchtower Creek. No environmental problems were noted. An adit, several pits, and trenches were described at the site (Zilka and Hamilton, 1982). The geology was described as "fault zone with trace silver, copper, and zinc".

6.16 Woods Creek Copper Mine (RA002084)

The Woods Creek Copper Mine was visited on 09/13/01 and one open hazardous adit was found. No environmental concerns were noted. The mine is in the Mineral Hill or Mineral Point mining district. It was listed as "developing" in 1974 (Lawson, 1975), "inactive" in 1975 (Lawson, 1976), and "developing" in 1984 (Lawson and Berg, 1985). It is east of an unnamed tributary of Woods Creek in tracts DDCA sec. 17, T.3S., R.22W., and was described as a part of the Copper Canyon Mine.

7.0 SUMMARY OF MINING IMPACTS ON BITTERROOT NATIONAL FOREST

Approximately 147 individual mine sites lie within the borders of the Bitterroot National Forest. The Crystal Mountain Fluorite is one of the larger mines within the Forest boundary. A discharge from a small adit to the west of the fluorite deposit was sampled but no exceedences of water-quality standards were noted. Most of the other sites are either small, rare-earth-element prospects, vermiculite, barite, and other non-metallics, placer gold, or were unpatented mining claims that were never developed. Several of the large mines considered in this inventory, including the Montana Prince and Curlew, were on private land and did not affect the Forest.

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Appendix I

Field Form

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 Meridan _____
Township _____ Range _____ Section _____ ¼_____ ¼_____ ¼_____
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 panoromic 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_____

MINE PRODUCTION

Commodity(s)							
Production (ounces)							

Years that Mill Operated_____
Mill Process: ____Amalgamation, ____Arrastre, ____CIP (Carbon-in-Pulp), ____Crusher only,
____Cyanidation, ____Flotation, ____Gravity, ____Heap Leach, ____Jig Plant,
____Leach, ____Retort, ____Stamp, ____ No Mill, ____Unknown

MILL PRODUCTION

Commodity(s)							
Production (ounces)							

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 inake _____miles, Probable use _____
Describe number and uses of surface water intakes observed for 15 miles downstream of site: _____

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

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

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

5. SAFETY RISKS

_____Open adit/shaft, _____Highwall or unstable slopes, _____Unstable structures,
_____Chemicals, _____Solid waste including sharp rusted items, _____Explosives

6. MINE OPENINGS

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

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

Opening Number						
Type of Opening						
Ownership						
Opening Length (ft)						
Opening Width (ft)						
Latitude (GPS)						
Longitude (GPS)						
Condition						
Ground water						
Water Sample #						
Photo Number						

Comments (*When commenting on a specfic 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 intermittant flow, STAND= Standing water only (*In this case, enter an estimate of depth below grade*)

7. MINE/MILL WASTE

Include in the following chart all mine/mill wastes located on or partially on National Forest lands. Also, include mine/mill wastes located entirely on private land if 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 has migrated onto National Forest land; only enter as much information about the waste as relevant and practicable.

TABLE 2 - DUMPS, TAILINGS, AND SPOIL PILES

Waste Number						
Waste Type						
Ownership						
Area (acres)						
Volume (cu yds)						
Size of Material						
Wind Erosion						
Vegetation						
Surface Drainage						
Indicators of Metals						
Stability						
Location with respect to Floodplain						
Distance to Stream						
Water Sample #						
Waste Sample #						
Soil Sample #						
Photo Number						

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

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

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

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

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

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

Surface Drainage (*Include all that apply*): RILL=Surface flow channels mostly < 1' deep, GULLY=Flow channels >1' deep, SEEP=Intermittant or continuous discharge from waste deposit, POND=Seasonsal 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

8. SAMPLES

Take samples only on National Forest lands.

TABLE 3 - WATER SAMPLES FROM MINE SITE DISCHARGES

Sample Number						
Date sample taken						
Sampler (*Initials*)						
Discharging From						
Feature Number						
Indicators of Metal Release						
Indicators of Sedimentation						
Distance to stream (ft)						
Sample Latitude						
Sample Longitude						
Field pH						
Field SC						
Flow (*gpm*)						
Method of measurement						
Photo Number						

Comments: (*When commenting on a specfic 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, VEG=Absence of, or stressed 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, banks and channel largely intact, MOD=Sediment deposits in channel, affecting flow patterns, banks largely intact, SIGN=Sediment deposits in channel and/or along stream banks extending to nearest stream

Method of Measurement: EST=Estimate, BUCK=Bucket and time, METER=Flow meter

TABLE 4 - WATER SAMPLES FROM STREAM(S)

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

Comments: *(When commenting on a specfic 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 ½ a mile or more downstream

Method of Measurement: EST=Estimate, BUCK=Bucket and time, METER=Flow meter

TABLE 5 - WASTE SAMPLES

Sample Number				
Date of sample				
Sampler (*Initials*)				
Sample Type				
Waste Type				
Feature Number				
Sample Latitude				
Sample Longitude				
Photo Number				

Comments: (*When commenting on a specfic 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 6 - SOIL SAMPLES

Sample Number				
Date of sample				
Sampler (*Initials*)				
Sample Type				
Sample Latitude				
Sample Longitude				
Likely Source of Contamination				
Feature Number				
Indicators of Contamination				
Photo Number				

Comments: (*When commenting on a specfic 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 7 - HAZARDOUS WASTES/MATERIALS

Waste Number				
Type of Containment				
Condition of Containment				
Contents				
Estimated Quantity of Waste				

Comments: (*When commenting on a specfic 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 8 - STRUCTURES

Type						
Number						
Condition						
Photo Number						

Comments:

_____

_____

_____

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

Type: CABIN=Cabin or community service (*store, church, etc.*), MILL=mill building, MINE=building related to mine operation, STOR=storage shed, FLUME=Ore Chute/flume or tracks for ore transport

Number: Number of particular type of structure all in similar condition or length in feet

Condition: GOOD=all components of structure intact and appears stable, FAIR=most components present but signs of deterioration, POOR=major component (*roof, wall, etc*) of structure has collapsed or is on the verge of collapsing, BAD=more than half of the structure has collapsed

11. MISCELLANEOUS

Are any of the following present? (Check all that apply): _____Acrid Odor, _____Drums, _____Pipe, _____Poles, _____Scrap Metal, _____Overhead wires, _____Overhead cables, _____Headframes, _____Wooden Structures, _____Towers, _____Power Substations, _____Antennae, _____Trestles, _____Powerlines, _____Transformers, _____Tramways, _____Flumes, _____Tram Buckets, _____Fences, _____Machinery, _____Garbage

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

_____

_____

_____

_____

General Comments/Observations (not otherwise covered)

_____

_____

_____

_____

_____

_____

_____

12. SITE MAP

Prepare a sketch of the site. Indicate all pertinent features of the site and nearby environment. Include all significant mine and surface water features, access roads, structures, etc. Number each important fearue 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,
Commerical/Industrial, ____ Fish Pond, ___ Mining,
Recreation, _____Other

Wells (*From well logs*)
Nearest well _____miles
Number of wells within 0-¼ miles _____¼-½ miles _____½-1 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 _____0-¼ miles _____¼-½ miles _____½-1 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 II

Descriptions of Screened-Out Mine Sites
on the Bitterroot National Forest-Administered Land

Ace Mine — Alta 7.5-min quadrangle
RA007295
The Ace Mine was screened out because it was described as a prospect only (Berg, 1977). It was listed as active in 1956 (Stout and Ackerman, 1957) but no other information could be found on it. The commodity was listed as silver.

Ambrose Creek — Grayhorse Creek 7.5-min quadrangle
RA002240
This site was screened out because it was an iron-titanium-thorium placer (Holt, 1964).

