OPEN-FILE REPORT 03-14

History, Geology, and Environmental Setting of Selected Mines in the Upper Alamosa River Basin, Rio Grande National Forest, Conejos and Rio Grande Counties, Colorado

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FOREWORD

Open-File Report 03-14 describes the history, geology, and environmental setting of several mines in the upper Alamosa River drainage basin. All of the sites lie at least partly on U.S. Forest Service-administered land. The sites were selected by the U.S. Forest Service based on the results of an abandoned mine inventory recently completed by the Colorado Geological Survey. This information is useful for State and Federal agencies and private owners for developing realistic and cost-effective reclamation plans for mines in the upper Alamosa River watershed.

Funding for this project was provided mostly by the U.S. Forest Service (Agreement No. 1102-0007-98-035). Partial funding came through the Water Quality Data program of the Colorado Geological Survey from the Colorado Department of Natural Resources Severance Tax Operational Fund. Severance taxes are derived from the production of gas, oil, coal, and minerals.

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LIST OF ABBREVIATIONS AND SYMBOLS

~	approximate or approximately
bk.	book
cm	centimeter(s)
CBM	Colorado Bureau of Mines
CDMG	Colorado Department of Minerals and Geology
CDPHE	Colorado Department of Public Health and Environment
cfs	cubic feet per second
CGS	Colorado Geological Survey
°	degrees
DO	dissolved oxygen
$	U.S. dollars
EDR	Environmental Degradation Rating
EPA	Environmental Protection Agency
FR	Forest Road
ft	feet
4WD	four-wheel drive
gpm	gallons per minute
>	greater than
<	less than
≤	less than or equal to
µg/L	micrograms per liter
µ	microns
µS/cm	microSiemens per centimeter
mg/L	milligrams per liter
NFS	National Forest System
n/a	not applicable or not analyzed
no. or No.	number
#	number
p.	page(s)
ppm	parts per million
%	percent
lb	pound(s)
PBS	Primary Base Series
sq. ft.	square feet
trec	total recoverable
oz	troy ounce(s)
U.S.	United States
USFS	United States Forest Service - Department of Agriculture
BLM	Bureau of Land Management - United States Department of Interior

INTRODUCTION

During the summer of 1993, the Colorado Geological Survey (CGS) inventoried mines in the upper Alamosa River basin of the Conejos Peak Ranger District, Rio Grande National Forest (Figure 1, Appendix). This project was part of an eight-year, statewide inventory of abandoned mines on National Forest System (NFS) lands in Colorado. Not all of the mines were on (NFS) lands; in some instances the forest boundary or mine locations were incorrectly located on Primary Base Series (PBS) maps. Some mines on private land close to NFS lands were inventoried, as were mines that potentially impacted NFS lands.

In 1998 and 1999, the Forest Service requested more detailed studies on selected mines in five inventory areas in the upper Alamosa River drainage basin (Figure 2). All of the selected mines had received Environmental Degradation Ratings (EDRs) of 3 (potentially significant) or worse from CGS. This study presents the results of the additional investigation (field work or historic records searches) requested on mines in the upper Alamosa River watershed.

Many of the smaller mines in the upper Alamosa River watershed were worked in the late 1800's and early 1900's. Some of the mines may have shipped very small quantities of ore, if any. Very little historical information was available regarding these mines. Without a formal mine or claim name, historical research is difficult. Defining geographical locations of mining claims from older county records can be difficult or impossible. Mining district or mining camp names vary depending on the reference source and time period. Some of the district or camp names used in the upper Alamosa River include Summitville, Jasper, Stunner, Decatur, and Gilmore.

METHODS OF INVESTIGATION

An explanation of some general methods used in the initial inventory will be helpful in understanding some of the text and figures that follow. During the inventory mines were grouped into inventory areas based primarily on geography and ease of inventory for the field geologist. These take the form of outlined "polygons" on inventory maps. The ID numbers for these inventory areas have the form ###-####-# and are keyed to general UTM coordinates. Mine openings were designated sequentially with 100-series numbers (100, 101, 102, etc.) within each inventory area. These openings are shown as standard mine symbols. Waste rock dumps are designated with 200-series numbers tied to the mine opening and are not symbolized on the maps unless very large. Water test sites (for pH and specific conductance) are indicated as 300-series numbers and shown as dots, unless they are at a mine or dump feature. The inventory forms for the mine features discussed in this report are included in the appendix. These forms contain the initial specific information collected for the mines of concern that prompted this subsequent, more detailed investigation.

For this investigation, patented claim ownership was determined through the Conejos and Rio Grande County Assessor's records. Assessor's records usually referred to books and pages in the County Recorder's office. In many cases the ownership history could be traced backward in time if the records were complete. In addition, mining claim indices were used to trace ownership from the original claim location forward in time. Frequently gaps in the ownership history could not be filled, especially in cases where the county acquired the property because of delinquent taxes. The Conejos County courthouse burned in the 1980's making some information difficult or impossible to obtain.

Reports by the Director of the Mint (Puckett, 1895, 1896), annual mineral-resources reports by the U.S. Geological Survey, and various newspapers and mining journals provided useful information for some of the mines that were active in the late 1800's and early 1900's, which was the case for most of the mines in this study. Colorado Bureau of Mines (CBM) inspector and mine manager's reports from the early 1900's are also excellent sources for historical information. U.S. Bureau of Mines annual mineral resources reports documents activity from about 1924 onward. Most of the later reports primarily focus on producing mines.

Discrepancies frequently occurred among county assessor's records, county recorder's records, BLM master title plats, and Forest Service PBS maps. Surveys and/or title searches are essential for some of the mine sites.

Field work for this study included a visit to each site to see if major changes had occurred since the inventory work in 1993 (Kirkham and Lovekin, 1995). Although water samples were collected at some of the sites in 1993, additional tests were taken and samples collected in 2000. In-stream samples were collected from some of the receiving streams in efforts to "bracket" selected mines or groups of mines and better quantify impacts to the watersheds. In addition, many of the waste-rock piles with EDRs of 3 or worse were sampled on a grid pattern to assess their potential environmental effects. Mineral Lab Inc. analyzed the waste-rock samples for numerous metallic elements and sulfate using x-ray fluorescence. Hazen Research, Inc. analyzed the waste-rock samples for potential acidity and paste pH.

At water sample sites, filtered (0.45 µ) and unfiltered water samples were collected for laboratory analyses. Depending on a variety of factors, including weather, time of day, distance from the vehicle, etc., subsampling into the filtered and raw bottles was done on site, at the vehicle, or indoors. Samples and/or subsamples were refrigerated until delivery to the lab.

Water samples were analyzed at the Colorado Department of Health Laboratory for total recoverable (unfiltered or raw) and dissolved (filtered) constituents. Analytical results are compared to standards established by the State Water Quality Control Commission. The tables in this report will show the most stringent of the domestic-water-supply, aquatic-life, or agricultural standards. Most domestic-water-supply standards are based on total recoverable metals, whereas most aquatic-life standards are based on dissolved ion concentrations and are calculated as a function of the water's hardness. Water quality standards for aquatic life are generally more stringent than the drinking water standards. Iron is an important exception. The aquatic life standard for total recoverable iron is 1,000 µg/L, but CGS has chosen to use the more stringent secondary drinking-water standard of 300 µg/L as a basis for comparison in this report.

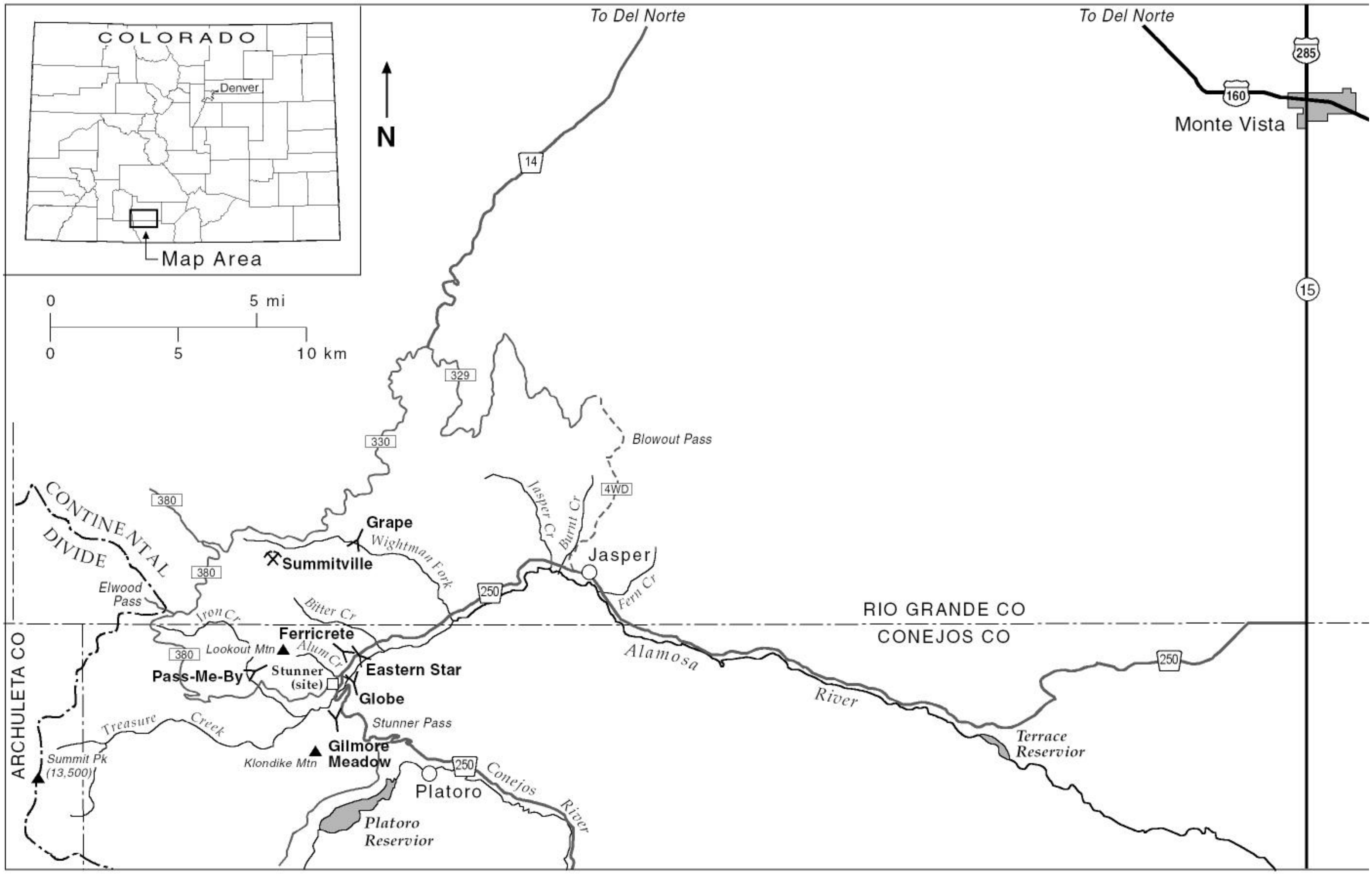


Figure 1. Index map of the upper Alamosa River basin.

Figure 2. PBS map of inventory areas and mine features in the upper Alamosa River basin. Scale is approximate; inventory area (polygon) ID numbers have the form ###-####-# and are keyed to general UTM coordinates; numbered mine openings (100-series numbers, shown as standard mine symbols), waste rock (200-series numbers), water test sites (300-series numbers, shown as dots if not at mine openings or dumps) are keyed to inventory forms in appendix; shaded areas represent patented mining claims.

LOCATION AND GEOGRAPHIC SETTING

The upper Alamosa River drainage basin is in northwestern Conejos and southwestern Rio Grande Counties. Only the Grape Mine evaluated for this study is in Rio Grande County; the other four are in Conejos County. Monte Vista, Colorado is about 35 miles by road northeast of the area. Access is via Forest Road 250, a primary NFS road that branches off State Highway 15 about 12 miles south of Monte Vista. Jasper, located approximately 5 miles east of the Grape Mine, is the site of the nearest seasonal residents (Figure 1). Secondary Forest Service roads, mine roads, and trails from Forest Road 250 access most of the mines. Elevations of the mines studied range from 9,700 to 10,600 feet above sea level.

GEOLOGIC SETTING

The upper Alamosa River lies in the southeastern part of the San Juan volcanic field that covers much of southwestern Colorado (Figure 3). Steven and Ratté (1960) report that the San Juan Mountains in the vicinity of the Summitville district consist almost entirely of volcanic rocks and related shallow intrusive rocks of middle or late Tertiary age; the only exceptions are surficial deposits derived from the volcanic bedrock. The oldest rocks exposed in the area belong to the Potosi volcanic series, which constitutes the bulk of the central and eastern San Juan Mountains. These rocks are separated by an erosional unconformity from the overlying Fisher quartz latite. The youngest rocks exposed in the area are remnants of the Hinsdale Formation, which forms volcanic necks or lava flows that rest unconformably upon an erosional surface across the Potosi and Fisher rocks. The Conejos Formation forms the base of the Potosi volcanic series, and is the most widespread sequence of rocks in the Summitville region. It consists mainly of a thick succession of gently dipping, uniformly textured flows, with an estimated thickness exceeding 3,000 feet (Steven and Ratté, 1960). The Conejos Formation near Summitville is cut by two intrusive bodies of diorite and quartz monzonite composition, also believed to be of Conejos age (Cross and Larsen, 1935, as cited by Steven and Ratté, 1960).

Erosion has dominated the Summitville area since the Hinsdale eruptions and has resulted in a deeply dissected mountainous terrain (Steven and Ratté, 1960). Glacial erosion has modified many of the higher peaks as well as the main stream valleys, and morainal deposits are widespread throughout the area.

The San Juan Volcanic Field began forming about 35 to 40 million years ago during the eruption of large volumes of lava from cone-shaped stratovolcanoes, which consist of alternating layers of lava, ash, or other pyroclastic material (Steven and Lipman, 1976). Many of the volcanic features and flows associated with this early phase of volcanism have been eroded or covered with later flows. About 30 million years ago, another period of volcanism began. These lava and ash flows were lighter in color due to greater silica content, and the volcanic activity became more explosive. After the ash and lava eruptions, the subsurface magma chambers collapsed to form calderas. The calderas are usually somewhat circular in shape and are 5 to 20 miles in diameter. At least 15 calderas are well documented in the San Juan Mountains. Many of these calderas formed within larger, slightly older calderas. These “nested ”calderas are usually highly fractured because of multiple episodes of resurgence and collapse (Steven and Lipman, 1976).

The nested Platoro and Summitville calderas are the dominant geologic features in the upper Alamosa River drainage basin. The Platoro Caldera began forming about 30 million years ago and is one of the oldest of the San Juan Volcanic Field (Steven and Lipman, 1976). Pre-caldera stratovolcanoes were deeply eroded, and the terrain was relatively flat when eruption of large volumes of silicic ash flows (Treasure Mountain Tuff) began. Subsequent collapse of the magma chamber formed the Platoro Caldera. This caldera had at least one period of resurgence, when the magma chamber was partly refilled with lava and formed a dome within the caldera (Steven and Lipman, 1976).

Between 29 and 30 million years ago, eruption of additional ash flows from within the Platoro Caldera formed the Summitville Caldera. The Summitville Caldera is nested in the northern part of the Platoro Caldera (Steven and Lipman, 1976).

Multiple episodes of large-scale volcanic activity caused extensive faulting and fracturing, especially near the margins of the calderas. The broken rocks were zones of weakness that served as plumbing and as hosts for later igneous activity and mineralization. At least five post-caldera igneous episodes occurred between 29 and 20 million years ago. Extensive hydrothermal alteration and base- and precious-metal deposits are related to hot, mineralized fluids that were injected into the “plumbing system” in the later stages of some of these post-caldera igneous events (Steven and Lipman, 1976).

The emplacement of various igneous stocks also provided plumbing to channel hydrothermal fluids into the adjacent rock mass. The Alamosa River, Summitville, and Jasper stocks are responsible for mineralization and extensive hydrothermal alteration of rocks in the upper Alamosa River drainage basin (Bove and others, 1995). Intrusion of the Alamosa River stock altered the rocks in the drainage basins of Iron, Alum, and Bitter Creeks, tributaries of the upper Alamosa River upstream of Wightman Fork, and part of the Alamosa River basin itself. Mineral deposits in the Stunner mining district are probably related to the Alamosa River stock. Intrusion of the Jasper stock altered the bedrock in Jasper and Burnt Creeks, tributaries of the Alamosa downstream of Wightman Fork. Mineralization in the Jasper mining district is probably related to this stock. A buried stock beneath South Mountain caused the mineralization and alteration at Summitville (Steven and Ratte, 1960, as cited in Bove and others, 1995). Massive opaline ledges and isolated siliceous sinter deposits overlying all of the altered igneous stocks in the upper Alamosa River basin probably represent hot springs and geysers active during the mineralizing events. The intense alteration associated with these stocks was caused primarily by the release of large volumes of sulfur dioxide and other gases during the igneous activity.