Art L. Widley — Schultz Saddle 7.5-min quadrangle
RA007174
This site had no references and no indication of the accuracy of the location and so was screened out. It may be a duplicate of the Logger (Bugle Ridge) Group.

BTM — Elk Mountain 7.5-min. quadrangle
RA007192
This site was screened out because it plotted outside of the Forest boundaries and the commodity was iron. MBMG mineral property files described it as unpatented claims consisting of trenches in the 8 Mile Creek area. The files have it listed in secs. 10 and 11, T.10N., R.18W., 15 miles east of Florence. Mineralization consists of specular hematite in limestone according to the MBMG mineral property files.

Bass Creek Sillimanite — Saint Mary Peak 7.5-min quadrangle
RA007180
This site was screened out because only a general location was given (secs. 25, 26, 27, 34, 35, and 36, T.10N., R.21W., and sec. 3, T.9N., R.20W., and the commodity was listed as kyanite. Sillimanite is associated more with high-temperature metamorphosed argillites so it may be the mineral present, as the name suggests.

Beaver Creek Columbite Deposit — Alta 7.5-min quadrangle
RA007207
This site was screened out in the office. It had no references to it in the USBM MILS database.

Bertie Lord Creek — Jennings Camp Creek 7.5-min quadrangle
RA000649
This site was screened out because it was described as a titanium-thorium placer with a location accuracy of +/-1 km in the USBM MILS database. It was a placer and probably no workings were associated with it.

Big Creek Victor 7.5-min quadrangle
RA008374
This site was screened out because it plotted on private land. The reference for it was USBM Report of Investigations 6365 on titanium placers (Holt, 1964).

Bitterroot Valley Stone Quarry Como Peaks 7.5-min quadrangle
RA002180
The site was screened out because it was a quartz or ornamental stone quarry and was determined to have little or no effects on BNF-administered land. It was described as a marble quarry in the USBM MILS database but MBMG reports from the operator described it as a quartz occurrence.

Blue Joint Placer Bare Cone 7.5-min quadrangle
RA006922
The Blue Joint placer was screened out because it was determined that it had little or no effects to BNF-administered land. Benham (1981) described the workings as “several prospect pits and trenches”. Lund and others (1983) theorized that the gold came from “mineralized zones in the volcanic rocks and granites”. Sahinen (1957) thought that the gold was in residual Tertiary gravels.

Broken File prospect French Basin 7.5-min quadrangle
RA002438
This site plotted on State of Montana land and had an inaccurate location and so was screened out. It was listed as a beryllium occurrence (Sahinen, 1957; Pattee and others, 1968). The beryl was found in a pegmatite dike in gneissic granite, along with quartz, orthoclase, and muscovite.

Bugle Schultz Saddle 7.5-min quadrangle
RA007108
There were no references for the Bugle and no indication of the accuracy from the USBM MILS database, therefore it was screened out. It may be associated with the Logger (Bugle Ridge) Group and the Logger Claims.

Burnt Fork Burnt Fork Lake 7.5-min quadrangle
RA000284
This site was screened out because of an inaccurate location (+/-5 km) in the USBM MILS database. The only reference for it was Holt (1964). The commodity was titanium and iron.

Cameron Creek Placer French Basin 7.5-min quadrangle
RA002294
This site had a very general location (secs. 15, 16, 22, 27, 34, T.2N., R.19W., and secs. 3, 4, 9, and 10, T.1N., R.19W.) and was a thorium-uranium-iron occurrence. It was also a placer. Minerals in the placer include ilmenite, garnet, zircon, magnetite, and monazite (Holt, 1964).

Chicago Placer Alta 7.5-min quadrangle
This site was screened out because it was a placer with little or no effects on BNF-administered land. Reference to it was found in Benham (1981) who described it as “several small prospects and one trench”. It is located at the confluence of the Bitterroot River and Deer Creek.

Claremont Corley Gulch 7.5-min quadrangle
RA002366
Sahinen (1957) described the Claremont as a single adit driven in argillite in the NE¼ sec. 1, T.8N., R.19W. It plots on private land and so was screened out for this inventory. It was a copper prospect with mineralization consisting of calcite, and iron and copper oxides.

Clifft Mine / Silver Dollar 1-6 Group St. Joseph Peak 7.5-min quadrangle
RA002420
Also known as the Silver Dollar Junior claims. This site was described as being in sec. 28, T.10N., R.21W. in the Bass Creek drainage at approximately 8,200 ft elevation. Workings were described in Sahinen (1957) as consisting of a shaft and a 550-foot adit trending toward the shaft. Zilka and Hamilton (1982) stated that the workings consisted of two adits and a shaft. The same report stated that the mine had been operated almost continuously since 1889 but with little production. The original lode locations were the Clifft, Blue Bird, and Dallas quartz lode claims. Other claims in the area included the Renegade, Domingo, Starr, Rocky Peak, Teddy and Tunnel Site claims (Baumbarger, 1985). In 1966, the claims were relocated as the Sky High Lode Claims Nos. 1-4 and were later located as the Silver Dollar and then the Blue Cliff claims. The site is located within the present Selway-Bitterroot Wilderness.

In 1968, the property was explored by a group of miners out of Stevensville: Earl Mace, Dee Alexander, Paul Alexander, Charles Kimmel, and Jessie Alexander (Stentz, 1968). At that time Adit No. 1 was caved (originally 60 feet) and Adit No. 2 was open and 800 feet long. Because of the remote location, the site was screened out during the 2001 inventory. Access is via 6 miles of trail to the base of St. Joseph Peak and then by faint trail switchbacking up the slope. Baumbarger (1985) noted that Adit No. 1 was caved; Shaft No. 1 was 300 ft northwest and 400 ft higher in elevation and it was of an unknown depth at that time. It was timbered (4 ft by 8 ft) for the first 20 ft. The rock was described as a dark gray stratiform gneiss with a small pegmatite dike and a 10-ft thick quartz vein with a 6-in. mineralized breccia zone.

Curlew Mine and Mill Victor 7.5-min quadrangle
RA002204
This site was screened out because it is on private land downstream from BNF-administered land. Sahinen (1957) included individual mine names for the workings: Price adit, Price incline, Pauline shaft, surface tunnel, Clarke opencut on the Elizabeth vein, the Maggie tunnel, and the Elizabeth tunnel. For a summary of Pioneer Technical Service's sampling, see PTS (1995). They found no discharging adits, springs, or shafts. The glory hole was filled with water. An estimated 41,000 cu yards of tailings were found. Hazards included two open adits, two structures, and a highwall.

Dominic Group Antimony Willow Mountain 7.5-min quadrangle
RA002060
The Dominic Group Antimony was screened out as a general location. It was mentioned in Lawson (1976) and in Lawson (1980), both listing it as "developing". It plots in sec. 35 and 36, T.7N., R.19W. No other references could be found for it to further define where the claims were. The owner/operator was listed in MBMG mineral property files as Betty Lykins of Hamilton. The same file had a description of shaft at the Dominic Group in the 1970's and 1980's.

Eagle Rock Group Gird Point 7.5-min quadrangle
RA002066
This site was screened out because it was a quartz crystal occurrence and because it was a very general location (secs. 1, 2, 6, 10, 11, 12, 13, 14, 15, and 22, T.5N., R.19W.).

Echo Gulch Lick Creek 7.5-min quadrangle
RA001096
This site was screened out because of an inaccurate location (+/-5 km) in the USBM MILS database. The only reference for it was Holt (1964). The commodity was iron-thorium-titanium- and zirconium; it was a placer.

Florence Willow Mountain 7.5-min quadrangle
RA007289
This site was screened out because it had a general location of secs. 26 and 27, T.7N., R.19W. on the Willow Mountain 7.5-min quadrangle. It was listed as an antimony prospect. The general area was visited but no workings were noted. Heavy timber obscured much of the area.

Gallogly (Ross' Hole, Medicine) Hot Springs Lost Trail Pass 7.5-min quadrangle
RA002198
This site was screened out because it is a geothermal spring as described in USGS Professional Paper 492 (Waring and others, 1965).

Gird Creek Vermiculite Gird Point 7.5-min quadrangle
RA007222
This site was described as being "east of Hamilton at the head of Gird Creek" although the accuracy was +/-5 km in the MILS database. The location was inaccurate and the commodity was vermiculite so the site was screened out. This was also known as the Chamberlain-Garnett Group and was described in MBMG mineral property files as "all bulldozer cuts.".

Gold Creek Willow Mountain 7.5-min quadrangle
RA006961
This site was screened out. It had only a general location of sec. 36, T.7N., R.19W. No other references were found and there was no indication on the topographic map of any workings in the area.

Green Goose and Sunset (Molly Hogan) Kent Peak 7.5-min quadrangle
RA007183
This site was screened out because it was described as a 35-foot adit and two pits (Banister and others, 1983) and the locations were only accurate to +/-1 km (located in secs. 24, 23, 25, and 26, T.4N., R.18W.). It plotted near Congdon Peak in the Sapphire Mountains but the exact location could not be determined. It would have been accessible only by a long hike, and was determined to have little or no effect on BNF-administered land. The occurrence was described as possibly being stratabound copper associated with a quartz vein in argillite/quartzite underlying a gabbro sill.

Guide Creek Jennings Camp Creek 7.5-min quadrangle
RA000916
This site was screened out because it was described as a titanium-thorium placer with an accuracy of +/-1 km in the USBM MILS database. It was a placer and probably no workings were associated with it.

Hart Creek French Basin 7.5-min quadrangle
RA0003336
This site was screened out; it was a titanium-thorium placer; it plotted on State of Montana land; and it had no references to it.

Highland Mine Piquett Mountain 7.5-min quadrangle
RA002210
The Highland Mine site was screened out because of an inaccurate location (+/-1 km) and little information on it. It was listed as "developing" by Lawson (1975 and 1976). It is described as being in the Overwich mining district. MBMG mineral property files describe it in sec. 7, T.2S., R.21W., and it operated in the 1970's with a possible 152 ft of tunnel. Owner/operators were listed as LCL Corporation: David Carruthers and Dan Loftus.

There are some prospect symbols shown on the topographic map to the north of the center of the section, and they may represent the location of the workings. The commodities listed are copper, gold, silver, and lead.

Iron Cap Grayhorse Creek 7.5-min quadrangle
RA002372
This site was screened out because it plotted on State of Montana land and the commodities listed were iron and quartz. Sahinen (1957) described the working as a "shallow vertical shaft that exposes a vein two feet wide". Minerals included massive specular hematite with limonite and quartz. It is in the faulted and folded Ravalli Formation in sec. 30, T.9N., R.18W.

Jackie Mine Alta 7.5-min quadrangle
RA007117
This site was screened out in the office because it is a small tin/tantalum occurrence with no other references except the USBM MILS database. The accuracy was unknown. It plotted on the Alta 7.5-min quadrangle near the south fork of Johnson Creek.

Jennings Camp Creek Jennings Camp Creek 7.5-min quadrangle
RA000908
This site was screened out because it was described as a titanium-thorium placer with an accuracy of +/-1 km in the USBM MILS database. It was a placer and probably no workings were associated with it.

Little Joe Prospect Mount Jerusalem 7.5-min quadrangle
RA007299
The Little Joe prospect was screened out because it was a uranium occurrence with no references to it and it had an unknown accuracy for the location. It plots just to the south of the Selway-Bitterroot Wilderness boundary in an area with no road or trail access.

Logger (Bugle Ridge) Group Schultz Saddle 7.5-min quadrangle
RA002000
This site is described as a silver-copper-beryl occurrence that was worked periodically between 1971 and 1976 (Berg, 1977). It was screened out because no workings were described associated with the site and the general location (sec. 6, T.1N., R.17W.).

The general area was visited 10/01/01 and the Logger No. 1 pit was found but no other workings were located. It was described as being located in a pegmatite in quartz monzonite. The workings consisted of a surface bulldozer cut for 50 ft along strike on 3 veins.

Lost Horse Creek Como Peaks 7.5-min quadrangle
RA002282
This site was screened out because it was a titanium-thorium placer. There were no references for it in the MILS database.

Lucky Joe Mine Alta 7.5-min quadrangle
RA007162
The Lucky Joe Mine plots on private land east of the West Fork of the Bitterroot River and so was determined to have little or no effects on BNF-administered land. It is described as a uranium prospect with an open adit (for 30 ft) in 1971 (Berg, 1977). A MBMG mineral property file describes 500 ft of surface trenching. The occurrence is in a shear zone in quartzite. Mineralization included uranite, gummite, and uranophane in a “phyllite”. It is in the Mineral Point mining district.

Lucky Strike French Basin 7.5-min quadrangle
RA007171
This site was screened out because it was listed as a beryllium deposit in Pattee and others (1968).

Lyman Creek French Basin 7.5-min quadrangle
RA000332
This site was screened out; it was a titanium-thorium placer and it had no references to it.

Martin Creek Lick Creek 7.5-min quadrangle
RA001535
This site was screened out because of an inaccurate location (+/-1 km) in the USBM MILS database. The only reference for it was Holt (1964). The commodity was titanium and thorium; it was a placer.

Meadow Creek Jennings Camp Creek 7.5-min quadrangle
RA000597
This site was screened out because it was described as a titanium-thorium placer with an accuracy of +/-1 km in the USBM MILS database. It was a placer and probably no workings were associated with it.

Miller Mine Grayhorse Creek 7.5-min quadrangle
RA007267
This site was screened out because it plotted on private land. Minobras (Elevatorski, 1975) described it as a barite mine with past production from Precambrian quartzite-limestone. A prospect to the southeast of the center of the section may be the actual mine.

Molly 1, 2, 3, 4, and 5 Skalkaho Pass 7.5-min quadrangle
RA002006
This site, also known as the "Aune molybdenite prospect", was screened out because no workings were described in the literature. It was a molybdenum prospect in the unorganized Skalkaho mining district that was listed as "developing" in 1974 and 1975 (Lawson, 1975 and 1976). No other information could be found on it and the accuracy of the location was uncertain.

The roads in the general area were driven and no workings were noted. MBMG mineral property files list a sample from this site as a siliceous limestone with disseminated pyrite in quartz. Another report lists the rock type as granite or quartz monzonite. The workings were described as a small prospect pit on a steep slope of talus and boulders.

Montana Star Mine Piquett Mountain 7.5-min quadrangle
RA007198
This site was screened out because it had no references and the accuracy was +/-1 km. It was listed in the MILS database as a lead-zinc-copper deposit. It may be a duplicate of the Slate Creek Prospect.

Moose Creek Lick Creek 7.5-min quadrangle
RA001343
This site was screened out because of an inaccurate location (+/-1 km) in the USBM MILS database. The only reference for it was Holt (9164) in the USBM RI 6365. The commodity was titanium, thorium, and zirconium; it was a placer.

Murray Grant Claims Alta 7.5-min quadrangle
RA007195
This site was screened out in the office. It had no references to it in the USBM MILS database, and an unknown accuracy for the location. It was listed as a lead, copper, gold, and silver occurrence.

Needle Creek Lick Creek 7.5-min quadrangle
RA001338
This site was screened out because of an inaccurate location (+/-1 km) in the USBM MILS database. The only reference for it was Holt (1964). The commodity was titanium and thorium; it was a placer.