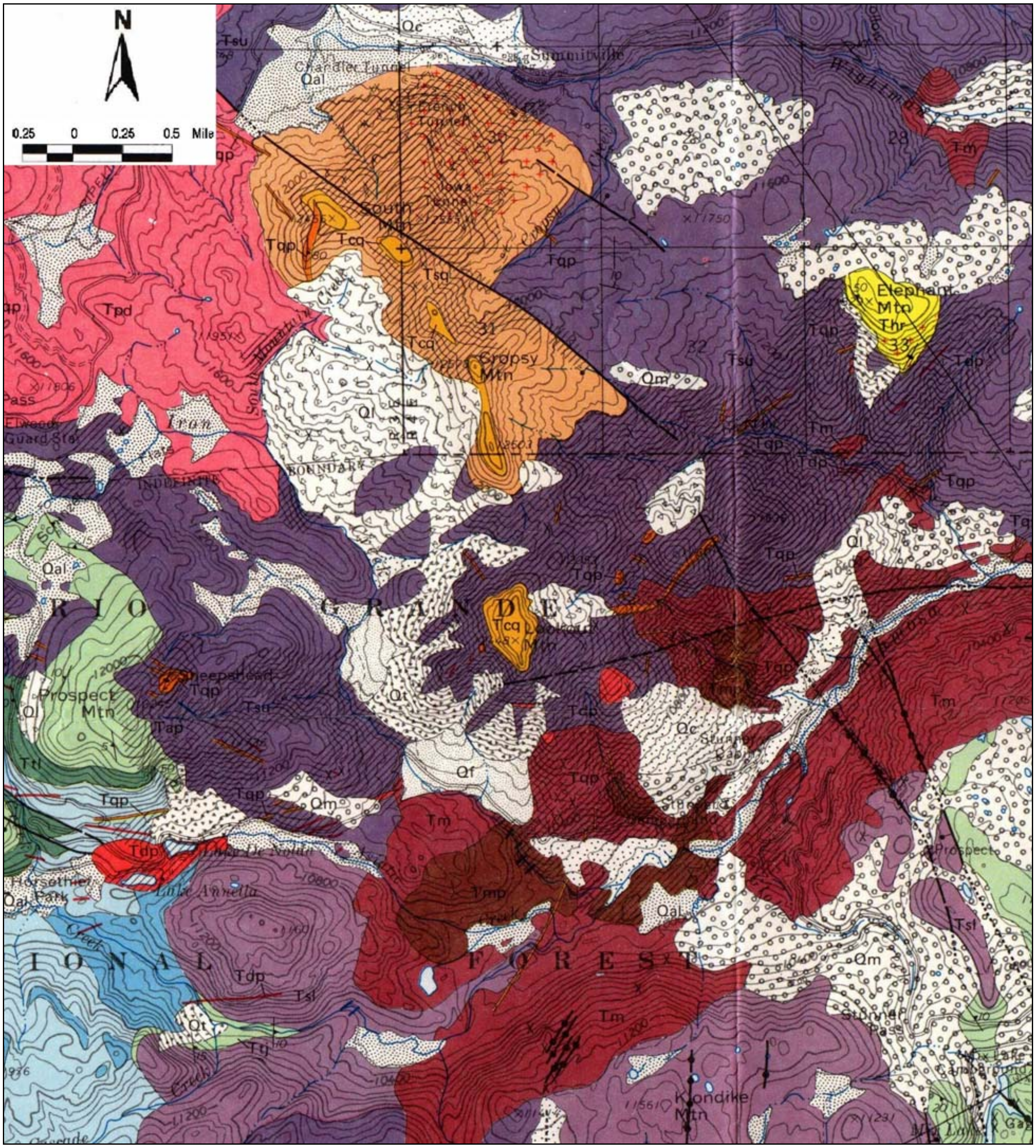


Figure 3. Geologic map of the upper Alamosa River basin (Modified from Lipman, 1974; scale is approximate).

Explanation of geologic map symbols on Figure 3.

Surficial deposits

Qal-alluvium
Qf-alluvial fan
Qc-colluvium
Qt-talus
Ql-landslide
Qm-glacial moraine

Regional Tertiary lavas

Thr-rhyolitic lava & tuffs

Tertiary ash flow sheets

Ttj-La Jara Canyon
Ttl-lower tuff

Tertiary Platoro Caldera lavas

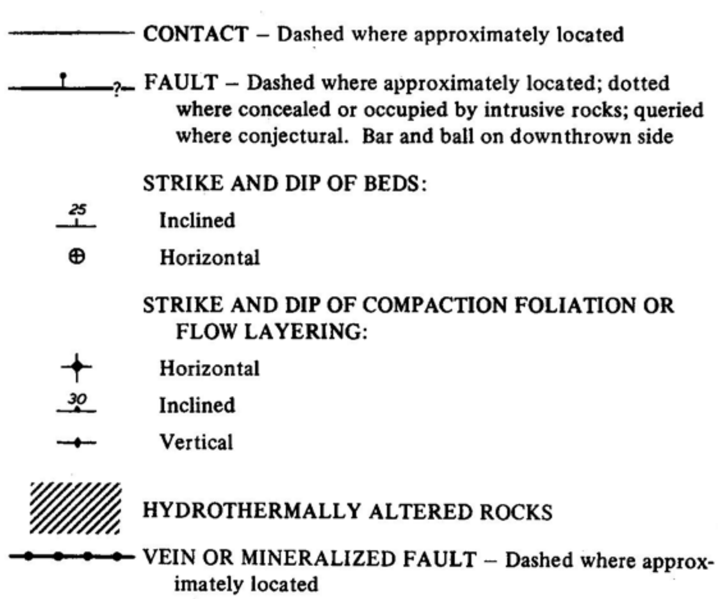
Tcq-Cropsy Mountain rhyolite
Tsq-South Mountain quartz latite
Tpd-Park Creek rhyodacite
Tsu-upper Summitville andesite
Tsl- lower Summitville andesite

Tertiary intrusive rocks

Tqp-quartz latite porphyry
Tdp- rhyodacite porphyry
Tmp-monzonite porphyry
Tm-monzonite

Early intermediate Tertiary rocks

Tcc-volcaniclastic facies
Tcv-vent facies



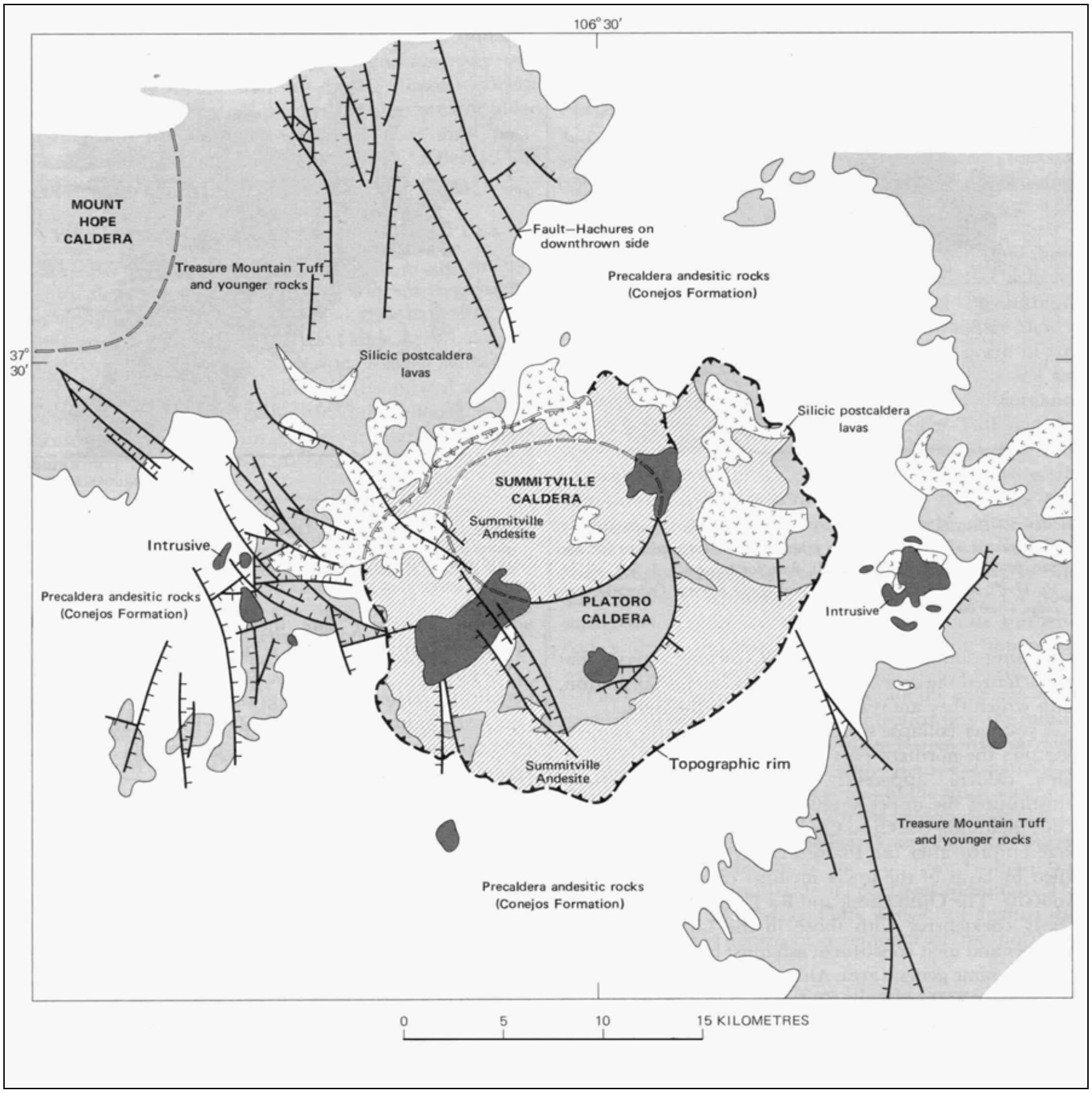


Figure 4. Platoro and Summitville calderas (From Steven and Lipman, 1976. Solid symbol indicates good to moderate control; conjectural shown by open symbol).

Alteration at South Mountain and the emplacement of the Summitville ore body occurred about 23 million years ago (Bove and others, 1995). Alteration occurred just before mineralization when an igneous stock was emplaced about 2,000 feet below the present-day surface. Ore at Summitville was found mostly in the South Mountain lava dome, along the northwestern margin of the Summitville and Platoro Calderas. At Summitville, nearly vertical, northwest trending mineralized veins and lenses in fracture zones cut intensely altered rocks of the lava dome. The mineralized zones have a core of vuggy silica. Ore minerals are richest in these central vuggy silica zones and are also present in lower concentrations in surrounding rocks. Deeper in the system the vuggy silica zones grade into thinner and better defined, steeply dipping quartz veins.

Veins at Summitville are generally short, but one, the Tewksbury vein, is over 1,600 feet long (Steven and Ratte, 1960). Mineralization extended over a vertical range of about 1,000 feet, and ore shoots were up to 30 feet wide. Ore also occurred in vertical pipe-shaped masses and at the intersection of fractures. Because many of the high-grade veins were closely spaced and lower grade disseminated gold occurred close to these veins, open-pit production was selected for the most recent mining efforts.

Most ore mined at Summitville was from the oxidized zone (upper 300 feet), where gold was enriched through weathering processes (Bove and others, 1995). Below the oxidized zone, covellite (copper sulfide), enargite (copper-arsenic sulfosalt), chalcocite (copper sulfide), chalcopyrite (copper-iron sulfide), and gold were the primary ore minerals with lesser amounts of sphalerite (zinc sulfide) and galena (lead sulfide).

The Alamosa River stock is 26 to 29 million years old, slightly older than the stock at Summitville. This stock was intruded in several phases. A late phase called the Alum Creek porphyry, in the northern part of the stock, is the most intensely altered and contains high concentrations of lead, copper, molybdenum, and zinc. Overall, alteration related to the Alamosa River stock was less intense than at Summitville. Pyrite up to 2 percent extends to several hundred feet in depth, but near the surface some has been oxidized and dissolved by rain and snowmelt. This process created acid that leached the host rocks and altered them to a variety of clay minerals. Silica-rich rocks were more resistant to this alteration and are easily recognizable because the soft clay-rich rocks around them have eroded to leave spires. The Alamosa River stock and the associated Stunner mining district have far fewer of the richly mineralized zones of vuggy quartz that are present at Summitville. Quartz, pyrite, gold-silver tellurides, chalcopyrite (copper-iron sulfide), and occasionally tetrahedrite and stibnite (antimony sulfide) occur in veins in the Stunner district. Generally the veins are 2 to 4 feet wide and a few hundred feet long.

Interestingly, early in the 1900s the Gilmore Mine followed a rich gold telluride vein for about 15 feet before it abruptly disappeared (Patton, 1917). Numerous holes excavated nearby failed to find the "lost" vein. In 1913 an examination by CGS geologist Horace Patton revealed that the vein disappeared because the mine was driven in a large block of relatively intact rock within a landslide. The rest of the vein was never found.

The Jasper stock is similar to the Alamosa River stock, but smaller. In the Jasper mining district, gold, sphalerite, galena, and pyrite occur (Patton, 1917) in a few small, widely scattered northwest-trending quartz veins. The Jasper and Stunner mining districts were not economically important, especially when compared to the highly mineralized Summitville district. Because of the presence of pyrite and other acid-generating minerals, all of the altered stocks in the upper Alamosa River basin produce poor-quality water (Bove and others, 1995). The waters are similar in that they are acidic and carry high concentrations of dissolved aluminum and iron. Trace metal concentrations in waters from the less mineralized stocks (Jasper and Alamosa River stocks) vary considerably, but are generally less than the water from Summitville. Water associated with the more mineralized Summitville deposit carries higher concentrations of trace metals such as copper, manganese, and zinc (Walton-Day and others, 1995).

PASS-ME-BY MINE

The Pass-Me-By Mine (adit #100, dump #200) is near the base of Lookout Mountain in the northern part of the "Pass Me By Mine" inventory area #357/4138-4 (Figures 2 & 5). A 4WD road from FR 380 along Iron Creek towards Schinzel Flats provides access to the mine. Stunner town site is about 2½ miles east of the mine. Adit #100 and most of the associated waste-rock pile (#200) appear to be on private property, presumably the Homestake and Youel Lodes. Mine effluent drains onto NFS-administered land and reaches Iron Creek. No production information was recorded, although the U.S. Bureau of Mines MAS/MILS database (1996) listed the Pass-Me-By Mine as a past producer. Any production was probably small.

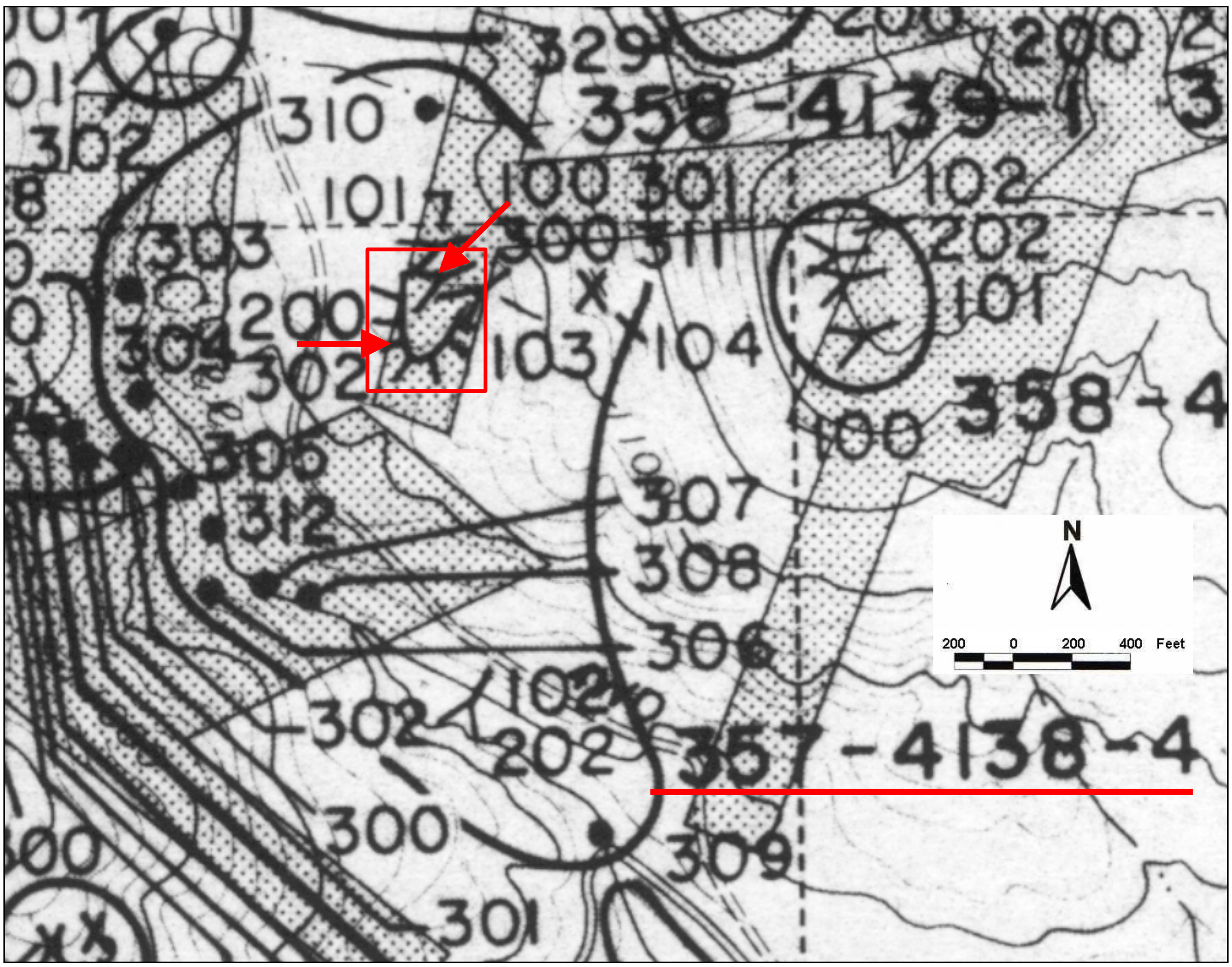


Figure 5. Pass-Me-By Mine inventory area #357-4138-4 [Scale is approximate; numbered mine openings (100-series numbers), waste rock (200-series numbers), water test sites (300-series numbers, shown as dots if not at mine openings or dumps) are keyed to inventory forms in appendix; adit #100 and dump #200 are the Pass-Me-By Mine].

MINING HISTORY

1881. Henry Room and others located the Homestake Lode (bk. C., p. 49; bk. E., p. 449). This could be a different Homestake Lode than the present day claim.

1884. Miners were working prospects on Lookout Mountain. Quartz veins contain disseminated gold similar in appearance to the quartz veins at Summitville, although higher grade (*Rocky Mountain News*, March 25, 1884, p. 2).

1897. Gold was discovered in a vein on the Arla claim (Patton, 1917, p. 104). J.G. Carpenter, U.G. Carpenter, O.P. Carpenter, P.A. Steinback, and M.J. Clark located the Pass-Me-By Lode in June (bk. C., p. 49; bk. E., p. 449; bk. 25, p. 201, 207).

1899. Maynard and others amended the location certificate for the Pass-Me-By Lode (general index bk. for 1878-1899, p. 108; bk. 25, p. 320).

1900. Alamosa Gold Corporation Mining Company performed annual assessment work on the Homestake Lode (bk. B., p. 157; bk. 25, p. 201). This could be different than the present day Homestake Lode. The Alamosa Gold Corporation Mining Company annual mine report (1902, p. 113; 1903, p. 242, Colorado Bureau of Mines-CBM) lists the Homestake Lode with several claims. None of the other claims listed are in the Pass-Me-By claim block.

1901. Pass-Me-By Tunnel, Mining and Milling Company amended the location certificate for the Youel, Homestake, and Pass-Me-By Lodes. Alamosa Gold Corporation Mining Company (C.F. Newcomb-president) did the annual assessment work on the claim block (bk. B., p. 91; bk. C., p. 153; bk. N., p. 111; bk. 48, p. 462, 474).

1902. A full force was employed on the property of the Pass-Me-By Tunnel, Mining, and Milling Company (N.G. Carpenter-president and general manager; O.P. Carpenter-vice president; J.Y. Carpenter-secretary; Samuel H. Morris-treasurer). An eight-drill compressor was in use on the property (*Denver Times*, March 31, 1902, p.9; October 29, p. 12; Wahlgreen, June 1902, p. 110). According to the mine manager (1916 annual report-Pass-Me-By, CBM) the original development work on the Pass-Me-By adit started in 1902.