New Discovery Corley Gulch 7.5-min quadrangle
RA007186
This site was screened out because it had an inaccurate location (+/-1 km) and had no other references except for a USBM mineral property file (21.106). The commodity was listed as copper and it was probably just a prospect.

Puff Ball No. 1-17 Alta 7.5-min quadrangle
RA007204
This site was screened out in the office because it had no other references to it other than the USBM MILS database. The commodity was listed as rare earths and the accuracy was unknown.

Rocky Point #5 Horse Creek Pass 7.5-min quadrangle
RA007084
This site was screened out in the office because it was listed as a barium deposit. Its location is shown on the map from Benham (1981) where it was described as "several dozer scrapes" in gneiss and argillites. Crowley (1960) described it in the Woods Creek deposits, where 8 ft of white barite was exposed.

Sargent Ranch Mountain House 7.5-min quadrangle
RA007096
The Sargent Ranch was screened out because it was a uranium-thorium occurrence with no other references except the MILS database. The accuracy was +/-1 km and it may be on private land.

Schroeder Carlton Lake 7.5-min quadrangle
MI002622
The Schroeder site was screened out because the commodity was listed as quartz crystals. The reference for it was the USGS CRIB database.

Sheep Creek Columbite Alta 7.5-min quadrangle
RA002390
This site was screened out because it is a duplicate of the Dark Star claim and is described there. Sahinen (1957) described it as a vein in gneiss containing columbite and vermiculite.

Shook Prospect Alta 7.5-min quadrangle
RA002444
This site was screened out in the office because it is a barite occurrence. Minobras (Elevatorski, 1975) described it as "barite veins in gneissic rocks" in sec. 20, T.3S., R.22W.

Sleeping Child Hot Springs Deer Mountain 7.5-min quadrangle
RA002186
This site was screened out: it is private and a geothermal spring. It was called Weeping Child or Medicine Rock Hot Spring (Waring and others, 1965).

Sleeping Child (A) Kent Peak 7.5-min quadrangle
RA007305
This site was screened out because it was listed as a quartz crystal occurrence, and there were no other references to it except for the USGS CRIB database.

Sleeping Child (B) Jennings Camp Creek 7.5-min quadrangle
RA007305
This site was screened out because it was listed as a quartz crystal occurrence, and there were no other references to it except for the USGS CRIB database.

Smith Mine Victor 7.5-min quadrangle
RA002042
This site is associated with the Curlew Mine and they both plot on private land less than a mile east of the BNF boundary. They were determined to have little or no effect on BNF-administered land. The Smith Mine was described as being southwest of the Curlew Mine (Sahinen, 1957). It consisted of two shafts on opposite sides of the creek and two adits.

Star Trapper Peak 7.5-min quadrangle
RA007252
This site was screened out. It plotted in the Selway-Bitterroot Wilderness with an unknown accuracy. No other references could be found for it. No indications could be found of mining activity by looking at the topographic map (no roads, prospect symbols, etc.). MILS listed the commodity as gold.

Starr Gash Point 7.5-min quadrangle
RA002360
Sahinen (1957) listed this mine as a gold prospect with no other information except that it was in sec. 36, T.9N., R.22W. Zilka and Hamilton (1982) described the workings as one adit and one trench along a schist-granodiorite contact. The location plotted north of the Big Creek pack trail and east of Beaver Creek. It was screened out because of the remote location and the small likelihood of it affecting BNF-administered land. It was estimated to be a 10-mile round-trip hike.

Tirebiter 5 & 6 Shoup 7.5-min quadrangle
RA007150
This site was screened out because it was a columbium-niobium occurrence with no references and a very general location (+/-5 km). A prospect symbol is near the location where the MILS database plotted this site, but it may not be the same.

Titanium Occurrence Alta 7.5-min quadrangle
RA001994
This site was screened out in the office from the description in Crowley (1960).

Titanium Occurrence Alta 7.5-min quadrangle
RA007138
This site was screened out in the office because it had no other references to it except for the USGS CRIB database. The commodity was listed as “rare earths”.

Titanium Occurrence Horse Creek Pass 7.5-min quadrangle
RA007273
This site was screened out because it is a small, titanium, iron, and rare-earth-element occurrence with the only reference to it in the USGS CRIB database. The accuracy was unknown.

Titanium Occurrence Alta 7.5-min quadrangle
RA007293
This site was screened out because it is a small, titanium, iron, and rare-earth-element occurrence with the only reference to it in the USGS CRIB database. The accuracy was unknown.

Two Bear Creek Deer Mountain 7.5-min quadrangle
RA000324
This site was screened out because it was a thorium placer and it had no other references to it. It plots near the Sleeping Child Hot Springs.

Unnamed Carbonate Bands Alta 7.5-min quadrangle
RA002342
This site was screened out because it was a carbonate occurrence. It had little or no effect on BNF-administered land. It was described as being in SE¼ sec. 10, T.4S., R.22W. and it contained aeschynite crystals (Crowley, 1960).

Unnamed location Piquett Mountain 7.5-min quadrangle
RA002450
This site was screened out because it was listed as a fluorite deposit in sec. 15 (?), T.2S., R.21W. The location was inaccurate.

Unnamed location Corley Gulch 7.5-min quadrangle
RA007087
This site was screened out because it was listed as a barium prospect in the USBM MILS database. There were no other references to it.

Unnamed location Skalkaho Pass 7.5-min quadrangle
RA007147
This site was screened out because it is a molybdenum occurrence with the only reference to it in the USGS CRIB database. The site had an accuracy of +/-5 km and so the site was screened out. The roads in the general area were driven but no mine workings were found.

Unnamed location Alta 7.5-min quadrangle
RA007147
This site was screened out because it is a small rare-earth element occurrence with the only reference to it in the USGS CRIB database. The accuracy was unknown, but it plotted on Sheep Creek on the Alta 7.5-min quadrangle.

Unnamed location Saint Mary Peak 7.5-min quadrangle
RA007279
This site was screened out because it is a small, silver-lead occurrence with the only reference to it in the USGS CRIB database. The accuracy was +/-1 km. It plotted within the Selway-Bitterroot Wilderness and no roads were nearby to indicate mining workings.

Unnamed location Alta 7.5-min quadrangle
RA007287
This site was screened out because it is a small rare-earth element occurrence with no other references to it. The accuracy was unknown.

Unnamed location Piquett Mountain 7.5-min quadrangle
RA007291
This site was screened out because it was listed as a copper-silver deposit and the location was inaccurate. The only reference for it was the USGS CRIB database.

Unnamed location Alta 7.5-min quadrangle
RA007291
This site was screened out because it is a small rare-earth element occurrence with no other references to it except for the USGS CRIB database. The accuracy was unknown.

Unnamed sample location Alta 7.5-min quadrangle
RA002462
This site was screened out because it is a small rare-earth (columbium-niobium) element and calcium occurrence. It was referenced in Crowley (1960). The accuracy was unknown.

Violet Group (Violet Claims 1-9) Shoup 7.5-min quadrangle
RA002090
This site was screened out because it was a general location (secs. 22, 28, and 29, T.4S., R.22W.). It was listed as "developing" in 1974 and 1975 (Lawson, 1975 and 1976) but no other information could be found on it. Commodities were listed as molybdenum, tungsten, silver, and gold.

West Fork Bitterroot River Alta 7.5-min quadrangle
RA007265
This site was screened out because it is a barite occurrence in Minobras (Elevatorski, 1975); it is in sec. 25, T.3S., R.22W.

Whipperwill (Whippoorwill) Mine Victor 7.5-min quadrangle
RA002012
This site was screened out because it had an accuracy of +/-1 km in the MILS database and it was in an area with poor access. Sahinen (1957) mentions the Whippoorwill as yielding "32 tons of lead concentrate and 36 tons of zinc concentrate" in 1948. The mine was operated by the Victor Development Company. There was no location given for the mine, however; only that it was in the same district as the Curlew. Hansen and others (1970) described it only as being in T.8N., R.21W. and being inactive at the time.

Wild Maple Carlton Lake 7.5-min quadrangle
RA007102
This site was screened out because of an inaccurate location (+/-1 km) and there were no references for it. The MILS database listed it as a zinc-silver-gold and lead prospect.

Windyridge Prospect Watchtower Peak 7.5-min quadrangle
RA006916
Windyridge was described as one pit near Watchtower Pass that explored "sulfide-bearing veinlets" in gneiss (Zilka and Hamilton, 1982). It was screened out because of the remote location and the small nature of the workings.

Woods Creek Barite Horse Creek Pass 7.5-min quadrangle
RA007281
This site was described by Benham (1981) as consisting of two dozer scrapes exposing a 10-inch and a 24-inch barite vein in argillite and gneiss. The location is inaccurate; the prospect may be on the Horse Creek Pass 7.5-min quadrangle in T.3S., R.23W.

Woods Creek Iron Mine Alta 7.5-min quadrangle
RA001988
This site was screened out because no workings were described at the location. It is in the same general vicinity as the Copper Canyon deposit. A Master's thesis was done on the area in 1967 (Kelley, 1967).

Woodtick No. 1 Piquett Mountain 7.5-min quadrangle
RA007302
This site was screened out because of the inaccurate location listed in the MILS database. The commodity was listed as gold and the only reference to it was the USGS CRIB database.

Appendix III

Water Analytical Results
Bitterroot National Forest

Ground-Water Information Center **Water Quality Report**

Site Name: CRYSTAL MOUNTAIN FLUORITE - RYE CREEK **Report Date:** 10/21/2003

Compare to Water Quality Standards

Location Information

Sample Id/Site Id: 2002Q0307 / 190953
Location (TRS): 03N 18W 18 CBDD
Latitude/Longitude: 46° 0' 25" N 113° 53' 29" W
Datum:
Altitude: 6630.00
County/State: RAVALLI / MT
Site Type: MINE DRAINAGE
Geology:
USGS 7.5' Quad: BALD TOP MOUNTAIN
PWS Id:
Project: BTFORST

Sample Date: 10/5/2001 10:45:00 AM
Agency/Sampler: MBMG / MK
Field Number: RUNS10M
Lab Date: 1/23/2002
Lab/Analyst: MBMG / JMC
Sample Method/Handling: GRAB / 3111
Procedure Type: DISSOLVED

	mg/L	meq/L		mg/L	meq/L
Calcium (Ca)	13.300	0.664	Bicarbonate (HCO3)	30.010	0.492
Magnesium (Mg)	1.490	0.123	Carbonate (CO3)	0.000	0.000
Sodium (Na)	4.450	0.194	Chloride (Cl)	<.5	0.000
Potassium (K)	0.783	0.020	Sulfate (SO4)	18.500	0.385
Iron (Fe)	0.005	0.000	Nitrate (as N)	<.05	0.000
Manganese (Mn)	0.005	0.000	Fluoride (F)	2.640	0.139
Silica (SiO2)	19.200		Orthophosphate (OPO4)	<.05	0.000
Total Cations		1.036	**Total Anions**		1.016

Trace Element Results (µg/L)

Aluminum (Al):	152.000	Cadmium (Cd):	<2	Mercury (Hg):	NR	Tin (Sn):	NR
Antimony (Sb):	<2	Chromium (Cr):	<2	Molybdenum (Mo):	<10	Titanium (Ti):	<1
Arsenic (As):	<1	Cobalt (Co):	<2	Nickel (Ni):	2.390	Thallium (Tl):	<5
Barium (Ba):	10.700	Copper (Cu):	<2	Silver (Ag):	<1	Uranium (U):	4.030
Beryllium (Be):	<2	Lead (Pb):	<2	Selenium (Se):	<1	Vanadium (V):	<5
Boron (B):	<30	Lithium (Li):	4.290	Strontium (Sr):	816.000	Zinc (Zn):	2.780
Bromide (Br):	<50					Zirconium (Zr):	<2

Field Chemistry and Other Analytical Results

**Total Dissolved Solids:	75.310	Field Hardness as CaCO3:		Ammonia (mg/L):	NR
**Sum of Diss. Constituents:	90.540	Hardness as CaCO3:	39.340	T.P. Hydrocarbons (µg/L):	NR
Field Conductivity (µmhos):	113.500	Field Alkalinity as CaCO3:	NR	PCP (µg/L):	NR
Lab Conductivity (µmhos):	145.500	Akalinity as CaCO3:	24.610	Phosphate, TD (mg/L as P):	<.05
Field pH:	5.230	Ryznar Stability Index:	11.180	Field Nitrate (mg/L):	
Lab pH:	6.690	Sodium Adsorption Ratio:	0.300	Field Dissolved O2 (mg/L):	
Water Temp (°C):	5.100	Langlier Saturation Index:	-2.245	Field Chloride (mg/L):	
Air Temp (°C):	NR	Nitrite (mg/L as N):	<.05	Field Redox (mV):	NR

Notes

Sample Condition: CLEAR
Field Remarks: ADIT DISCHARGE ON BITTERROOT NATIONAL FOREST LAND
Lab Remarks:

Explanation: **mg/L** = milligrams per Liter; **µg/L** = micrograms per Liter; **ft** = feet; **NR** = No Reading in GWIC

Qualifiers: **A** = Hydride atomic absorption; **E** = Estimated due to interference; **H** = Exceeded holding time; **K** = Na+K combined; **N** = Spiked sample recovery not within control limits; **P** = Preserved sample; **S** = Method of standard additions; ***** = Duplicate analysis not within control limits; ****** = Sum of Dissolved Constituents is the sum of major cations (Na, Ca, K, Mg, Mn, Fe) and anions (HCO3, CO3, SO4, Cl, SiO2, NO3, F) in mg/L. Total Dissolved Solids is reported as equivalent weight of evaporation residue.

Drinking water limits are based on U.S. Environmental Protection Agency primary and secondary standards for public water supplies (view their standards). Stock water and irrigation water recommendations are from U.S. Department of Agriculture Natural Resources Conservation Service water-quality guidelines. The guidelines are general and my vary depending on specific applications. Irrigation guidelines are based on continuous irrigation.

Sample Id	GWIC Id	Sample Date	Site Name	Location	Site Type
2002Q0307	190953	10/5/2001 10:45:00 AM	CRYSTAL MOUNTAIN FLUORITE - RYE CREEK	03N 18W 18 CBDD	MINE DRAINAGE