1903. In September, Mineral Survey No. 15371 was conducted on the Pass-Me-By, Arla, Vivian, Agness, Youel, Starlight, Edna, Daylight, Cleora, Upper Ten, and Homestake Lodes, owned by The Pass-Me-By Tunnel, Mining and Milling Company (Figure 6). Improvements surveyed on the claim block included 16 cuts, 9 tunnels, 2 drifts, and 1 cross cut. Inventory feature #100/200 is most likely the 940-foot-long adit surveyed on the Homestake and Youel Lodes (Mineral Survey No. 15371, BLM files).

1905. The Pass-Me-By Tunnel, Mining and Milling Company received a patent for the Pass-Me-By, Arla, Vivian, Agness, Youel, Starlight, Edna, Daylight, Cleora, Upper Ten, and Homestake Lodes (BLM files).

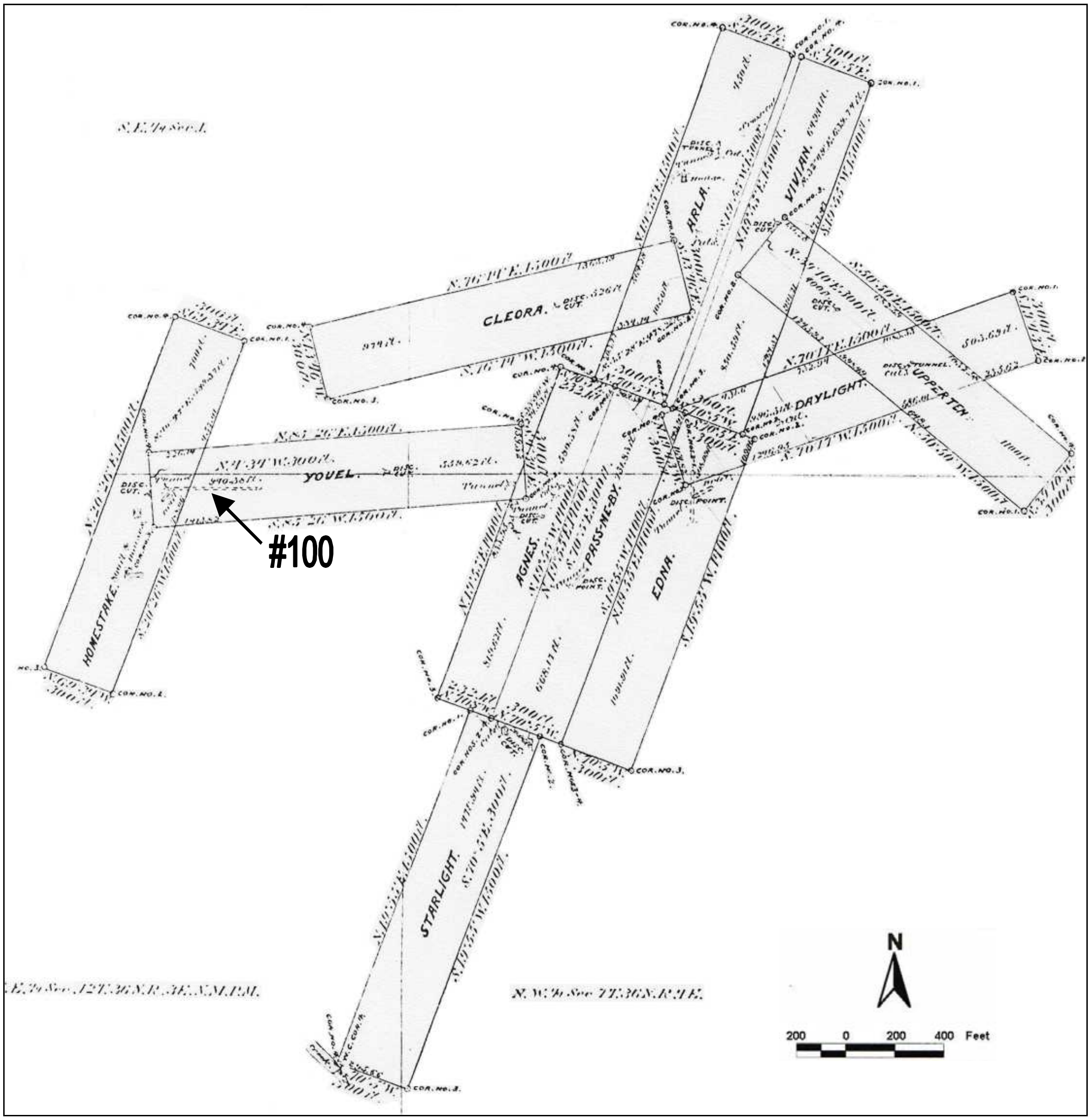


Figure 6. Mineral survey of the Pass-Me-By claim block (Modified; Scale is approximate).

1907. The Pass-Me-By Tunnel, Mining and Milling Company’s 3,725-foot-long adit intersected veins at a depth of 1,800 feet (Naramore, 1908, p. 251).

1912. The Pass-Me-By Tunnel, Mining and Milling Company (U.G. Carpenter-president; J.Y. Carpenter-secretary; M.G. Carpenter-manager) owned and operated the Pass-Me-By claim block. Underground development higher on Lookout Mountain included many short adits (100- to 400-feet-long) and numerous shallow shafts and open cuts. Near the base of Lookout Mountain, a

4,000-foot-long, 7 by 8 ft, double tract tunnel was the most recent underground development. This crosscut tunnel intersected 27 veins. The company estimated that the lowest-grade vein would be profitable if a mill was built. Plans were formulated to construct a 100-ton capacity mill using an amalgamation, concentration, and cyanide-leaching process. The porphyritic quartz veins contained tellurium, sylvanite, and free gold. Assay values averaged $17.00 per ton (1912 mine manager's report-Pass-Me-By, CBM).

1913. The Pass-Me-By Tunnel, Mining, and Milling Company was actively driving the Pass-Me-By adit intended to intersect veins discovered higher on Lookout Mountain. The Arla vein was the most promising and would be intersected at a depth of 600 feet. The 3,600-foot-long adit ran north 85° west for 2,500 feet from the portal, then north 50° west for the remaining 1,100 feet. Mines surveyed in the Platoro-Summitville mining district included the Pass-Me-By Mine (Figure 7) (Patton, 1917, p. 103-104; plate 1).

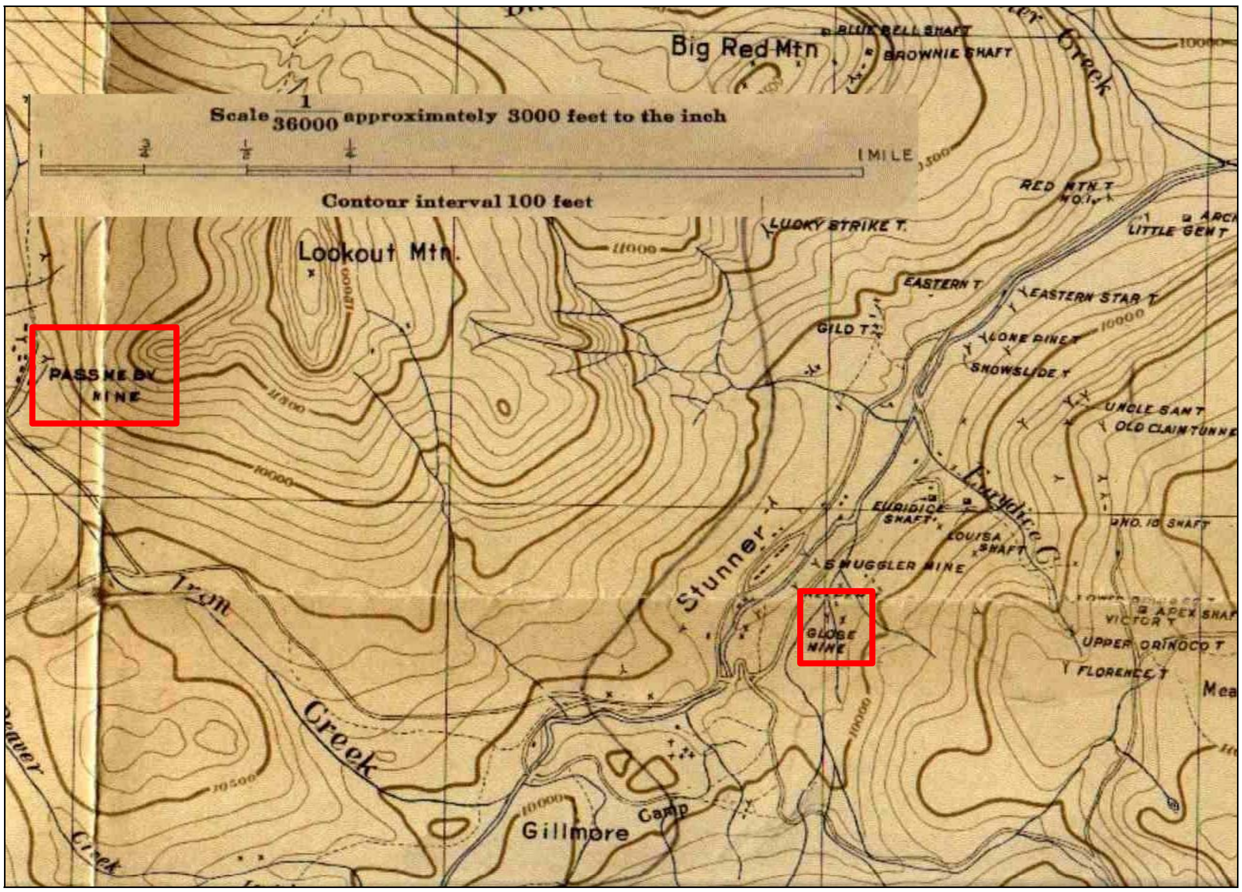


Figure 7. Map of mines surveyed in the Upper Alamosa River area during 1913 (Modified from Patton, 1917, p. 103-104; plate 1; scale is approximate).

1914. The Pass-Me-By Tunnel, Mining and Milling Company owned and operated the Pass-Me-By claim block. Work was concentrated on reopening, re-timbering, and laying pipe and ventilation lines in the 4,000-foot-long tunnel. Surface improvements included a boarding house, bunkhouses, pump buildings, and powerhouse buildings. The gold-bearing ore ranged in value from $4 to $25 per ton (1914 mine manager's report-Pass-Me-By, CBM).

1915. L. Ewing bought the Pass-Me-By claim block (Mineral Survey No. 15371) from the county (bk. 96, p. 376). The Pass-Me-By adit had been closed since 1913 due to bad air. Facilities at the mine included a large bunkhouse, tunnel house, and power plant with a 100-horse-power tubular boiler and Leyner compressor. Effluent contained abundant "ferrous sulphate" and "arsenic" (Patton, 1917, p. 104).

1916. C.J. Ewing (secretary) was the only officer listed for the Pass-Me-By Tunnel, Mining and Milling Company (1916 Mine managers annual report-Pass-Me-By, CBM).

1917. Apparently, the Pass-Me-By Tunnel, Mining and Milling Company failed to pay the annual corporation taxes and went out of business. No work was done on the property during the year. The County sold the property "to satisfy a judgment" (C.J. Ewing note included with 1917 Mine managers annual report-Pass-Me-By, CBM).

1946. Ewing owned surface rights, Rivera owned mineral rights, and Bockhaus owned the timber for the Pass-Me-By claim block (Mineral Survey No. 15371) (bk. 178, p. 457).

1956. Vernon Baker bought the Pass-Me-By claim block (Mineral Survey No. 15371) From Ewing. Rivera kept ½ of the mineral rights for 20 years (bk. 192, p. 338).

1961. Inspiration Development Company, E.A. Maxwell, J.B. Rigg, J.B. Rigg Jr., N.J. Rigg, and J.H. Tippit located a large claim block in the vicinity of the Pass-Me-By Mine (BLM files).

1977. Reynolds Mining Company and Summitville Mining Company located a large claim block in the vicinity of the Pass-Me-By Mine (BLM files).

1986-1987. A.M. Davis and Summitville Consolidated Mining Company located a large claim block in the vicinity of the Pass-Me-By Mine (BLM files).

1991. Last year assessment work was performed on A.M. Davis and Summitville Consolidated Mining Company's claims (BLM files).

2000. Conejos County records listed Walter Baker as the owner of the Pass-Me-By claim block (Mineral Survey No. 15371).

GEOLOGY

The Pass-Me-By Mine (adit #100) was driven in a hydrothermally altered section of the upper member of the Oligocene Summitville Andesite (Figure 3). Associated with the Summitville caldera, the Summitville Andesite consists of mostly aphanitic flows and breccias. Adit #100 trends toward a Miocene quartz latite porphyry dike (Lipman, 1974). Pyrite was only found in the brecciated rock on the dump. During 1912, the Pass-Me-By Mine intersected 27 veins; the lowest-grade vein was considered profitable. Assay values averaged $17.00 per ton. The porphyritic quartz veins contained tellurium, sylvanite, and free gold (1912 mine manager's report-Pass-Me-By, CBM).

SITE DESCRIPTION

The Pass-Me-By Mine and associated features are reached by traveling about 10 miles west of Jasper on FR 250 and FR 380, then heading northwest about ¾ mile on the Schinzel Flats/Iron Creek road to the short mine road. Stunner town site and the junction of FR 250 and FR 380 are about 2½ miles east of the mine. The Pass-Me-By Mine was not examined in detail for this study because it is on private property. A surface map of the mine was not prepared and no samples were collected, however, a sketch map was included on the form (Appendix).

The portal of the Pass-Me-By Mine (adit #100) was caved at the time of the inventory (1993) and during the additional fieldwork in 2000. Water emerges from the collapsed portal about 3 feet above the adit floor (Figure 8). A larger quantity of water flows to the surface about 25 feet from the collapsed portal in a pond formed on the dump bench (Figure 9). Although the source of the water was not determined, it is presumed to be from the mine. The water could be channeled through buried debris or transported through a buried pipe designed to drain the adit. From the bench pond, water flows west away from the dump partly in a channel (Figures 10a and 10b) and eventually enters Iron Creek, about 1,200 feet from the portal (Figure 11). A seep formed at the base of the Pass-Me-By Mine dump (#200) flows intermittently southwest about 1,000 feet to Iron Creek (Figures 12-14). Dead trees and iron-oxide deposits appear along both waterways. These extensive ferricrete/ferrosinter deposits could indicate pre-mining conditions.

The size of the Pass-Me-By Mine dump (#200) is estimated at 12,000 cubic yards. Vegetation is sparse, consisting of mostly spruce trees. Pyrite was only found in the brecciated rock.

Figure 8. Seep from collapsed Pass-Me-By Mine portal (#100).

Figure 9. Effluent pond formed on the Pass-Me-By Mine dump (#200) bench.

a) Effluent flows adjacent to waste-rock (flow from top to bottom of photo).

b) Channelized flowpath below waste-rock pile.

Figure 10. Channelized effluent from the Pass-Me-By Mine.

Figure 11. Pass-Me-By Mine effluent entering Iron Creek.

Figure 12. Seep emerging from base of Pass-Me-By Mine Dump (#200).

Figure 13. Seeps at the base of Pass-Me-By Mine Dump (#200).

Figure 14. Effluent about 100 feet below Pass-Me-By Mine dump (#200).

WASTE AND HAZARD CHARACTERISTICS

The majority of the following information is taken from the USFS Abandoned Mine Land Inventory Project Summary Report for the Rio Grande National Forest – Conejos Peak Ranger District (Kirkham and Lovekin, 1995), much of which was later published in Kirkham and others (1995).

The Pass-Me-By mine is located on private land east of Iron Creek, on the western flank of Lookout Mountain. Included within the site is a draining adit (#100) and a dump (#200) with a seep at its base. The Pass-Me-By adit (#100) is regarded as the most serious environmental hazard in the inventory area. The adit portal has collapsed shut. On August 5, 1993 an estimated 1 gpm of water with a pH of 3.2 and conductivity of 1,410 µS/cm was discharging from the collapse debris about 3 feet above the original portal floor. About 25 feet in front of the collapsed portal, water was surfacing out of dump material beneath the channel, at a measured rate of 27 gpm, including the drainage that issued from the collapse debris. The water surfacing from the dump material had essentially the same pH and conductivity as water issuing from the collapsed debris, and was assumed to be mine drainage that was following a drain tile or pipe along the haul track.

Kirkham and Holm (1989; as cited in Kirkham and Lovekin, 1995) reported total recoverable metal concentrations for water discharging from the Pass-Me-By mine on September 16, 1986 as shown on Table 1. Also shown are data from an August, 1993 sampling event by the USGS (1994; as cited in Kirkham and Lovekin, 1995).

Table 1. Results of chemical analyses for water samples from Pass-Me-By mine portal effluent from 1986 and 1993 sampling events.

Analyte	Concentration (µg/L)		
	16 Sept 1986 (trec)	11 Aug 1993 (trec)	11 Aug 1993 (dissolved; 0.2 µm)
pH	3,200	3,020	3,020
Aluminum	51,200	56,000	59,000
Cadmium	20	n/a	n/a
Chromium	30	n/a	n/a
Cobalt	n/a	110	120
Copper	90	120	80
Iron	151,000	115,000	140,000
Lead	180	n/a	n/a
Manganese	340	330	310
Molybdenum	50	n/a	n/a
Nickel	110	90	100
Zinc	200	190	180

The total concentrations reported by Kirkham and Holm (1989) and by the USGS (1994) are similar for most constituents. Discharge from the Pass-Me-By mine flows down the hillslope across an impressive ferrosinter mound, along which most trees have died, before it enters Iron Creek. The investigator noted red or yellow precipitate in the channel (Appendix).

The waste-rock dump (#200) associated with the Pass-Me-By mine contains an estimated 12,000 yds of material with some pyrite, and has been assigned an EDR of 3. A small seep at the toe of the dump discharged an estimated 0.4 gpm with pH of 2.5 and conductivity of 2,430 µS/cm. The flow infiltrated into the ground a short distance below the dump. A prominent zone of dead trees and a deposit of ferricrete extend below the dump. Local landowners confirmed that the adit drainage was directed to this area in former years. In addition the dump seep may have discharged larger amounts of water during the past, contributing to the ferricrete deposit and soil toxicity. Downstream, just before flowing into Iron Creek, the seep flow increased to an estimated 2 gpm, with pH of 2.71 and conductivity of 1,190 µS/cm; no sample was collected.

From an outcrop adjacent to the aforementioned test site, several seeps emerged with an estimated combined flow of 2 gpm. The largest of the seeps had pH of 2.57 and conductivity of 1,630 µS/cm. The seeps were described as being 40 feet from Iron Creek, but the investigator did not specify if the seeps drained to Iron Creek. Red or yellow precipitate was noted (Appendix).

Although the dump was only discharging an estimated 0.4 gpm from the seep at its base, the dump could possibly have a greater impact to ground water than is immediately apparent. The dimensions of the dump are recorded as 400 ft long by 125 ft wide, equaling a surface area of 50,000 sq. ft. The annual precipitation in the mine area is greater than 45 inches, thus it can be calculated that approximately 3 gpm of precipitation could be infiltrating to the dump, depending on evapotranspiration and runoff, and ultimately to groundwater. Depending on the extent of sulfide oxidation and other reactions that could release acidity and trace metals, this component could potentially be a greater contaminant source than the adit discharge. It is reasonable to assume that the dump discharge chemistry could be similar to the seep effluent that has pH of 2.5 and conductivity of 2,430 µS/cm. Further study would be required to quantify the contribution to ground water from dump infiltration.

Iron Creek is degraded by naturally occurring pollution above the inflow from the Pass-Me-By mine. Major sources of degraded water include the tributary that drains the saddle between Cropsy and Lookout Mountain and the Upper Iron NOAMS (Naturally Occurring Acidic, Metal-Rich Spring). Significant sources of naturally degraded water entering Iron Creek below the inflow from the Pass-Me-By mine include the tributary draining the east flank of Sheepshead (pH 3.71; conductivity 348 µS/cm) and the Lower Iron NOAMS (Table 2). Numerous other smaller sources of naturally degraded water discharge into Iron Creek throughout the entire region west and southwest of Lookout Mountain.

Water samples were collected during the inventory project on August 5, 1993 from Iron Creek above and below the inflow from the Pass-Me-By mine and submitted to the CDPHE for dissolved metals analyses (Table 1 in Kirkham and Lovekin, 1995). The sample data revealed that Iron Creek experienced a slight drop in pH from 4.25 to 4.22 and an increase in conductivity from 181 to 210 µS/cm due to inflow from the Pass-Me-By mine. The concentration of dissolved iron in Iron Creek increased from 880 to 2,700 µg/L and aluminum increased from 1,900 to 3,000 µg/L, but manganese and zinc showed only slight increases from 140 to 150 µg/L and 28 to 30 µg/L, respectively. Other tested metals (arsenic, barium, cadmium, chromium, copper, lead, nickel, and silver) either remained constant or were below detection limits. Similarly, iron and aluminum loads in Iron Creek increased dramatically below the Pass-Me-By mine, while loadings for manganese, copper, and zinc remained constant or had slight increases. Kirkham and Holm (1989) report that aluminum (trec) increased from 2,800 to 3,500 µg/L and iron (trec) increased from 4,200 to 5,600 µg/L in Iron Creek from above to below the Pass-Me-By mine inflow on September 16, 1986. Other metal concentrations remained constant and some even decreased.

For comparative purposes, it is interesting to examine the quality of water issuing from the Upper Iron NOAMS and from the Lower Iron NOAMS to the drainage from the Pass-Me-By mine (Table 1 in Kirkham and Lovekin, 1995). On August 5, 1993, the Upper Iron NOAMS was discharging a combine flow of 6.7 gpm of pH 2.5 water with a conductivity of 2,590 µS/cm. The water was analyzed by the CDPHE laboratory and found to contain dissolved metal concentrations as shown on Table 2.

On August 27, 1993, during a heavy rain, an estimated 20 gpm of pH 2.9 water with conductivity of 622 µS/cm was issuing from the Lower Iron NOAMS. A water sample collected from the Lower Iron NOAMS was analyzed by USGS, which reported metal concentrations as shown on Table 2. Based on these analyses, the Pass-Me-By mine contributes appreciably more iron and aluminum to the system than the two NOAMS combined. The Pass-Me-By mine provides about an equal amount of zinc as do the two NOAMS, but the NOAMS are responsible for greater manganese and copper loadings.

Table 2. Results of chemical analyses for water samples from Upper Iron and Lower Iron NOAMS from 1993 sampling events.

Analyte	Concentration (µg/L)		
	Upper Iron NOAMS 5 Aug 1993 (dissolved)	Lower Iron NOAMS 27 Aug 1993 (trec)	Lower Iron NOAMS 27 Aug 1993 (dissolved)
Aluminum	120,000	11,000	9,000
Copper	990	<40	<40
Iron	160,000	45,000	26,000
Manganese	240	860	650
Zinc	260	170	130

If the unlikely assumption is made that all of the dissolved iron and aluminum contained in the drainage from Pass-Me-By enters Iron Creek and remains in solution until the creek reaches the Alamosa River, then the iron and aluminum loadings in the mine drainage could account for 21 to 31% of the dissolved iron and 8 to 12% of the dissolved aluminum in the creek at its mouth, based on the July and October samplings of Iron Creek by the USF&WS and USEPA (1994).

GILMORE MEADOW

Gilmore Meadow inventory area (#359/4136-1) is south of the Alamosa River near the base of Klondike Mountain (Figures 2 & 15). Adit #100 is on the southeast side of FR 250-6G about ½ mile southwest of the intersection with FR 250 (Stunner Pass Road). Stunner town site is about a mile north of the mine. Adit #100 and associated waste-rock pile #200 are completely on NFS-administered land.

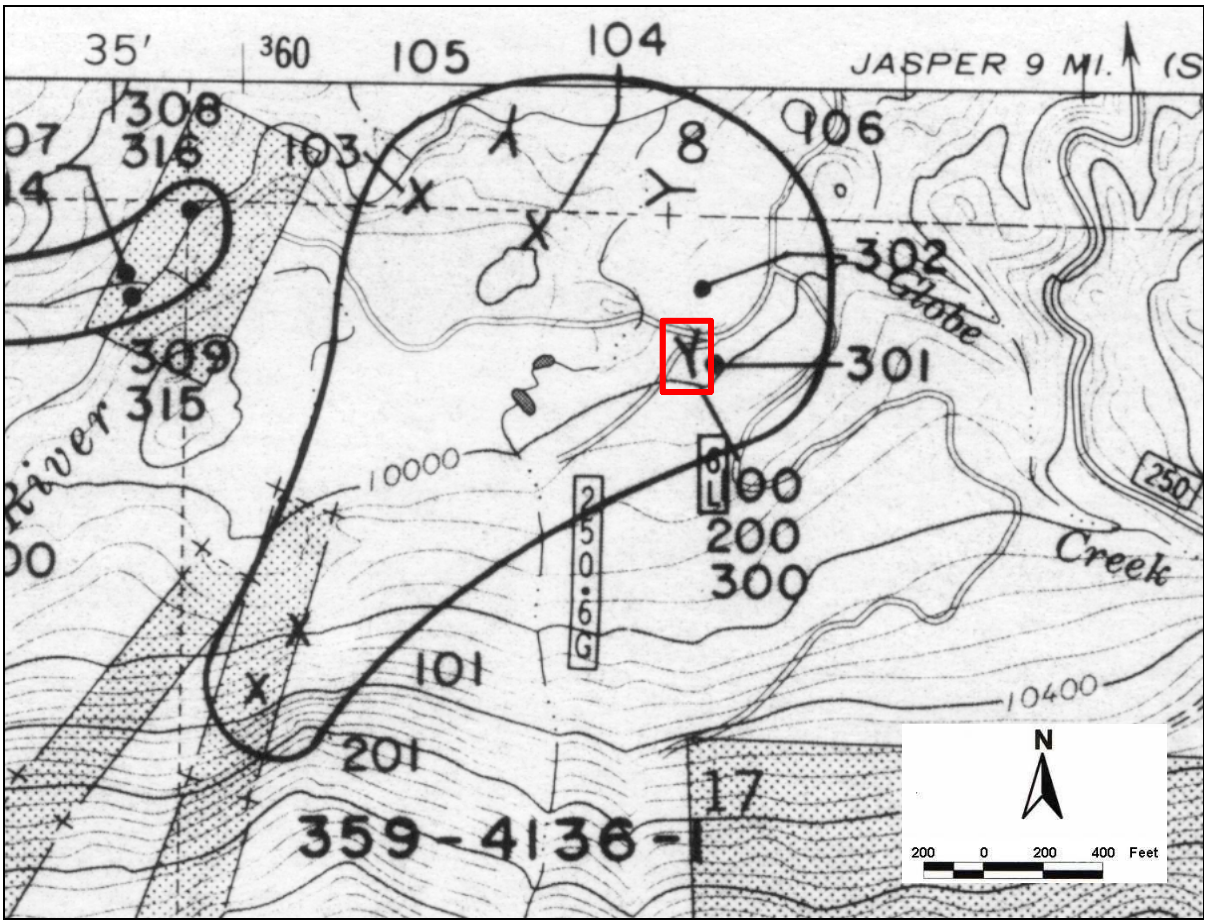


Figure 15. Gilmore Meadow inventory area #359-4136-1 [Scale is approximate; numbered mine openings (100-series numbers), waste rock (200-series numbers), water test sites (300-series numbers, shown as dots if not at mine openings or dumps) are keyed to inventory forms in appendix].

No name or historic information was found for adit #100. An adit was surveyed (Patton, 1917, plate 1) about 300 feet above inventory feature #100 during 1913 (Figure 7 and 16). No adit was found above adit #100. It is assumed that adit #100 is the adit depicted on the Patent map. If this assumption is correct, adit #100 was initially worked prior to or during 1913.

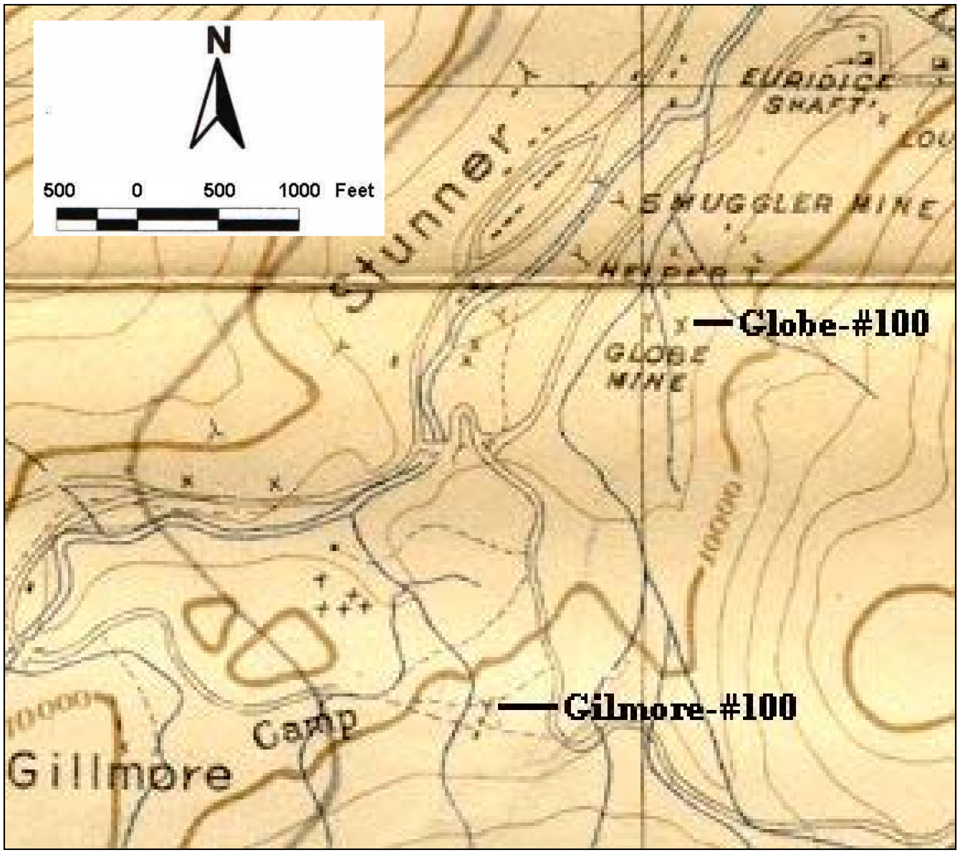


Figure 16. Enlarged map of Gilmore/Stunner area mines surveyed in 1913 (Modified from Patton, 1917, plate 1; scale is approximate; Gilmore was misspelled on the base map).

CLAIM BLOCKS

1961. Inspiration Development Company, E.A. Maxwell, J.B. Rigg, J.B. Rigg Jr., N.J. Rigg, and J.H. Tippit located a large claim block in the vicinity of adit #100 (BLM files).

1973. The Coronado Silver Corporation located the Vera #15 and KI claim block (filed by Union Mines Inc. with the BLM) in the vicinity of adit #100 (BLM files).

1979. Union Mines Inc. located the Gil claim block in the vicinity of adit #100 (BLM files).

1982. Assessment work was performed for the last year on the claim block located by Inspiration Development Company, E.A. Maxwell, J.B. Rigg, J.B. Rigg Jr., N.J. Rigg, and J.H. Tippit (BLM files).

1983. Union Mines Inc. located the AL #4, Fall #7, and Globe #1-#8 claim block in the vicinity of adit #100 (BLM files).

1985. Assessment work was performed for the last year on the Vera #15 and KI claims (BLM files).

1986. Union Mines Inc. located the KI 308 and KI 309 claims in the vicinity of adit #100 (BLM files).

1992. Assessment work was performed for the last year on the Gil, KI 308-309, AL #4, Fall #7, and Globe #1-#8 claims (BLM files).

GEOLOGY

Adit #100 was driven in a Pleistocene glacial moraine (Figure 3). A fine- to medium-grained, Oligocene Monzonite intrusive rock unit lies beneath the glacial moraine (Lipman, 1974). Dump material is mostly gravel to fine grained altered country rock. Pyrite was noted in one yellow-stained chunk of country rock and a 6-inch thick piece of quartz vein.

SITE DESCRIPTION

Adit #100 (Gilmore Meadow inventory area) is reached by traveling about 9 miles southwest of Jasper on FR 250, then heading southwest about ½ mile on FR 250-6G. A locked gate on FR 250-6G is near FR 250 intersection. Adit #100 is on the south side of FR 250-6G and west of a small-unnamed creek (Figure 17). Colorado Division of Mines and Geology placed a grated culvert at the portal (Figure 18) and dug a channel to divert the effluent from the dump.

Water was flowing from the portal at a rate of 0.8 gpm in August 1993 and 0.5 gpm in August 2000. The effluent is contained in a 30-foot-long trench (gully) between the portal and dump. At the end of the trench the effluent was diverted into a channel at the top of the dump. The channel directs most of the flow toward a creek on the eastern side of the dump. A small portion of the effluent forms a muddy area on the dump bench. Wetlands were formed along the effluent path next to the dump and along the creek (Figure 19). Orange-red precipitate is deposited in the effluent path and in the creek below the confluence with the effluent. No precipitate is evident in the creek above the confluence, although moss covered rocks are abundant.

Dump #200 contains about 800 cubic yards of mostly gravel to fine-grained altered country rock with rare pyrite (Figure 20). A moderate growth of spruce and grass appear to be successfully revegetating the dump. This suggests the waste rock is relatively unmineralized.

WASTE AND HAZARD CHARACTERISTICS

The Gilmore mine adit has been assigned an EDR of 3, and is the most significant environmental hazard known in the inventory area. In August of 2000, the portal effluent was flowing an estimated 0.5 gpm with pH of 6.66 and conductivity of 371 µS/cm, compared to 0.8 gpm with 5.29 pH and 276 µS/cm in August of 1993. A water sample collected in 2000 (MH-2000-13) revealed that analytes exceeding State water quality standards included total recoverable iron and dissolved iron, and manganese (Table 3). The detection limits for dissolved chromium, silver, and total recoverable thallium were greater than the standards. Orange-red precipitate was observed in the effluent channel and on the filter during sampling (Appendix).

The effluent from the Gilmore adit discharges to an unnamed tributary of the Alamosa River adjacent to the mine. CGS collected water samples from the tributary in 2000 both above (MH-2000-14) and below (MH-2000-12) where the effluent enters. Above the mine inflow (sample MH-2000-14), the stream had pH of 6.84 with conductivity of 170 µS/cm, and no analytes exceeded State water quality standards (Table 3), but it should be noted that the detection limits for dissolved chromium, silver, and total recoverable thallium were greater than the standard. Below the inflow (MH-2000-12), pH was 6.63 with conductivity of 194 µS/cm, and dissolved iron and manganese exceeded standards, indicating that the mine effluent is adversely impacting the watershed (Table 3).

The Gilmore mine dump was assigned an EDR of 5, and is therefore not considered to be an environmental hazard. A composite sample (MWR-2000-4) collected from the dump (Table 4) revealed no significant anomalies. However, the sample is slightly acid generating as shown by the negative net acid base potential and the paste pH. In August of 2000, seeps were discharging from the toe of the dump in the wetlands, but samples could not be obtained. There is no record of the seeps having been sampled. The dump's aerial dimensions are reported as 100 ft by 50 ft, equaling a surface area of 5,000 sq. ft. Assuming annual precipitation of 45 inches (and neglecting evaporation and runoff), up to 0.3 gpm of precipitation could be infiltrating through the dump to ground water. If sulfide oxidation is occurring in the dump, then leaching of the dump could be contributing trace metals, and acidity could be released to ground water.