Constituent	This Sample	Drinking Water	Stock Water	Irrigation Water
Calcium (Ca)	13.300 mg/L	---	---	---
Magnesium (Mg)	1.490 mg/L	---	2,000 mg/L	---
Sodium (Na)	4.450 mg/L	250 mg/L [smcl]	2,000 mg/L	see SAR
Potassium (K)	0.783 mg/L	---	---	---
Iron (Fe)	0.005 mg/L	0.3 mg/L [smcl]	---	---
Manganese (Mn)	0.005 mg/L	0.05 mg/L [smcl]	---	2.0 mg/L
Silica (SiO2)	19.200 mg/L	---	---	---
Bicarbonate (HCO3)	30.010 mg/L	---	---	---
Carbonate (CO3)	0.000 mg/L	---	---	---
Chloride (Cl)	<.5 mg/L	250 mg/L [smcl]	1,500 mg/L	---
Sulfate (SO4)	18.500 mg/L	250 mg/L [smcl]	1,500 mg/L	[b]
Nitrate (NO3 as N)	<.05 mg/L	10 mg/L [mcl]	100 mg/L	---
Fluoride (F)	2.640 mg/L	4 mg/L [mcl]	2 mg/L	---
Ortho-Phosphate (as P)	<.05 mg/L	500 mg/L [smcl]	5,000 mg/L	2,000 mg/L [c]
Aluminum (Al)	152.000 ug/L	50-200 ug/L [smcl]	---	1,000 ug/L
Antimony (Sb)	<2 ug/L	6 ug/L [mcl]	---	---
Arsenic (As)	<1 ug/L	10 ug/L [mcl]	50 ug/L	100 ug/L
Barium (Ba)	10.700 ug/L	2,000 ug/L [mcl]	---	---
Boron (B)	<30 ug/L	---	---	---
Cadmium (Cd)	<2 ug/L	5 ug/L [mcl]	10 ug/L	5 ug/L
Chromium (Cr)	<2 ug/L	100 ug/L [mcl]	1,000 ug/L	100 ug/L
Cobalt (Co)	<2 ug/L	---	1,000 ug/L	50 ug/L
Copper (Cu)	<2 ug/L	1,300 ug/L [mcl]	500 ug/L	200 ug/L
Lead (Pb)	<2 ug/L	15 ug/L [mcl]	50 ug/L	5,000 ug/L
Lithium (Li)	4.290 ug/L	---	---	2,500 ug/L
Molybdenum (Mo)	<10 ug/L	---	---	5 ug/L
Nickel (Ni)	2.390 ug/L	---	---	200 ug/L
Phosphate (P)	<.05 ug/L	---	---	---
Selenium (Se)	<1 ug/L	50 ug/L [mcl]	50 ug/L	20 ug/L
Silver (Ag)	<1 ug/L	100 ug/L [smcl]	---	---
Strontium (Sr)	816.000 ug/L	---	---	---
Titanium (Ti)	<1 ug/L	---	---	---
Vanadium (V)	<5 ug/L	---	---	---
Zinc (Zn)	2.780 ug/L	5,000 ug/L [smcl]	24,000 ug/L	2,000 ug/L
Zirconium (Zr)	<2 ug/L	---	---	---

Key: **NR** = No reading in GWIC; **mg/L** = milligrams per Liter; **ug/L** = micrograms per Liter; **---** = Currently no standard for this constituent; **[b]** = High concentrations of sulfate may restrict calcium uptake by crops; **[c]** = Varies with crop, generally dissolved solids should be less than 2,000 mg/L (equivalent to specific conductance of about 2,000 to 3,000 micromhos/cm); **[d]** = Dependent upon other variables such as type of clay in soil and salt content of water. (See SAR); **[mcl]** = U.S. Environmental Protection Agency maximum contaminant level or action level: revised October 13, 1999; **[smcl]** = U.S. Environmental Protection Agency maximum contaminant level or action level: revised October 13, 1999. This standard is based on aesthetic quality of water (i.e. odor, color, etc.) and is not a health standard.

Appendix IV

Mine Location Data

MBMG ID# - MBMG Abandoned/Inactive database identification number.

Latitude and Longitude - reported in decimal degrees, datum is NAD27. Latitude and longitude for sites visited by MBMG staff were determined with Trimble Geoexplorer III GPS units. For sites that MGMG staff did not visit, the latitude and longitude data is either from the USBM MILS database (and has not been verified) or corrected by MBMG staff according to the description of the site in literature.

Ownership - N = National Forest, P = Private, S = State, M = mixed private/public or unknown ownership because of inaccurate location.

MBMG ID#	SITE NAME	LATITUDE	LONGITUDE	TOWNSHIP	RANGE	SECTION	TRACT	USGS TOPOGRAPHIC MAP	VISIT	OWNERSHIP	RANGER DISTRICT
RA007295	Ace Mine	45.5322	-114.3411	03S	22W	32		Alta	N	N	West Fork
RA007481	Airedale Prospect	46.0247	-113.6881	03N	17W	11	BCCD	Whetstone Ridge	N	N	Sula
RA002240	Ambrose Creek	46.5425	-113.9144	09N	18W	18		Grayhorse Creek	N	M	Stevensville
RA007174	Art L. Wildey	45.8658	-113.7789	01N	18W	1		Schultz Saddle	N	N	Sula
RA007180	Bass Creek Sillimanite	46.5808	-114.2033	10N	21W	35		Saint Mary Peak	N	N	Stevensville
RA009111	Beaver Creek Adit	45.5125	-114.3917	04S	23			Horse Creek Pass	Y	N	West Fork
RA007207	Beaver Creek Columbite Deposit	45.5164	-114.3275	04S	22W	4		Alta	N	N	West Fork
RA000649	Bertie Lord Creek	45.9128	-113.7847	02N	18W	24		Jennings Camp Creek	N	N	Sula
RA008374	Big Creek	46.4606	-114.1708	08N	21W	12	C	Victor	N	P	Stevensville
RA002180	Bitterroot Valley Stone Quarry	46.1103	-114.2575	04N	21W	7		Como Peaks	N	N	Darby
RA006922	Blue Joint Placer	45.6482	-114.4854	02S	23W	19		Bare Cone	N	N	West Fork
RA002078	Blue Nose Mine	45.4627	-114.3463	04S	22W	29		Shoup	Y	N	West Fork
RA002438	Broken File Prospect	45.8786	-113.9789	02N	19W	32		French Basin	N	S	Sula
RA007192	BTM Iron Claims	46.6419	-113.8208	10N	18W	11	A	Elk Mountain	N	N	Stevensville
RA007108	Bugle	45.8594	-113.7744	01N	18W	1		Schultz Saddle	N	N	Sula
RA002294	Cameron Creek Placer	45.9078	-113.9569	02N	19W	21		French Basin	N	P	Sula
RA006928	Chicago Placer	45.5936	-114.3208	02S	22W	9		Alta	N	M	West Fork
RA002366	Claremont	46.4839	-113.9125	08N	19W	1		Corley Gulch	N	P	Stevensville
RA007156	Clay Pit	45.7092	-114.2783	01S	22W	35		Painted Rocks Lake	Y	M	West Fork
RA007159	Clay Pit	45.6781	-114.2994	02S	22W	10		Painted Rocks Lake	Y	S	West Fork
RA007165	Clay Pit	45.7414	-114.2847	01S	22W	23		Painted Rocks Lake	Y	N	West Fork
RA002354	Cleveland	46.615	-113.8206	10N	18W	23	ACAB	Cleveland Mountain	Y	N	Stevensville
RA002991	Cleveland Spring Prospect	46.6186	-113.8181	10N	18W	23	A	Cleveland Mountain	Y	N	Stevensville
RA002981	Cleveland Summit Prospect	46.6203	-113.8119	10N	18W	13	C	Cleveland Mountain	Y	N	Stevensville
RA002420	Cliff / Clifft /Silver Dollar Group	46.5944	-114.2519	10N	21W	28		Saint Joseph Peak	N	N	Stevensville
RA002390	Columbite	45.5047	-114.3219	04S	22W	9		Alta	N	N	West Fork
RA002030	Copper Canyon Mine / Cooper Canyon	45.5592	-114.3361	03S	22W	20		Alta	N	N	West Fork
RA002396	Copper Queen	46.5423	-114.3157	03S	22W	28		Alta	Y	N	West Fork
RA007297	Crandall Creek / Chrandall Creek	45.5878	-114.2317	03S	21W	7		Henderson Ridge	N	M	West Fork
RA002174	Crystal Mountain Fluorite	46.0056	-113.8867	03N	18W	18	C	Bald Top Mountain	Y	M	Darby
RA002204	Curlew	46.4553	-114.1842	08N	21W	14	AB	Victor	N	P	Stevensville
RA000159	Daly Creek Prospects	46.1981	-113.87	05N	18W	8	D	Skalkaho Pass	Y	N	Darby
RA002096	Dark Star Group / Sheep Creek Adits	45.5183	-114.2997	04S	22W	3		Alta	Y	N	West Fork
RA002060	Dominic Group Antimony	46.3197	-113.9331	07N	19W	35		Willow Mountain	N	N	Stevensville
RA002066	Eagle Rock Mining Co.	46.1939	-113.9375	05N	19W	14		Gird Point	N	N	Darby
RA001096	Echo Gulch	45.9058	-113.7458	02N	17W	15		Lick Creek	N	M	Sula
RA007289	Florence	46.3303	-113.9519	07N	19W	26		Willow Mountain	Y	N	Stevensville

MBMG ID#	SITE NAME	LATITUDE	LONGITUDE	TOWNSHIP	RANGE	SECTION	TRACT	USGS TOPOGRAPHIC MAP	VISIT	OWNERSHIP	RANGER DISTRICT
RA002198	Gallogly Hot Spring / Medicine	45.7497	-113.9394	01S	19W	15	BCCC	Lost Trail Pass	N	N	Sula
RA007222	Gird's Creek Vermiculite	46.2158	-113.9225	05N	19W	1		Gird Point	N	N	Darby
RA006961	Gold Creek	46.3189	-113.9022	07N	19W	36		Willow Mountain	N	N	Stevensville
RA002426	Gold Leaf (Duplicate (?)Of Sec. 14)	46.0147	-113.7428	03N	17W	17	BADA	Whetstone Ridge	Y	N	Sula
RA007183	Green Goose & Sunset / Molly Hogen	46.0861	-113.7772	04N	18W	24		Kent Peak	N	N	Darby
RA000916	Guide Creek	45.8903	-113.8472	02N	18W	28		Jennings Camp Creek	N	N	Sula
RA000336	Hart Creek	45.9389	-113.9483	02N	19W	10		French Basin	N	S	Sula
RA007090	Hidden Lake Tungsten	45.9369	-113.5322	02N	15W	7	CBBD	Kelly Lake	N	N	Sula
RA002210	Highland Mine	45.6764	-114.2389	02S	21W	7		Piquett Mountain	N	N	West Fork
RA007263	High-level Placers (Hughes Creek) 1	45.6056	-114.2439	03S	21W	6		Henderson Ridge	N	N	West Fork
RA007261	High-level Placers (Hughes Creek) 2	45.6125	-114.1544	02S	21W	35		Henderson Ridge	N	N	West Fork
RA007258	Hughes Creek Placer	45.6181	-114.1272	02S	21W	36		Henderson Ridge	N	M	West Fork
RA002216	Hughes Gulch Placer	45.6031	-114.1514	03S	21W	2		Henderson Ridge	Y	P	West Fork
RA006937	Hughs Creek Placer	45.6142	-114.1967	03S	21W	33		Henderson Ridge	N	N	West Fork
RA002372	Iron Cap	46.51	-113.9128	09N	18W	30		Grayhorse Creek	N	S	Stevensville
RA000173	J & I Group	45.5228	-114.3281	4S	22W	4	B	Alta	N	N	West Fork
RA007117	Jackie Mine	45.5175	-114.2792	04S	22W	2		Alta	N	N	West Fork
RA000908	Jennings Camp Creek	45.8953	-113.8322	02N	18W	27		Jennings Camp Creek	N	N	Sula
RA000178	Jew Mountain Prospect	45.6811	-114.2236	02S	21W	7		Piquett Mountain	Y	N	West Fork
RA002222	Larrigon Mine	45.6161	-114.1764	02S	21W	34		Henderson Ridge	Y	N	West Fork
RA006901	Last Chance	45.6286	-114.3017	02S	22W	27		Painted Rocks Lake	N	M	West Fork
RA006934	LBJ, PIC and PERe Groups	45.6767	-114.3411	02S	22W	8		Painted Rocks Lake	N	N	West Fork
RA007299	Little Joe Prospect	45.7789	-114.3989	01S	23W	2		Mount Jerusalem	N	N	West Fork
RA002000	Logger (Bugle Ridge) Group	45.865	-113.77	01N	17W	6	CBBD	Schultz Saddle	N	N	Sula
RA007135	Logger No. 1 Claim	45.865	-113.77	01N	17W	6		Schultz Saddle	Y	N	Sula
RA002282	Lost Horse Creek	46.0997	-114.2539	04N	21W	18		Como Peaks	N	N	Darby
RA007162	Lucky Joe Mine	45.5956	-114.3133	03S	22W	9		Alta	N	P	West Fork
RA003001	Lucky Star Claim	46.6086	-113.8203	10N	18W	23	D	Cleveland Mountain	Y	N	Stevensville
RA007171	Lucky Strike	45.9103	-113.8753	02N	18W	19		French Basin	N	N	Sula
RA007120	Lucky Strike Shaft	46.5674	-114.3272	03S	22W	21		Alta	Y	N	West Fork
RA002378	Lumberjack Group - Crystal Mountain	46.0128	-113.88	03N	18W	18		Bald Top Mountain	N	M	Darby
RA008065	Lutz Mine Clu / Gold Leaf	46.0075	-113.6767	03N	17W	14	DBCA	Whetstone Ridge	Y	P	Sula
RA000332	Lyman Creek	45.9164	-113.9356	02N	19W	14		French Basin	N	M	Sula
RA002072	Marion Mine Nos. 1,2,3,4,5	45.3317	-113.9256	07N	19W	25		Willow Mountain	Y	N	Stevensville
RA001535	Martin Creek	45.9342	-113.7236	02N	17W	9		Lick Creek	N	N	Sula
RA002432	Mayflower Prospect	46.0256	-113.6894	03N	17W	10	ADDA	Whetstone Ridge	N	N	Sula
RA000597	Meadow Creek	45.9036	-113.7756	02N	18W	24		Jennings Camp Creek	N	N	Sula