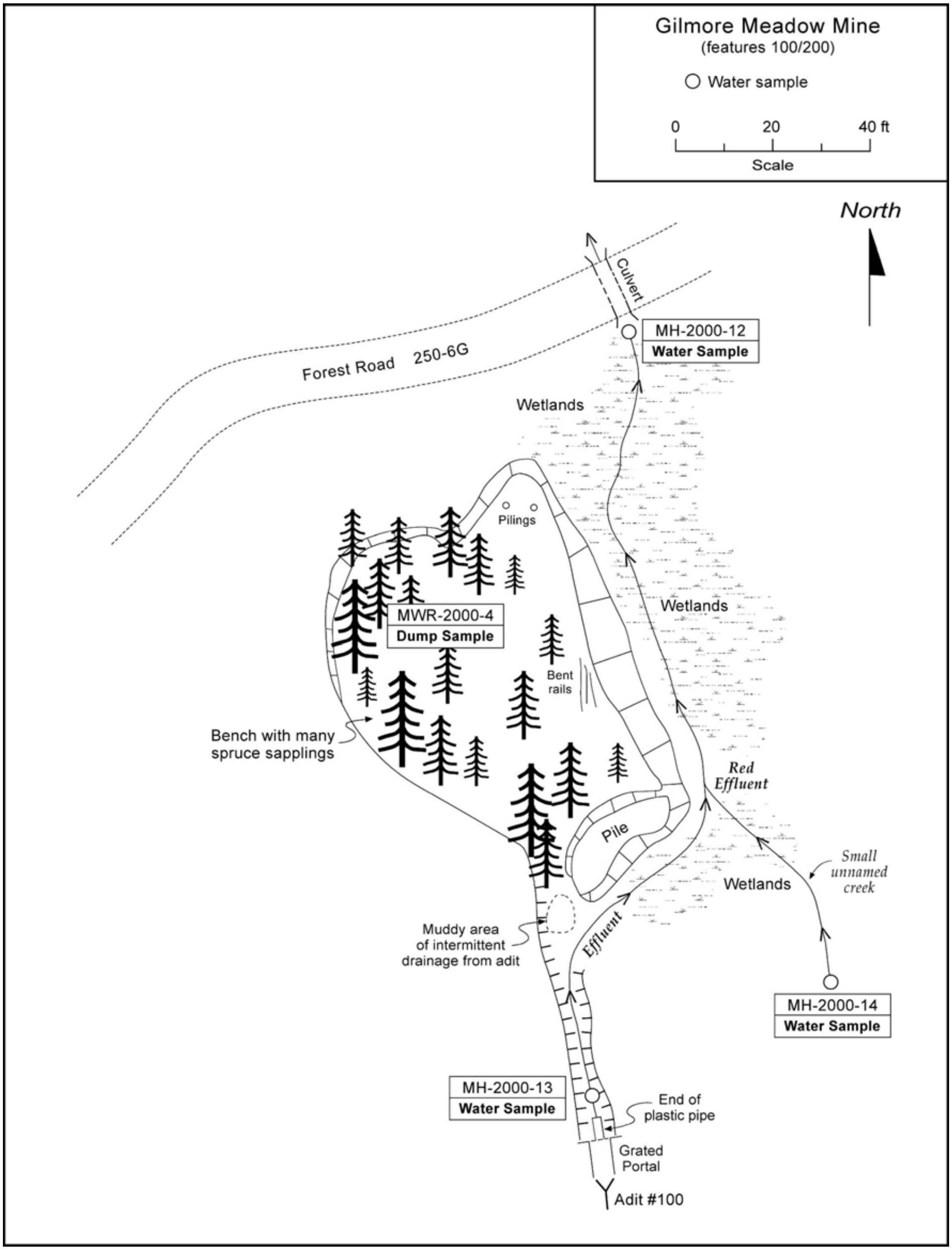


Figure 17. Surface map of mine #100/#200 and sample sites in Gilmore Meadow.

Figure 18. Adit #100 portal in Gilmore Meadow inventory area.

Figure 19. Effluent next to dump #200 in Gilmore Meadow inventory area.

Figure 20. Dump #200 in Gilmore Meadow inventory area.

Table 3. Results of chemical analyses and measurement of field parameters for water samples MH-2000-12 to MH-2000-14 from the Gilmore Meadow area. All concentrations are dissolved unless identified as total recoverable (trec). (<) denotes concentration is below laboratory detection limit.

Sample	MH-2000-12, GILMORE MEADOWS BELOW (8/22/00)				MH-2000-13, GILMORE MEADOWS PORTAL (8/22/00)			
Parameter	Concentration/ measurement	Standard	Factor above standard	Load (grams/day)	Concentration/ measurement	Standard	Factor above standard	Load (grams/day)
Flow (gpm)	1.7				0.5			
pH (standard units)	6.63	6.5 - 9.0			6.66	6.5 - 9.0		
Conductivity (µS/cm)	194	None	N/A		371	None	N/A	
Alkalinity (mg/L CaCO3)	30	None	N/A		45	None	N/A	
Hardness (mg/L CaCO3)	84	None	N/A		165	None	N/A	
Aluminum (trec) (µg/L)	<50	None	N/A	N/A	170	None	N/A	0.5
Antimony (trec) (µg/L)	<1	6	Not detected	N/A	<1.0	6	Not detected	N/A
Arsenic (trec) (µg/L)	<1	10	Not detected	N/A	<1.0	10	Not detected	N/A
Iron (trec) (µg/L)	800	1,000	Below standard	7.4	3,800	1,000	3.8	10.4
Thallium (trec) (µg/L)	<1	0.5	Not detected	N/A	<1.0	0.5	Not detected	N/A
Zinc (trec) (µg/L)	15	2,000	Below standard	0.1	110	2,000	Below standard	0.3
Aluminum (µg/L)	<50	87	Not detected	N/A	<50	87	Not detected	N/A
Cadmium (µg/L)	<0.3	1.96	Not detected	N/A	<0.3	3.23	Not detected	N/A
Calcium (mg/L CaCO3)	70	None	N/A	649	140	None	N/A	382
Chloride (mg/L)	<10	250	Not detected	N/A	<10.0	250	Not detected	N/A
Chromium (µg/L)	<20	11	Not detected	N/A	<20	11	Not detected	N/A
Copper (µg/L)	<4	7.68	Not detected	N/A	<4.0	13.71	Not detected	N/A
Fluoride (mg/L)	<0.1	2	Not detected	N/A	0.26	2	Below standard	0.7
Iron (µg/L)	670	300	2.2	6.2	1,600	300	5.3	4.4
Lead (µg/L)	<1	2.1	Not detected	N/A	<1.0	4.3	Not detected	N/A
Magnesium (mg/L)	3.3	None	N/A	31	6	None	N/A	16
Manganese (µg/L)	150	50	3.0	1.4	340	50	6.8	0.9
Nickel (µg/L)	<20	44.7	Not detected	N/A	<20	79.3	Not detected	N/A
Potassium (mg/L)	<1	None	N/A	N/A	<1.0	None	N/A	N/A
Silicon (mg/L)	5	None	N/A	46	5.5	None	N/A	15
Silver (µg/L)	<0.2	0.06	Not detected	N/A	<0.2	0.18	Not detected	N/A
Sodium (mg/L)	2.3	None	N/A	21	3.10	None	N/A	8.4
Sulfate (mg/L)	52	250	Below standard	482	140	250	Below standard	382
Zinc (µg/L)	14	101	Below standard	0.1	110	180	Below standard	0.3

Table 3. Results of chemical analyses and measurement of field parameters for water samples MH-2000-12 to MH-2000-14 from the Gilmore Meadow area -- continued.

Sample	MH-2000-14, GILMORE MEADOWS ABOVE (8/22/00)			
Parameter	Concentration/ measurement	Standard	Factor above standard	Load (grams/day)
Flow (gpm)	0.5			
pH (standard units)	6.84	6.5 - 9.0		
Conductivity (µS/cm)	170	None		
Alkalinity (mg/L CaCO3)	50	None		
Hardness (mg/L CaCO3)	74	None	N/A	
Aluminum (trec) (µg/L)	<50	None	N/A	N/A
Antimony (trec) (µg/L)	<1.0	6	Not detected	N/A
Arsenic (trec) (µg/L)	<1.0	10	Not detected	N/A
Iron (trec) (µg/L)	<10	1,000	Not detected	N/A
Thallium (trec) (µg/L)	<1.0	0.5	Not detected	N/A
Zinc (trec) (µg/L)	13	2,000	Below standard	0.04
Aluminum (µg/L)	<50	87	Not detected	N/A
Cadmium (µg/L)	0.3	1.80	Not detected	N/A
Calcium (mg/L CaCO3)	62	None	N/A	169
Chloride (mg/L)	<10.0	250	Not detected	N/A
Chromium (µg/L)	<20	11	Not detected	N/A
Copper (µg/L)	<4.0	6.95	Not detected	N/A
Fluoride (mg/L)	<0.10	2	Not detected	N/A
Iron (µg/L)	<10	300	Not detected	N/A
Lead (µg/L)	<1.0	1.8	Not detected	N/A
Magnesium (mg/L)	3	None	N/A	8.2
Manganese (µg/L)	<4	50	Not detected	N/A
Nickel (µg/L)	<20	40.4	Not detected	N/A
Potassium (mg/L)	<1.0	None	N/A	N/A
Silicon (mg/L)	4.7	None	N/A	12.8
Silver (µg/L)	<0.2	0.05	Not detected	N/A
Sodium (mg/L)	2	None	N/A	5.5
Sulfate (mg/L)	36	250	Below standard	98
Zinc (µg/L)	12	92	Below standard	0.03

Table 4. Results of chemical analyses for waste-rock sample MWR-2000-4 from the Gilmore Meadow Mine dump.

Constituent	Units	Concentration
Gold	oz/ton	<0.002
Mercury	ppm	0.4
Silver	oz/ton	0.28
Neutralization Potential	Tons $CaCO_3$/ 1000 tons	<0.1
Potential Acidity	Tons $CaCO_3$/ 1000 tons	6.5
Net Acid Base Potential	Tons $CaCO_3$/ 1000 tons	-6.5
Paste pH	Standard Units	4.05
Na_2O	wt %	0.09
MgO	wt %	1.02
Al_2O_3	wt %	17.7
SiO_2	wt %	69.7
P_2O_5	wt %	0.06
S	wt %	0.41
Cl	wt %	<0.02
K_2O	wt %	3.90
CaO	wt %	0.12
TiO_2	wt %	0.75
MnO	wt %	0.02
Fe_2O_3	wt %	2.48
BaO	wt %	0.03
V	ppm	135
Cr	ppm	77
Co	ppm	<10
Ni	ppm	<10
W	ppm	<10
Cu	ppm	19
Zn	ppm	33
As	ppm	<20
Sn	ppm	<50
Pb	ppm	74
Mo	ppm	<10
Sr	ppm	78
U	ppm	<10
Th	ppm	<10
Nb	ppm	<10
Zr	ppm	223
Rb	ppm	114
Y	ppm	38

GLOBE MINE

The Globe Mine inventory area #360/4137-2 (adit #100/200) is on the eastern side of Globe Creek south of Stunner town site (Figures 2 & 21). Adit #100 and associated waste-rock pile #200 appear to be completely on NFS-administered land. Patented claims (Helper and Smuggler) are about 200 feet north of adit #100. A short mine road from the Stunner Pass Road (FR 250) provides access.

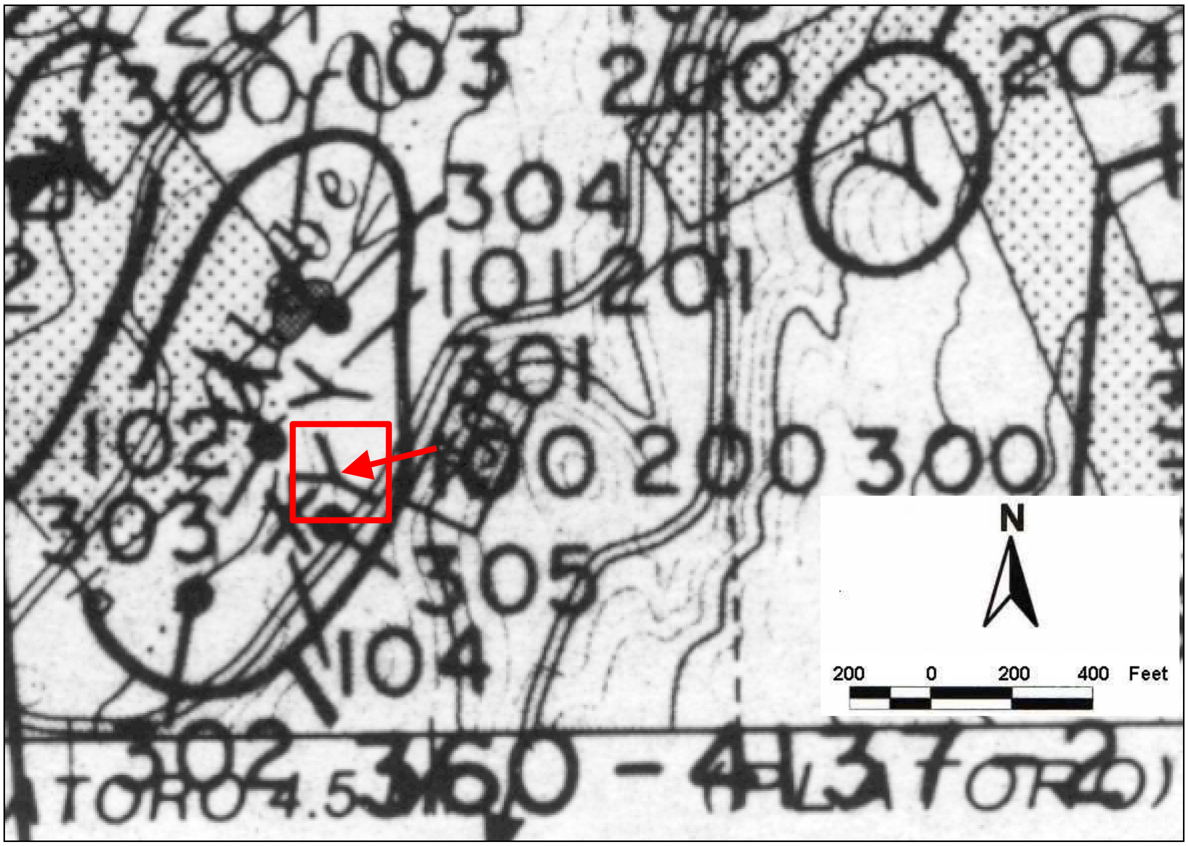


Figure 21. Globe inventory area #360-4137-2 [Scale is approximate; numbered mine openings (100-series numbers), waste rock (200-series numbers), water test sites (300-series numbers, shown as dots if not at mine openings or dumps) are keyed to inventory forms in appendix; adit #100 and dump #200 are the Globe Mine].

Very little historic information was available for the mine. Apparently ore was shipped, although no specific quantities or dates were recorded. U.S. Bureau of Mines MAS/MILS database (1996) listed National Research Assoc. Inc. as a current producer, although no date was recorded. The most recent activity recorded was around 1968, the year that Calkin and Tidwell (1968) mapped the Globe Mine for National Research Assoc. Between 1960 and 1980, the U.S. Bureau of Mines Minerals Yearbooks (Bieniewski and Henkes, 1967) listed gold and silver production for

Conejos County from 1966 through 1968 and 1970 through 1974. Company names and specific mines were not given. Only counties reporting significant production were discussed individually. Production for Conejos County must have been small.

MINING HISTORY

1884. Aaron B. Page and Henry R. Crock located the Globe lode (bk. C, p. 37).

1885. The first year gold ($277) and silver ($57) production was reported for mines in Conejos County (Wilson, 1886, p. 136). No mines were listed. During the 1880's, 1885 was the only year the Director of the Mint reported gold and silver production for Conejos County.

1887. Munson (1888, p. 180) reported that the Globe Mine had shipped ore. It was not determined if the "confidential" production report was for a Globe Mine in Rio Grande County or actually referred to the Globe Mine in Conejos County. Conejos County was not included in the report. Most of the mining in the Summitville/Decatur mining district was in the Rio Grande County portion of the district. For some years, mining activities in the Conejos County part of the Summitville/Decatur mining district were possibly included in Rio Grande County. No other references for a Globe Mine in Rio Grande County were found.

1888. Production from the Globe Mine in "Rio Grande County" was considered as confidential (Munson, 1889, p. 120). This could refer to the Globe Mine in Conejos County. Conejos County was not listed in the report.

1894. G.B. Boggs and others performed annual assessment work on the Globe lode (bk. B, p. 77).

1897-1899. L.J. Rummerfield located the Cashier, Flossie Piper, Cornucopia, and Old Glory claims in the vicinity of the Globe Mine. Although a claim map of the area was not available, the claims were related to the Sheridan claims (Mineral Survey No. 19830 and 19480-patented in 1915 and 1918 to Frances J. Sheridan) and were staked southwest of the Sheridan group (BLM files). The Sheridan Group is east of the Globe Mine.

1913. Patton (1917, plate 1) published a map of mine locations in the Platoro-Summitville mining district. Mines surveyed in 1913 included the Globe Mine. An adit and prospect next to a short creek (Figures 7 and 16) appear to be labeled the Globe Mine. Adit #100 appears to be the prospect shown on the eastern side of the creek. Patton also shows the Helper Tunnel trending toward the Globe Mine.

1961. Inspiration Development Company, E.A. Maxwell, J.B. Rigg, J.B. Rigg Jr., N.J. Rigg, and J.H. Tippit, located a large claim block in the vicinity of the Globe Mine (BLM files).

1965-1967. Inspiration Development Company located additional claim blocks in the vicinity of the Globe Mine (BLM files).

1967. Cleo Adams located/resurveyed the Globe and Globe Annex claims (Figure 22) (bk. 220, p. 471-474; BLM files).

1968 National Research Assoc. Inc. (Calkin and Tidwell, July 1968) mapped and sampled the Globe Mine (Figure 23). U.S. Bureau of Mines (1996) listed the National Research Assoc. Inc.'s Globe Mine as a "current producer." U.S. Bureau of Mines did not record a date the mine produced. It is assumed that the company operated the mine around the time the mine was mapped. According to Keating (1969, p. 136), National Research Associates was laying rail and cleaning up the Globe Mine workings.

1973. The Coronado Silver Corporation located the KI claim block (filed by Union Mines Inc. with the BLM) in the vicinity of the Globe Mine (BLM files).

1982. Last year assessment work was performed on Inspiration Development Company's claim block and some of Union's KI claims (BLM files).

1983. Union Mines Inc. located the Fall (8-9) and AL (1-3) claims in the vicinity of the Globe Mine (BLM files).

1985. Last year assessment work was performed on some of Union Mines Inc.'s KI claims (BLM files).

1987. A.M. Davis and Summitville Consolidated Mining Company located the Summit claim block in the vicinity of the Globe Mine (BLM files).

1989. Cleo Adams acquired Jack Nam Yee's and J. Harry Shelton's interest in the Globe and Globe Annex claims (BLM files).

1991. Last year assessment work was performed on A.M. Davis and Summitville Consolidated Mining Company's Summit claims (BLM files).

1992. Last year assessment work was performed on Rummerfield's claims and some of Union Mines Inc.'s KI, Fall, and AL claims (BLM files).

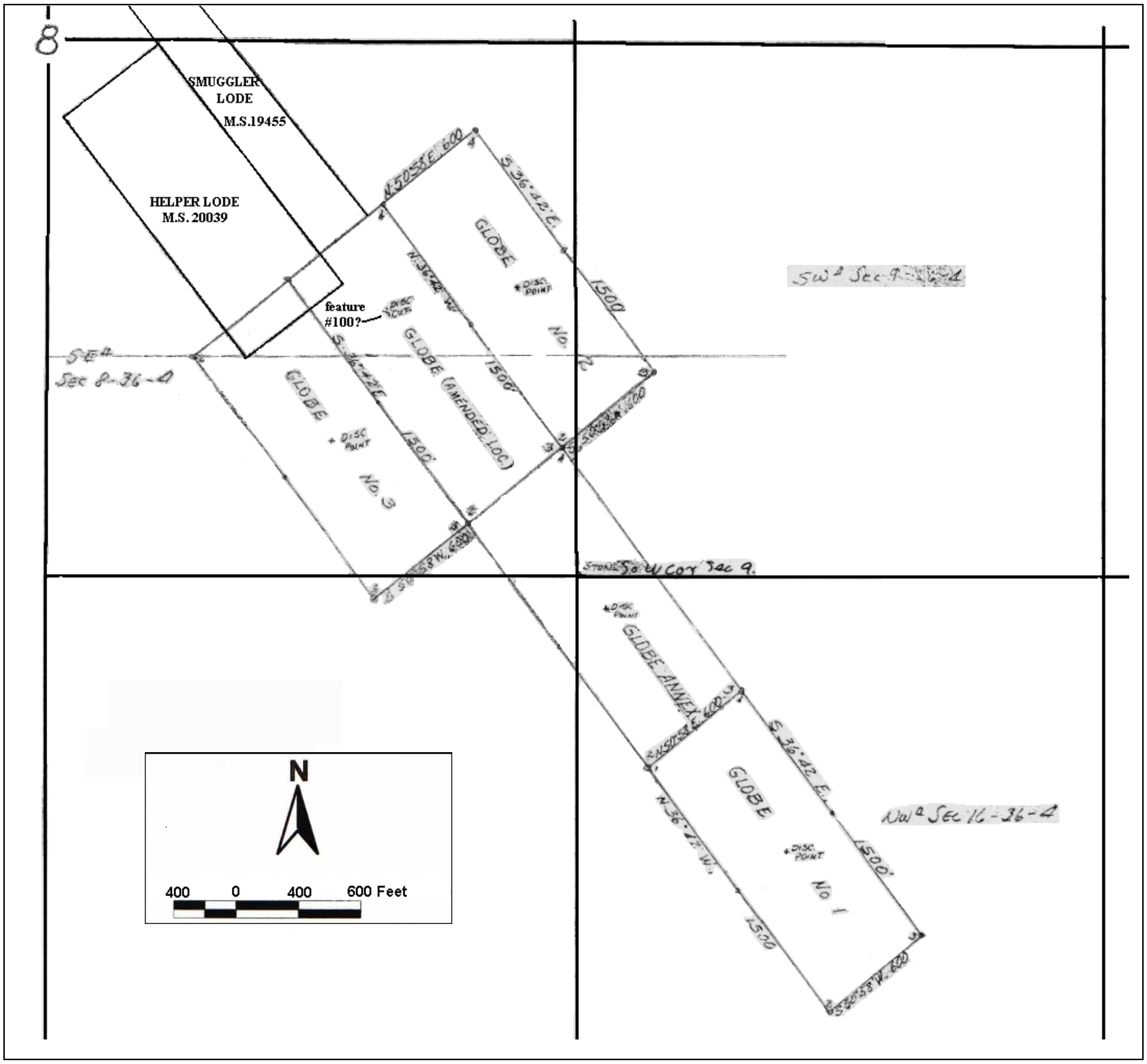


Figure 22. Globe claim map (Modified from BLM files; scale is approximate).

1993. Cleo Adams conducted a surface and underground sampling program on the Globe and Globe Annex claims as part of the annual assessment work (BLM files).

1996. Last year assessment work was performed on the Globe and Globe Annex claims (BLM files).

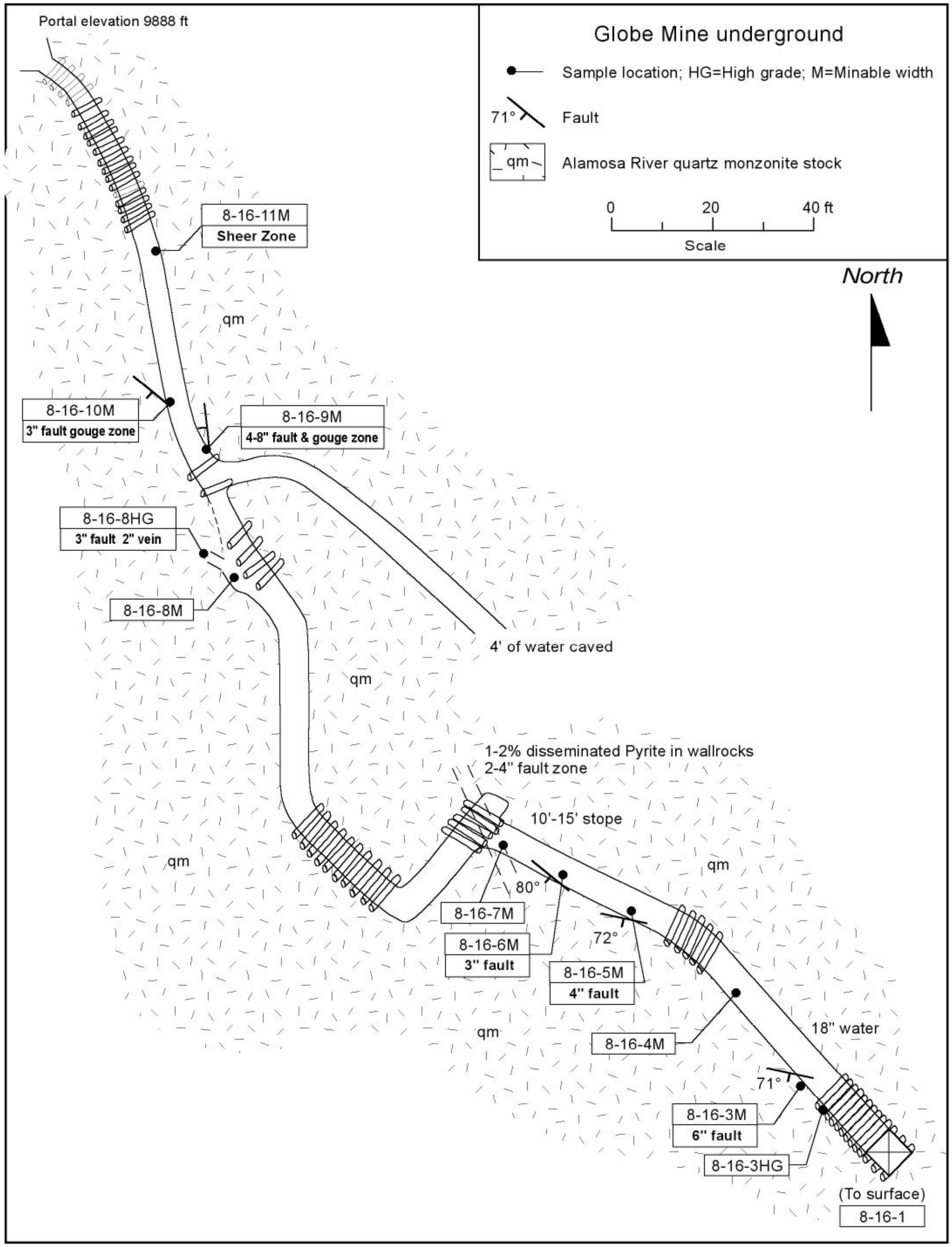


Figure 23. Underground map of the Globe Mine (Modified from BLM files; scale is approximate).

GEOLOGY

The Globe Mine (Figure 3) was driven in a fine- to medium-grained Oligocene monzonite intrusive rock (Lipman, 1974). A series of mineralized northwest-trending faults was mapped in the mine (Figure 23). Some of the faults were wide enough to be considered suitable for mining. Sericitization apparently was the dominant alteration in the mine. Propylitized, silicified, and pyritic zones were also identified (Calkin and Tidwell, 1968). Minor pyrite in vuggy, yellow, brown, and red-stained quartz was noted on the waste-rock-pile.

SITE DESCRIPTION

The Globe Mine (adit #100) is accessed by traveling about 9 miles southwest of Jasper on FR 250. A short mine road east of FR 250 leads directly onto the waste-rock pile. Most of the waste rock is east of Globe Creek (Figure 24). The majority of the main segment of the dump was deposited in the wetland associated with Globe Creek (Figure 25). Globe Creek flows along the western side of the main body of the Globe dump, and is actively eroding portions of the northwest part of the waste-rock pile. Rock sample MH-2000-3 was collected from the main body of the waste-rock pile. The dump contains about 1,200 cubic yards of material. South of the main waste-rock dump, an older mine dump, possibly associated with this mine, has naturally revegetated.

A large culvert supports the Globe Mine portal (Figure 26). An unlocked and partly open grate at the end of the culvert does not effectively prevent access. Water emerging from the portal had deposited abundant red precipitate. Effluent flows from the portal down a channel along the east side of the waste-rock pile (Figure 27). The effluent flows around the northern toe of the dump into grassy wetlands before entering Globe Creek (Figure 28).

Another water source at this site lies immediately to the west of the southern edge of the waste-rock pile. Water emerges from a narrow pipe (Figure 24) in an area with moss-covered rocks. This pipe and the rocks are at the base of a natural drainage path that originates far above the Globe Mine. This small stream separates the main body of the Globe dump on the east from an older and probably associated dump on the west. The water in this stream flows along and near the western toe of the main body of the Globe dump before entering Globe Creek upstream of the culvert that carries Globe Creek beneath the mine access road.

A prospect symbol on the 7.5-minute topographic map on the west side of the gully may represent a shallow underground working at this location, possibly associated with the older dump material. However, no obvious evidence of an underground working was seen. A small prospect was dug into the colluvium/alluvium adjacent to and partly within the western dump, but this is probably not large enough to be shown on the topographic map, and it was excavated after deposition of the older western dump.

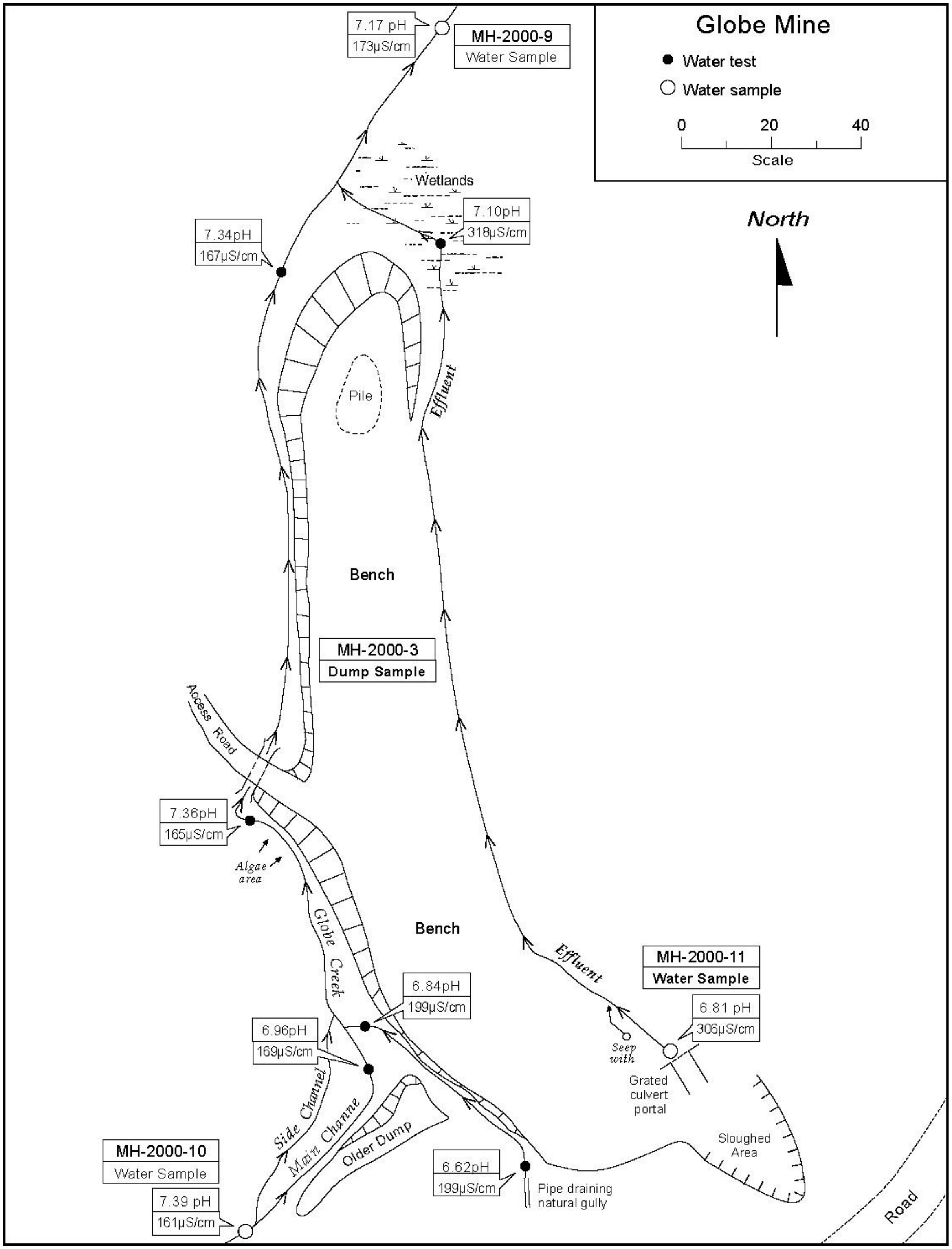


Figure 24. Surface map of Globe Mine and sample sites.

Figure 25. Globe Creek wetlands next to Globe Mine dump.

Figure 26. Globe Mine portal.

Figure 27. Effluent pathway (on right) next to Globe Mine dump.

Figure 28. Effluent (left) entering Globe Creek (right) at toe of Globe Mine dump.

WASTE AND HAZARD CHARACTERISTICS

Water was sampled or tested at several locations in the vicinity of the Globe Mine (Figure 24). Water samples were collected from just inside the portal of the Globe Mine (MH-2000-11), and from Globe Creek both upstream (MH-2000-10) and downstream (MH-2000-9) of the influence of the Globe Mine.

In August of 1993, flow from the Globe mine adit was measured at 1.5 gpm with pH of 6.4 and conductivity of 304 µS/cm. A water sample from the adit discharge contained dissolved metal concentrations of 800 µg/L iron, 60 µg/L aluminum, 1,000 µg/L manganese, and 240 µg/L zinc. In 2000, the flow was measured at 5 gpm with pH of 6.81 and conductivity of 306 µS/cm. Water sample MH-2000-11, collected from the adit discharge, had dissolved and total recoverable iron, and dissolved manganese exceeding State water quality standards (Table 5). Thallium (trec) and dissolved chromium and silver were not detected, but the detection limits were greater than the State water quality standard. The adit has been assigned an EDR of 3.

The downstream sample (MH-2000-9) was collected upstream of a small, caved, seeping adit and associated waste-rock pile. Test parameters and visual observations suggest no degradation of Globe Creek associated with this small working. Flow from this adit was too small to measure or sample in August 2000, and the 50-cubic-yard dump is not an apparent threat to Globe Creek.

Globe Creek appears relatively clean above the Globe Mine, although some of the rocks in the channel are stained red. The upstream sample (MH-2000-10) had pH of 7.39 with conductivity of 161 µS/cm. No analytes exceeded State water quality standards, but the detection limits for dissolved chromium, silver, and total recoverable thallium were above the standard (Table 5). Downstream of the Globe Mine the red stain is more obvious and filamentous algae is common. The increase in visible degradation to the creek occurs gradually, beginning slightly upstream of the culvert. Test parameters at both locations were similar however.

The Globe mine dump is adjacent to Globe Creek and has been partially removed by stream erosion, so it is reasonable to assume that weathering of the dump is releasing contaminants to the creek. The dump has been assigned an EDR of 3. A composite rock sample (NWR-2000-3) collected from the dump (Table 6) revealed no significant anomalies. However, the sample is slightly acid generating, as shown by the negative net acid base potential and the Paste pH.

The dimensions of the dump are reported as 150 ft by 40 ft, equaling a surface area of 6,000 sq. ft. Assuming 45 inches of annual precipitation, it is possible that up to 0.3 gpm is infiltrating through the dump, potentially picking up metals and acidity, and discharging to Globe Creek or to ground water.

Adit #101, with an EDR of 4, discharges an estimated 0.1 gpm. The discharge had pH of 5.6 and conductivity of 389 µS/cm when measured in 1993 (Figure 21 and Appendix).

Table 5. Results of chemical analyses and measurement of field parameters for water samples MH-2000-9 to MH-2000-11 from the Globe Mine area. All concentrations are dissolved unless identified as total recoverable (trec). (<) denotes concentration is below laboratory detection limit.

Sample	MH-2000-9, GLOBE MINE BELOW (8/22/00)				MH-2000-10, GLOBE MINE ABOVE (8/22/00)			
Parameter	Concentration/ measurement	Standard	Factor above standard	Load (grams/day)	Concentration/ measurement	Standard	Factor above standard	Load (grams/day)
Flow (gpm)	45				95			
pH (standard units)	7.17	6.5 - 9.0			7.39	6.5 - 9.0		
Conductivity (µS/cm)	173	None	N/A		161	None	N/A	
Alkalinity (mg/L CaCO3)	50	None	N/A		60	None	N/A	
Hardness (mg/L CaCO3)	76	None	N/A		71	None	N/A	
Aluminum (trec) (µg/L)	<50	None	N/A	N/A	<50	None	N/A	N/A
Antimony (trec) (µg/L)	<1.0	6	Not detected	N/A	<1.0	6	Not detected	N/A
Arsenic (trec) (µg/L)	<1.0	10	Not detected	N/A	<1.0	10	Not detected	N/A
Iron (trec) (µg/L)	490	1,000	Below standard	120	120	1,000	Below standard	62
Thallium (trec) (µg/L)	<1.0	0.5	Not detected	N/A	<1.0	0.5	Not detected	N/A
Zinc (trec) (µg/L)	11	2,000	Below standard	2.7	13	2,000	Below standard	6.7
Aluminum (µg/L)	<50	87	Not detected	N/A	<50	87	Not detected	N/A
Cadmium (µg/L)	<0.3	1.83	Not detected	N/A	<0.3	1.73	Not detected	N/A
Calcium (mg/L CaCO3)	59	None	N/A	14,473	55	None	N/A	28,482
Chloride (mg/L)	<10.0	250	Not detected	N/A	<10.0	250	Not detected	N/A
Chromium (µg/L)	<20	11	Not detected	N/A	<20	11	Not detected	N/A
Copper (µg/L)	<4.0	7.10	Not detected	N/A	<4.0	6.65	Not detected	N/A
Fluoride (mg/L)	0.10	2	Below standard	25	<0.10	2	Not detected	N/A
Iron (µg/L)	280	300	Below standard	69	67	300	Below standard	34.7
Lead (µg/L)	<1.0	1.9	Not detected	N/A	<1.0	1.7	Not detected	N/A
Magnesium (mg/L)	4.20	None	N/A	1,030	3.80	None	N/A	1,968
Manganese (µg/L)	110	50	2.2	27	18	50	Below standard	9.3
Nickel (µg/L)	<20	41.3	Not detected	N/A	<20	38.7	Not detected	N/A
Potassium (mg/L)	<1.0	None	N/A	N/A	<1.0	None	N/A	N/A
Silicon (mg/L)	4.500	None	N/A	1,104	4.6	None	N/A	2,382
Silver (µg/L)	<0.2	0.05	Not detected	N/A	<0.2	0.04	Not detected	N/A
Sodium (mg/L)	2.40	None	N/A	589	2.50	None	N/A	1,295
Sulfate (mg/L)	34	250	Below standard	8,340	28	250	Below standard	14,500
Zinc (µg/L)	15	94	Below standard	3.7	10	88	Below standard	5.2

Table 5. Results of chemical analyses and measurement of field parameters for water samples MH-2000-9 to MH-2000-11 from the Globe Mine area-- continued.