MBMG ID#	SITE NAME	LATITUDE	LONGITUDE	TOWNSHIP	RANGE	SECTION	TRACT	USGS TOPOGRAPHIC MAP	VISIT	OWNERSHIP	RANGER DISTRICT
RA007267	Miller Mine	46.5081	-113.93	09N	19W	25		Grayhorse Creek	N	P	Stevensville
RA002006	Molly 1, 2, 3, 4 and 5 Mine	46.1867	-113.8378	05N	18W	15		Skalkaho Pass	Y	N	Darby
RA008064	Montana Prince Mine and Mill	46.0139	-113.6819	03N	17W	14	BACD	Whetstone Ridge	Y	M	Sula
RA007198	Montana Star Mine	45.6883	-114.2217	02S	21W	5		Piquett Mountain	N	N	West Fork
RA001343	Moose Creek	45.9397	-113.7158	02N	17W	9		Lick Creek	N	N	Sula
RA007195	Murry Grant Claims	45.5217	-114.3228	04S	22W	4		Alta	N	N	West Fork
RA001338	Needle Creek	45.9222	-113.7089	02N	17W	15		Lick Creek	N	M	Sula
RA007186	New Discovery	46.4933	-113.8892	09N	18W	32		Corley Gulch	N	N	Stevensville
RA007189	Nez Pearce #1 / Thunderhead?	45.7328	-114.4183	01S	23W	22		Bare Cone	N	N	West Fork
RA006913	One Horse	46.6417	-114.175	10N	21W	12		Carlton Lake	Y	N	Stevensville
RA007301	Ore Finder Group	46.3569	-114.2183	07N	21W	4		Victor	N	P	Stevensville
RA000250	Overwich Creek Adits	45.6469	-114.2497	02S	22W	24		Piquett Mountain	N	N	West Fork
RA007168	Pine Tree	46.1611	-113.9561	05N	19W	27		Gird Point	N	N	Darby
RA002456	Placer	45.62	-114.155	02S	21W	35		Henderson Ridge	N	N	West Fork
RA007126	Placer Mine	46.6008	-113.8583	10N	18W	28		Cleveland Mountain	Y	S	Stevensville
RA007129	Placer Mine	46.6011	-113.845	10N	18W	27		Cleveland Mountain	Y	N	Stevensville
RA007204	Puff Ball No. 1-17	45.5314	-114.3144	03S	22W	33		Alta	N	N	West Fork
RA002384	Retirement Claims	46.0128	-113.8694	03N	18W	17		Kent Peak	N	M	Darby
RA007084	Rocky Point No. 5	45.5619	-114.3603	03S	22W	19		Alta	N	N	West Fork
RA007096	Sargent Ranch	46.1461	-114.0806	05N	20W	34		Mountain House	N	M	Darby
MI002622	Schroeder	46.6972	-114.1386	11N	20W	20		Carlton Lake	N	M	Stevensville
RA002312	Sheep Creek Columbite Deposits	45.5192	-114.3167	04S	22W	4		Alta	N	N	West Fork
RA002444	Shook	45.5619	-114.3433	03S	22W	20		Alta	N	N	West Fork
RA007099	Skalkaho Vermiculite Deposit	46.2503	-113.785	06N	18W	25		Burnt Fork Lake	Y	N	Darby
RA002018	Slate Creek Prospect	45.6884	-114.2213	02S	21W	6		Piquett Mountain	Y	N	West Fork
RA007093	Sleeping Child	46.04	-113.8369	03N	18W	4		Kent Peak	N	M	Darby
RA007303	Sleeping Child (a)	46.0114	-113.8389	03N	18W	16		Kent Peak	N	N	Sula
RA007305	Sleeping Child (b)	45.9642	-113.8156	03N	18W	34		Jennings Camp Creek	N	N	Sula
RA002186	Sleeping Child Hot Springs	46.1064	-114.0047	04N	19W	7		Deer Mountain	N	P	Darby
RA002042	Smith Mine	46.4553	-114.1792	08N	21W	14		Victor	N	M	Stevensville
RA009112	Smuggler's Union (Anna Belle)	46.6483	-113.9428	10N	19W	2		Davis Point	N	M	Stevensville
RA007132	Stansbury Vermiculite - Unnamed	46.2575	-113.91	06N	19W	24		Willow Mountain	Y	N	Darby
RA007252	Star	45.9286	-114.2958	02N	22W	14		Trapper Peak	N	N	Darby
RA008304	Star / Gold Talc / Brickley's Mine	45.6546	-114.2781	02S	22W	23	A	Painted Rocks Lake	Y	N	West Fork
RA002360	Starr	46.4958	-114.3153	09N	22W	36		Gash Point	N	N	Stevensville
RA007153	Taylor Creek Mine - Open Pit	45.6164	-114.1786	02S	21W	34		Henderson Ridge	Y	N	West Fork

MBMG ID#	SITE NAME	LATITUDE	LONGITUDE	TOWNSHIP	RANGE	SECTION	TRACT	USGS TOPOGRAPHIC MAP	VISIT	OWNERSHIP	RANGER DISTRICT
RA007150	Tirebiter #5 & #6	45.4994	-114.2944	04S	22W	10		Shoup	N	N	West Fork
RA001994	Titanium Occurrence	45.5161	-114.3231	04S	22W	4		Alta	N	N	West Fork
RA007138	Titanium Occurrence	45.5097	-114.3503	04S	22W	8		Alta	N	N	West Fork
RA007273	Titanium Occurrence	45.5625	-114.4531	03S	23W	21		Horse Creek Pass	N	N	West Fork
RA007293	Titanium Occurrence	45.5275	-114.3611	03S	22W	31		Alta	N	N	West Fork
RA006919	Trapper Ck Claims	45.9167	-114.2589	02N	21W	19		Trapper Peak	Y	N	Darby
RA000324	Two Bear Creek	46.1119	-114.0078	04N	19W	7		Deer Mountain	N	N	Darby
RA002342	Unnamed Carbonate Bands	45.5003	-114.2939	04S	22W	10		Alta	N	N	West Fork
RA007141	Unnamed Location	46.1839	-113.8433	05N	18W	16		Skalkaho Pass	N	N	Darby
RA007277	Unnamed Location	45.9139	-114.1875	02N	21W	22		Burnt Ridge	Y	N	Darby
RA007087	Unnamed Location	46.4808	-113.8956	08N	18W	6		Corley Gulch	N	N	Stevensville
RA007279	Unnamed Location	46.5953	-114.2456	10N	21W	28		Saint Mary Peak	N	N	Stevensville
RA002450	Unnamed Location	45.6625	-114.1758	02S	21W	15		Piquett Mountain	N	N	West Fork
RA007147	Unnamed Location	45.5036	-114.3	04S	22W	10		Alta	N	N	West Fork
RA007271	Unnamed Location	45.5608	-114.3414	03S	22W	20		Alta	N	N	West Fork
RA007287	Unnamed Location	45.5175	-114.3208	04S	22W	4		Alta	N	N	West Fork
RA007291	Unnamed Location	45.7067	-114.1764	01S	21W	34		Piquett Mountain	N	N	West Fork
RA007970	Unnamed Prospect	46.0028	-113.6706	03N	17W	14	DDDC	Whetstone Ridge	N	N	Sula
RA007971	Unnamed Prospect	46.0022	-113.6681	03N	17W	24	BBBB	Whetstone Ridge	N	M	Sula
RA002462	Unnamed Sample Location	45.5067	-114.3225	04S	22W	9		Alta	N	N	West Fork
RA002192	Unnamed Warm Springs	45.7069	-114.3608	01S	22W	31		Painted Rocks Lake	N	N	West Fork
RA002402	Vermiculite - St Clair Creek Pros.	46.2617	-113.8867	06N	18W	20		Willow Mountain	Y	N	Darby
RA002090	Violet Group	45.4728	-114.3	04S	22W	22		Shoup	N	N	West Fork
RA007265	W Fork-bitterroot River	45.5461	-114.2583	03S	22W	25		Alta	N	N	West Fork
RA007255	Washington	45.8853	-114.1861	02S	21W	34		Piquett Mountain	Y	N	West Fork
RA006907	Watchtower 1-9	45.7556	-114.425	01S	23W	10		Mount Jerusalem	Y	N	West Fork
MI005555	Whaley Big Vein / Blue Racer,	46.6856	-113.9867	11N	19W	28		Davis Point	N	P	Stevensville
RA002012	Whipperwill Mine	46.4506	-114.2275	08N	21W	16		Victor	N	P	Stevensville
RA002102	White Cloud	46.6528	-113.935	10N	19W	1		Davis Point	N	P	Stevensville
RA007102	Wild Maple	46.6389	-114.1406	10N	20W	8		Carlton Lake	N	M	Stevensville
RA009110	Wind Dancer / Windy Dancer	45.7322	-113.9506	01S	19W	21	DBCD	Lost Trail Pass	Y	N	Sula
RA006916	Windyridge	45.8172	-114.5278	01N	23W	24		Watchtower Peak	N	N	West Fork
RA007281	Woods Creek Barite No. 1	45.5692	-114.4331	03S	23W	16		Horse Creek Pass	N	N	West Fork
RA002084	Woods Creek Copper Mine	45.5689	-114.3331	03S	22W	17		Alta	Y	N	West Fork
RA002324	Woods Creek Iron Deposit	45.5728	-114.3333	03S	22W	17		Alta	N	N	West Fork
RA001988	Woods Creek Iron Mine	45.5594	-114.3511	03S	22W	20		Alta	N	N	West Fork
RA007307	Woodtick No.1	45.6625	-114.1969	02S	21W	16		Piquett Mountain	N	N	West Fork