Sample	MH-2000-11, GLOBE MINE PORTAL (8/22/00)			
Parameter	Concentration/ measurement	Standard	Factor above standard	Load (grams/day)
Flow (gpm)	5			
pH (standard units)	6.81	6.5 - 9.0		
Conductivity (µS/cm)	306	None	N/A	
Alkalinity (mg/L CaCO3)	30	None	N/A	
Hardness (mg/L CaCO3)	135	None	N/A	
Aluminum (trec) (µg/L)	130	None	N/A	3.5
Antimony (trec) (µg/L)	<1.0	6	Not detected	N/A
Arsenic (trec) (µg/L)	3.0	10	Below standard	0.1
Iron (trec) (µg/L)	2,200	1,000	2.2	60
Thallium (trec) (µg/L)	<1.0	0.5	Not detected	N/A
Zinc (trec) (µg/L)	140	2,000	Below standard	3.8
Aluminum (µg/L)	<50	87	Not detected	N/A
Cadmium (µg/L)	<0.3	2.79	Not detected	N/A
Calcium (mg/L CaCO3)	100	None	N/A	2,726
Chloride (mg/L)	<10.0	250	Not detected	N/A
Chromium (µg/L)	<20	11	Not detected	N/A
Copper (µg/L)	<4.0	11.56	Not detected	N/A
Fluoride (mg/L)	0.32	2	Below standard	8.7
Iron (µg/L)	1,100	300	3.7	30
Lead (µg/L)	<1.0	3.5	Not detected	N/A
Magnesium (mg/L)	8.50	None	N/A	232
Manganese (µg/L)	580	50	11.6	15.8
Nickel (µg/L)	<20	67.0	Not detected	N/A
Potassium (mg/L)	<1.0	None	N/A	N/A
Silicon (mg/L)	5.1	None	N/A	139
Silver (µg/L)	<0.2	0.13	Not detected	N/A
Sodium (mg/L)	2.20	None	N/A	60
Sulfate (mg/L)	110	250	Below standard	2,998
Zinc (µg/L)	130	152	Below standard	3.5

Table 6. Results of chemical analyses for waste-rock sample MWR-2000-3 from the Globe Mine dump.

Constituent	Units	Concentration
Gold	oz/ton	0.03
Mercury	ppm	1.1
Silver	oz/ton	0.67
Neutralization Potential	Tons $CaCO_3$/ 1000 tons	0.2
Potential Acidity	Tons $CaCO_3$/ 1000 tons	2.6
Net Acid Base Potential	Tons $CaCO_3$/ 1000 tons	-2.4
Paste pH	Standard Units	4.48
Na_2O	wt %	0.36
MgO	wt %	0.58
Al_2O_3	wt %	14.7
SiO_2	wt %	73.8
P_2O_5	wt %	0.45
S	wt %	0.17
Cl	wt %	<0.02
K_2O	wt %	2.63
CaO	wt %	0.32
TiO_2	wt %	0.53
MnO	wt %	0.03
Fe_2O_3	wt %	2.23
BaO	wt %	0.02
V	ppm	100
Cr	ppm	55
Co	ppm	<10
Ni	ppm	<10
W	ppm	<10
Cu	ppm	20
Zn	ppm	30
As	ppm	26
Sn	ppm	<50
Pb	ppm	369
Mo	ppm	<10
Sr	ppm	167
U	ppm	<10
Th	ppm	13
Nb	ppm	<10
Zr	ppm	151
Rb	ppm	72
Y	ppm	32

FERRICRETE MINE - GUILD/WINCHELL/MICROCOSM TUNNEL(S)

The Ferricrete Mine inventory area (#361/4138-1) is northeast of the Stunner town site on the southeastern slope of Big Red Mountain (Figures 2 & 29). A short mine road from FR 250 provides access to the area. Adit #101 and associated waste-rock pile #201, descriptively labeled the Ferrocrete Mine during the CGS inventory, is on the east side of an intermittent tributary to the Alamosa River. Neither "Ferricrete" nor "Ferrocrete" are formal or historical names for this mine. In fact, a formal name was not determined, however historical accounts in the following section suggest that the adit could be the Guild, Winchel, and/or Microcosm tunnels. No maps were found that would confirm this observation and courthouse data were destroyed. Adit #101 is apparently on NFS-administered land about 100 feet south of and trending toward the patented Guild Lode, suggesting a possible relationship. Adit #101 probably underlies the Guild Lode. The following historical information appears to link adit #101 to the Guild Lode. Adit #101 could be the Guild and/or Winchell Tunnel. Very little information is available on the Ferricrete Mine and Guild Lode. No production was recorded.

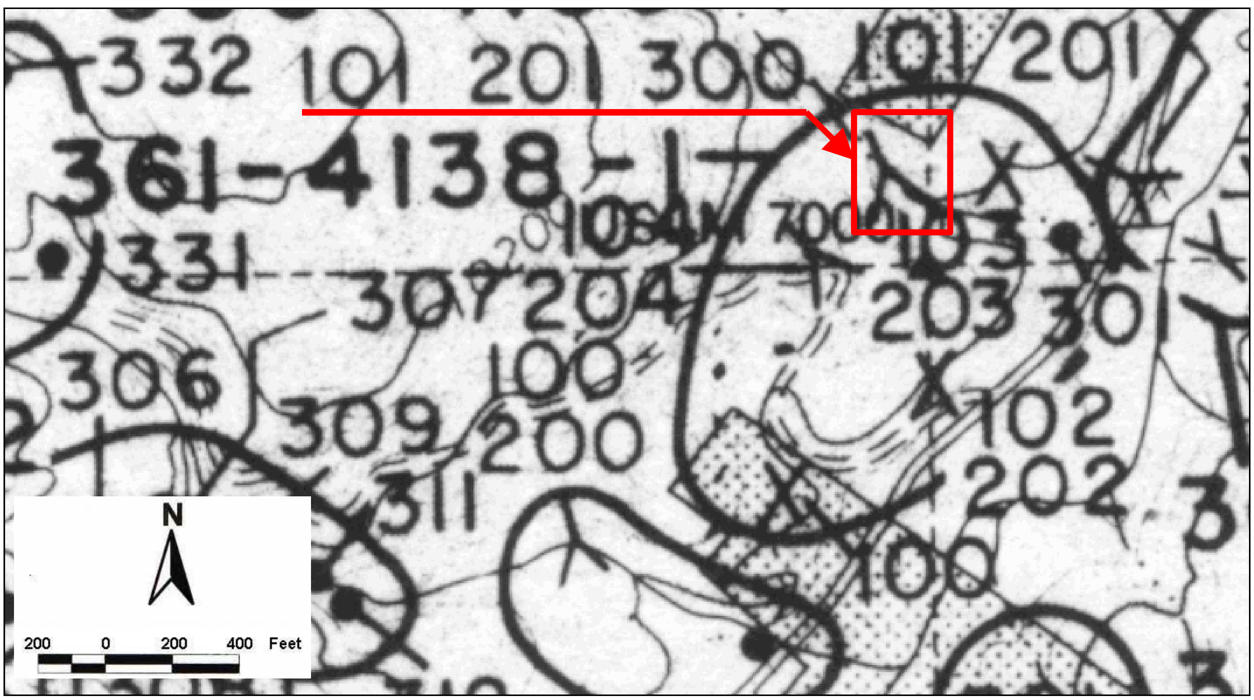


Figure 29. Ferricrete Mine inventory area #361-4138-1 [Scale is approximate; numbered mine openings (100-series numbers), waste rock (200-series numbers), water test sites (300-series numbers, shown as dots if not at mine openings or dumps) are keyed to inventory forms in appendix; adit #101 and dump #201 are the Ferricrete Mine].

MINING HISTORY

1890. J.C. Winchell located the Guild Lode in January (bk. 15, p. 31; Mineral Survey No. 7133).

1891. J.C. Winchell amended the location certificate for the Guild Lode (bk. 25, p. 315). Mineral Survey No. 7133 (Figure 30) was conducted on the Guild Lode in September. Workings shown on the survey are in the southern part of the claim and include a 13-ft-deep discovery shaft and a 30-foot-deep shaft. Earlier claimants built the log cabin and dug the other 30-ft-deep shaft (Mineral Survey No. 7133).

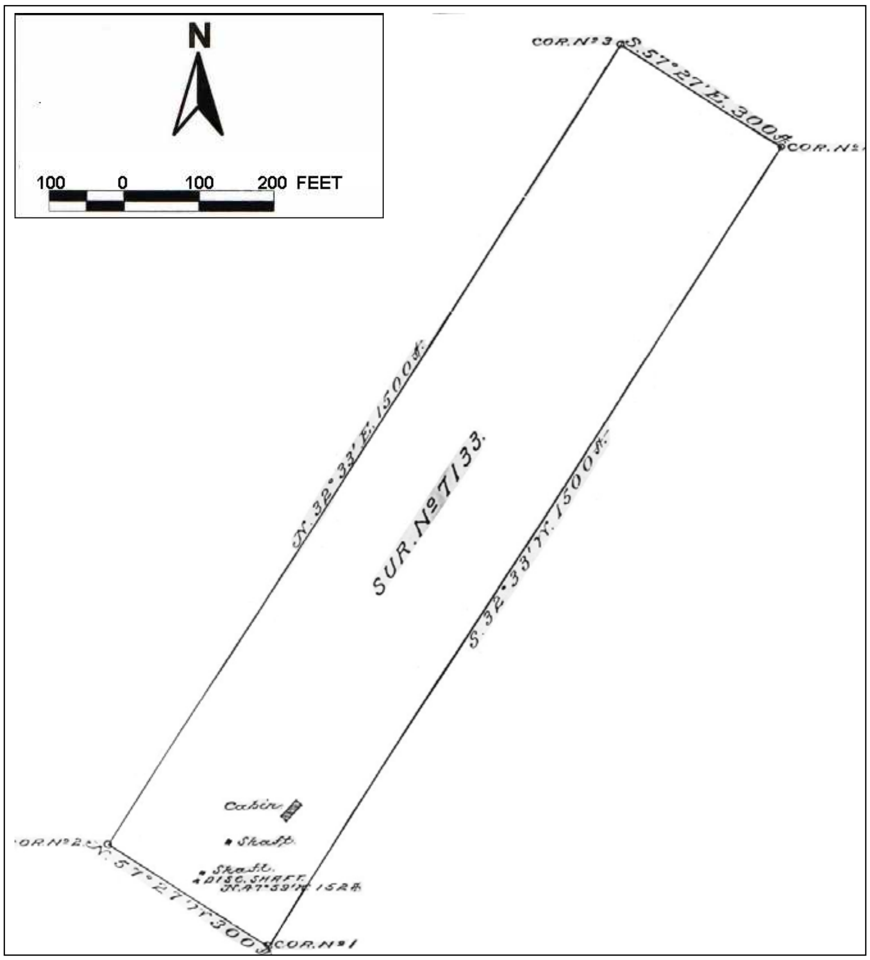


Figure 30. Mineral survey of the Guild Lode (Modified; scale is approximate).

1892. Jeremiah C. Winchell was granted a patent for the Guild Lode (BLM files).

1913. A map of the mines in the Platoro-Summitville mining district labeled an area with two adits (Figures 7 and 31) the “Gild” Tunnel (Patton, 1917, plate 1). An adit shown just below the access road could be either inventory feature #104 or #101. The adit at the end of the road could be inventory feature #101. It was not determined which working Patton referred to as the Eastern Tunnel.

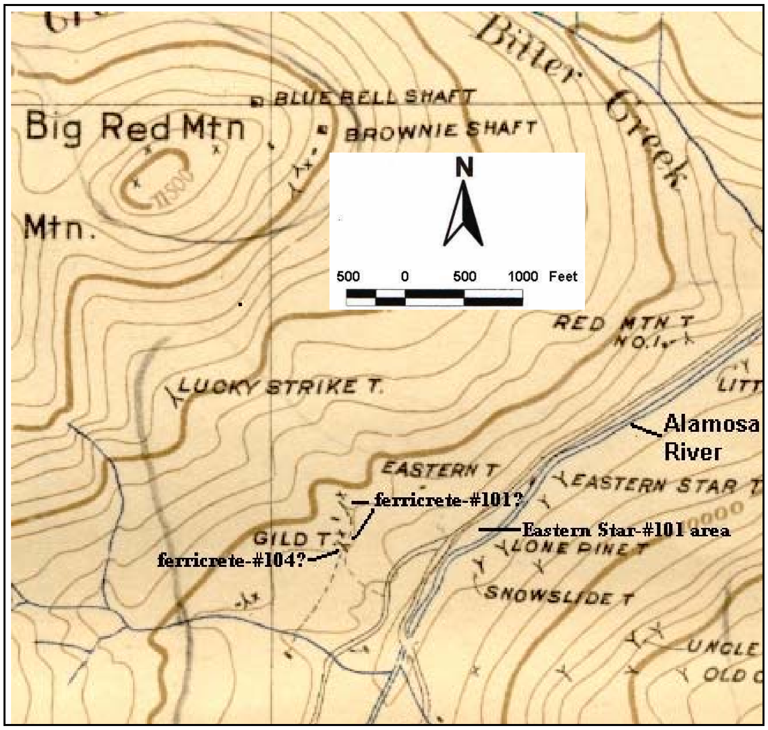


Figure 31. Mines surveyed on the southeastern slope of Big Red Mountain during 1913 (Modified from Patton, 1917, plate 1; Scale is approximate).

1932. H.H. Winchell and Associates Operated the Microcosm Tunnel part of the year. The location of the Microcosm Tunnel was listed in “Rio Grande County” near Stunner. No production was reported (Colorado Bureau of Mines, 1933, p. 53).

1938. C.H. Snow and Associates operated the Winchell Tunnel on the Microcosm (unpatented) and Guild (patented) Lodes owned by Bessie Winchell. Apparently the 1,200-foot long Winchell Tunnel was intended to intersect a vein exposed above the site (Murray, Inspectors report-Winchell Tunnel, July 15, 1938; 1938 Mine managers report-Winchell Tunnel, CBM). It is unclear when the Winchell Tunnel was excavated. Adit #101 could be the Winchell Tunnel and possibly on the Microcosm Lode. Adit #101 trends toward the Guild Lode.

1961. Inspiration Development Company, E.A. Maxwell, J.B. Rigg, J.B. Rigg Jr., N.J. Rigg, and J.H. Tippit, located a large claim block in the area that included the Ferricrete inventory area (BLM files).

1965. Inspiration Development Company, E.A. Maxwell, J.B. Rigg, J.B. Rigg Jr., N.J. Rigg, and J.H. Tippit, located additional claims in the area (BLM files).

1967. Inspiration Development Company, E.A. Maxwell, J.B. Rigg, J.B. Rigg Jr., N.J. Rigg, and J.H. Tippit, located additional claims in the area (BLM files).

1973. Inspiration Development Company located additional claims in the area (BLM files).

1979. M.F. Ayler and FRM Minerals Inc. located the First Miss #1 claim in the vicinity of the Ferricrete inventory area (BLM files).

1982. Last year assessment work was performed on Inspiration Development Company, E.A. Maxwell, J.B. Rigg, J.B. Rigg Jr., N.J. Rigg, and J.H. Tippit's claims (BLM files).

1983. W.S. Calkin and Jasper Joint Venture located the JJV 7 and JJV 8 claims in the vicinity of the Ferricrete inventory area (BLM files).
1986. Union Mines Inc. located the ALA (1-3) claims in the vicinity of the Ferricrete inventory area (BLM files).

1987. Summitville Consolidated Mining Company and A.M. Davis located a large claim block in the area that included the Ferricrete inventory area (BLM files).

1991. Last year assessment work was performed on A.M. Davis and Summitville Consolidated Mining Company's claims, and W.S. Calkin and Jasper Joint Venture's claims (BLM files).

1994. Last year assessment work was performed on Union Mines Inc.'s claims (BLM files).

2000. J.M. Throckmorton, Janet E. Throckmorton, and Larry R. Martz were the owners of the Guild Lode (bk. 287, p. 303; bk. 344, p. 158). Assessment work was performed on the First Miss #1 claim for the last year (BLM files).

GEOLOGY

Adit #101 (Ferricrete Mine) was driven in Holocene colluvium overlying an unnamed Oligocene monzonite (Figure 3). The monzonite unit is a fine- to medium-grained, gray-colored intrusive rock that contains altered pyroxene and sparse biotite (Lipman, 1974). Ferricrete outcrops at the portal of adit #101 (Figure 32). Ferric-hydroxide precipitate from the mine effluent is forming a deposit of ferrosinter near the portal (Figure 33) and on the upper part of the dump (Figure 34).

Figure 32. Ferricrete outcrop at the portal of Ferricrete Mine adit #101.

Figure 33. Iron-hydroxide precipitate and filamentous algal growth near portal of Ferricrete Mine adit.

Figure 34. Ferricrete Mine dump #201. Upper photo is view to northeast, lower photo is view to southeast.

SITE DESCRIPTION

The Ferricrete Mine inventory area is reached by traveling about 7 miles southwest of Jasper on FR 250, then heading northwest about ¼ mile up the Alum Creek road. A short mine road heads northeast from the Alum Creek road to the Guild Lode. Adit #101 (Ferricrete Mine) is below the Guild Lode on the northeastern bank of a small, unnamed creek (not a tributary to Alum Creek) east of the mine road. Photographs were considered adequate to show the dump area in relation to the effluent and creek, therefore a surface map was not prepared.

Water was flowing from the partly collapsed portal at a rate of 0.8 gpm in August 1993 and 2.3 gpm in August 2000. On both occasions a flume was used to measure the flow rate. Above adit #101 the gulch was dry, suggesting that during part of the year the adit is the source of the water in the creek. Effluent spreads out over the dump bench and deposits abundant ferrosinter (Figure 35). Effluent drains into the creek on the southwestern side of the dump. The creek infiltrates into colluvium about 50 feet downstream from the top of the dump, then emerges 20 feet upstream from FR 250 and flows into the Alamosa River. Ferrosinter and ferricrete deposits are exposed in the stream channel above FR 250 and probably predate the mine.

Dump #201 contains about 600 cubic yards of mostly gravel and finer sized material. Aspen, pine, and grass seem to flourish on the lower part of the dump away from effluent and ferrosinter deposits. No dump samples were taken.

WASTE AND HAZARD CHARACTERISTICS

The Ferricrete Mine adit is considered the most significant environmental hazard in the area, and has been assigned an EDR of 2. In August of 1993 the flow from the adit was measured at 0.8 gpm with pH of 3.98 and conductivity of 682 µS/cm. A water sample from the adit discharge had the chemical signature shown in Table 7.

Table 7. Results of chemical analyses for water sample collected from Ferricrete Mine, August 12, 1993 sampling event.

Analyte	Concentration (µg/L)
Aluminum	11,000
Cadmium	790
Iron	61,000
Manganese	2,400
Nickel	30
Zinc	250

In 2000, the portal discharge was measured at 2.3 gpm with pH of 3.66 and conductivity of 726 µS/cm. A water sample of the portal discharge (MH-2000-18) exceeded State water quality standards in iron (trec), and dissolved aluminum, iron, manganese, sulfate and zinc (Table 8).

Table 8. Results of chemical analyses and measurement of field parameters for water samples MH-2000-18 to MH-2000-20 from the Ferricrete Mine area. All concentrations are dissolved unless identified as total recoverable (trec). (<) denotes concentration is below laboratory detection limit.

Sample	MH-2000-18, FERRICRETE MINE (8/23/00)				MH-2000-19, FERRICRETE BELOW (8/23/00)			
Parameter	Concentration/ measurement	Standard	Factor above standard	Load (grams/day)	Concentration/ measurement	Standard	Factor above standard	Load (grams/day)
Flow (gpm)	2.3							
pH (standard units)	3.66	6.5 - 9.0			2.67	6.5 - 9.0		
Conductivity (µS/cm)	726	None	N/A		1,030	None	N/A	
Alkalinity (mg/L CaCO3)	N/A	None	N/A		N/A	None	N/A	N/A (standing)
Hardness (mg/L CaCO3)	160	None	N/A		160	None	N/A	N/A (standing)
Aluminum (trec) (µg/L)	13,000	None	N/A	163	13,000	None	N/A	N/A (standing)
Antimony (trec) (µg/L)	<1.0	6	Not detected	N/A	<1.0	6	Not detected	N/A (standing)
Arsenic (trec) (µg/L)	<1.0	10	Not detected	N/A	<1.0	10	Not detected	N/A (standing)
Iron (trec) (µg/L)	69,000	1,000	69	865	14,000	1,000	14	N/A (standing)
Thallium (trec) (µg/L)	<1.0	0.5	Not detected	N/A	<1.0	0.5	Not detected	N/A (standing)
Zinc (trec) (µg/L)	290	2,000	Below standard	3.6	270	2,000	Below standard	N/A (standing)
Aluminum (µg/L)	13,000	87	149	163	13,000	87	149	N/A (standing)
Cadmium (µg/L)	0.7	3.16	Below standard	0.01	0.6	3.16	Below standard	N/A (standing)
Calcium (mg/L CaCO3)	90	None	N/A	1,128	90	None	N/A	N/A (standing)
Chloride (mg/L)	<10.0	250	Not detected	N/A	<10.0	250	Not detected	N/A (standing)
Chromium (µg/L)	<20	11	Not detected	N/A	<20	11	Not detected	N/A (standing)
Copper (µg/L)	<4.0	13.36	Not detected	N/A	<4.0	13.36	Not detected	N/A (standing)
Fluoride (mg/L)	0.45	2	Below standard	5.6	0.42	2	Below standard	N/A (standing)
Iron (µg/L)	68,000	300	227	853	14,000	300	47	N/A (standing)
Lead (µg/L)	<1.0	4.2	Not detected	N/A	4.0	4.2	Below standard	N/A (standing)
Magnesium (mg/L)	17	None	N/A	213	17	None	N/A	N/A (standing)
Manganese (µg/L)	2,600	50	52	33	2,700	50	54	N/A (standing)
Nickel (µg/L)	30	77.3	Below standard	0.4	29	77	Below standard	N/A (standing)
Potassium (mg/L)	3.1	None	N/A	39	3.4	None	N/A	N/A (standing)
Silicon (mg/L)	20.0	None	N/A	251	20.0	None	N/A	N/A (standing)
Silver (µg/L)	<0.2	0.17	Not detected	N/A	<0.2	0.17	Not detected	N/A (standing)
Sodium (mg/L)	1.70	None	N/A	21	1.80	None	N/A	N/A (standing)
Sulfate (mg/L)	370	250	1.5	4,639	370	250	1.5	N/A (standing)
Zinc (µg/L)	290	176	1.7	3.6	270	176	1.5	N/A (standing)

Table 8. Results of chemical analyses and measurement of field parameters for water samples MH-2000-18 to MH-2000-20 from the Ferricrete Mine area-- continued.

Sample	MH-2000-20, FERRICRETE NEAR FR 250 (8/23/00)			
Parameter	Concentration/ measurement	Standard	Factor above standard	Load (grams/day)
Flow (gpm)	1.5			
pH (standard units)	3.31	6.5 - 9.0	N/A	
Conductivity (µS/cm)	582	None	N/A	
Alkalinity (mg/L CaCO3)	N/A	None	N/A	
Hardness (mg/L CaCO3)	140	None	N/A	
Aluminum (trec) (µg/L)	8,600	None	N/A	70
Antimony (trec) (µg/L)	<1	6	Not detected	N/A
Arsenic (trec) (µg/L)	<1	10	Not detected	N/A
Iron (trec) (µg/L)	13,000	1,000	13	106
Thallium (trec) (µg/L)	<1	0.5	Not detected	N/A
Zinc (trec) (µg/L)	190	2,000	Below standard	1.6
Aluminum (µg/L)	8,600	87	99	70
Cadmium (µg/L)	0.3	2.88	Below standard	0.002
Calcium (mg/L CaCO3)	83	None	N/A	679
Chloride (mg/L)	<10	250	Not detected	N/A
Chromium (µg/L)	<100 (1)	11	Not detected	N/A
Copper (µg/L)	<20 (1)	11.97	Not detected	N/A
Fluoride (mg/L)	0.22	2	Below standard	1.8
Iron (µg/L)	9,800	300	33	80
Lead (µg/L)	1	3.6	Below standard	0.008
Magnesium (mg/L)	14	None	N/A	115
Manganese (µg/L)	1,400	50	28	11.4
Nickel (µg/L)	<100 (1)	69.3	Not detected	N/A
Potassium (mg/L)	2.2	None	N/A	18
Silicon (mg/L)	19	None	N/A	155
Silver (µg/L)	<0.2	0.13	Not detected	N/A
Sodium (mg/L)	2.1	None	N/A	17
Sulfate (mg/L)	250	250	At standard	2,044
Zinc (µg/L)	190	157	1.2	1.6

Notes: (1) Detection limits elevated due to dilution required during analyses.

The two other water samples were taken, one downstream from the confluence of the adit discharge and the creek, as shown on Figure 35, next to the dump (MH-2000-19) and the other 20 feet above FR 250 (MH-2000-20). Sample MH-2000-19 was taken from a small pool of effluent just before it infiltrated into the streambed. The pool had pH of 2.67 with conductivity of 1,030 µS/cm and red-orange precipitate. Iron (trec), and dissolved aluminum, iron, manganese, sulfate and zinc exceeded State water quality standards (Table 8). Farther downstream and about 20 ft above FR250, at a pooled spring surrounded by fresh and slightly hardened ferrosinter, sample site MH-2000-20 had flow of 1.5 gpm with pH of 3.31 and conductivity of 582 µS/cm. Iron (trec), and dissolved aluminum, iron, manganese, and zinc exceeded State water quality standards (Table 8). In 1993, the site had flow of 1.5 gpm with pH of 3.4 and conductivity of 439 µS/cm.

Barry (1996) states that almost all of the Alum Creek watershed is underlain by primary and secondary quartz-sericite-pyrite alteration, and that the Alum Creek waters are significantly more degraded (i.e. lower pH and higher concentrations of metals) than nearby watersheds draining to the Alamosa River. The watershed reportedly contains up to 1-2 volume percent pyrite (Bove and others, 1995). The Ferricrete Mine does not lie in the Alum Creek watershed, but in a nearby-unnamed creek that drains directly to the Alamosa River. The geology of this watershed is similar to that of Alum Creek.

The Ferricrete Mine dump has been assigned an EDR of 4, indicating slight environmental degradation. The dump abuts the unnamed creek and has been partially eroded by it. The creek also flows over part of the dump, so it is reasonable to assume that the dump leaches metals and acidity to the stream. The combined surface area of the four dumps inventoried in the area is over 4,000 sq. ft. Assuming annual precipitation of 45 inches, up to 0.2 gpm of precipitation could be infiltrating into the dumps and mobilizing acidity and trace elements to ground water.

Two features in the area have a degree of physical hazard. The Ferricrete adit has been assigned a hazard rating of 2 (significant hazard) due to unrestricted access to the mine workings. A prospect hole downgradient from the mine has been assigned a hazard rating of 3 (potential hazard), because of the potential fall hazard associated with its 17-foot depth.

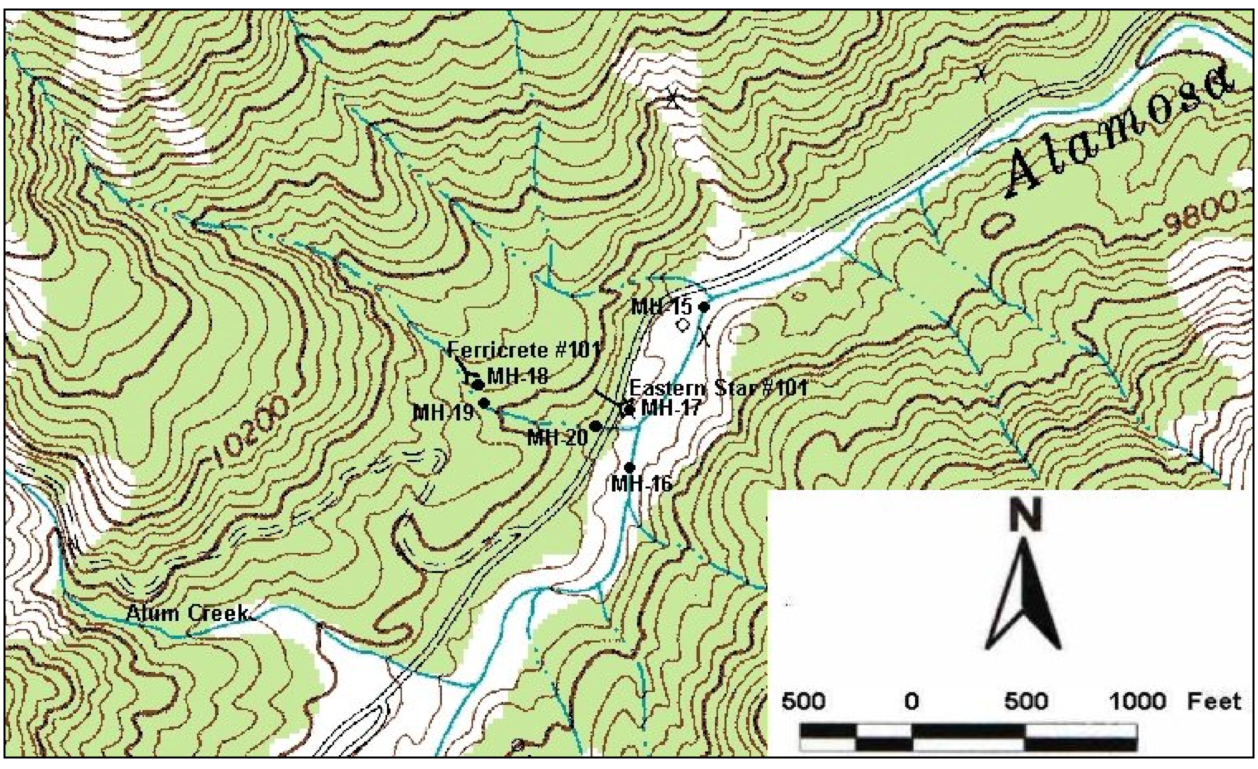


Figure 35. Water sample sites for the Ferricrete and Eastern Star inventory areas (scale is approximate) .

EASTERN STAR TUNNEL

The Eastern Star Tunnel inventory area (#361/4138-2) is about ¾ mile northeast of the Stunner town site and 7 miles west of Jasper (Figures 2 & 36). Of the five adits included in the inventory area, only adit #101 is on the north side of the Alamosa River and is the only adit draining water. Adit #101 is near the base of Big Red Mountain just below FR 250 (Figures 31 and 36). Adit #101 and associated waste-rock pile #201 are entirely on USFS-administered land.

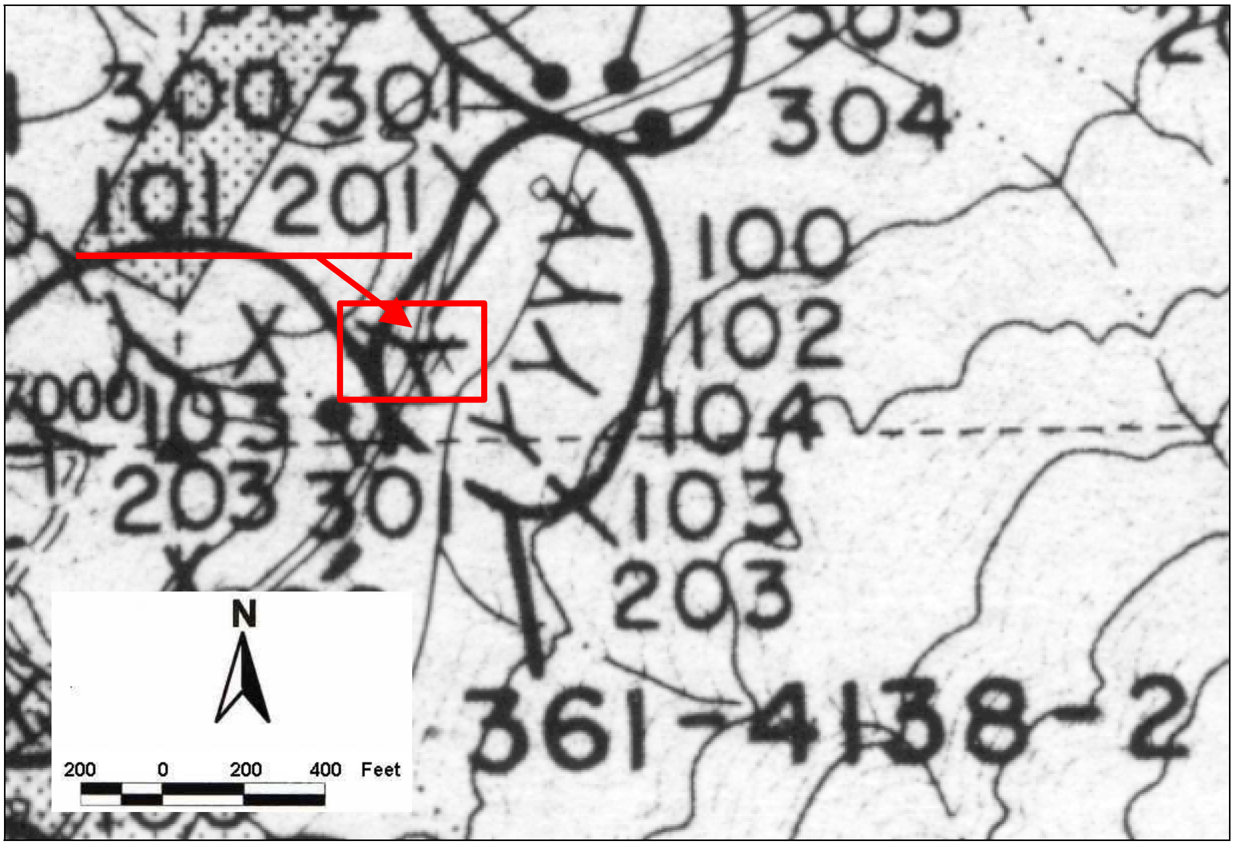


Figure 36. Eastern Star Tunnel inventory area #361-4138-2 [Scale is approximate; numbered mine openings (100-series numbers), waste rock (200-series numbers), water test sites (300-series numbers, shown as dots if not at mine openings or dumps) are keyed to inventory forms in appendix; adit 101 is the Eastern Star Tunnel with associated waste-rock dump 201).

No historic information was found on any of the mines in the inventory area. Adit #101 trends toward and could be related to the Guild Mine, located about 600 feet higher on the hill (See preceding Ferricrete Mine mining history section). During 1913, Patton (1917, plate 1) and CGS surveyed 4 adits (Snowslide-#103, Lone Pine-#104, Eastern T-#102, and Eastern Star T-#100) near the southern shore of the Alamosa River across from the Eastern Star Tunnel (inventory feature #100); see Figures 7 and 31. No working was illustrated on the northern side of the Alamosa River in the vicinity of adit #101 although the exact position of the Eastern Star T adit is unclear, but presumed to be the adit below the Eastern Star T. It is assumed that the adit was started after 1913.

CLAIM BLOCKS

1961. Inspiration Development Company, E.A. Maxwell, J.B. Rigg, J.B. Rigg Jr., N.J. Rigg, and J.H. Tippit located a large claim block in the area that included the Eastern Star inventory area (BLM files).

1968. R. Edger located the Robb-John #12 claim in the vicinity of the Eastern Star inventory area (BLM files).

1981. H. Steiner located the Claim Steiner claim in the vicinity of the Eastern Star inventory area (BLM files).

1982. Last year assessment work was performed on Inspiration Development Company, E.A. Maxwell, J.B. Rigg, J.B. Rigg Jr., N.J. Rigg, and J.H. Tippit's claims (BLM files).

1984. S. Horvat located the Rosco claims in the vicinity of the Eastern Star inventory area (BLM files).

1986. Union Mines Inc. located the ALA claims in the vicinity of the Eastern Star inventory area (BLM files).

1987. A.M. Davis and Summitville Consolidated Mining Company located a large claim block in the area that included the Eastern Star inventory area (BLM files).

1991. Last year assessment work was performed on A.M. Davis and Summitville Consolidated Mining Company's claims (BLM files).

1992. Last year assessment work was performed on H. Steiner's claim (BLM files).

1994. Last year assessment work was performed on Union Mines Inc. and R. Edger claims (BLM files).

2000. Last year assessment work was performed on S. Horvat's claims (BLM files).

GEOLOGY

Adit #101 (Eastern Star inventory area) was driven in fine- to medium-grained, gray-colored Oligocene intrusive monzonite (Figure 3) that contains altered pyroxene and sparse biotite (Lipman, 1974). Waste rock was composed of mostly white to light yellow altered country rock with about 20% altered gray country rock. Vuggy quartz vein material was a minor constituent of the dump. The light colored country rock appears mineralized and the gray country rock appears barren.

SITE DESCRIPTION

Adit #101 (Eastern Star inventory area) is about 7 miles southwest of Jasper just below FR 250. Road construction activities along FR 250 must have obliterated the adit. It was not determined if the portal was in the embankment or if the effluent is piped under the road. Water from the road embankment forms a small wetland on the dump bench (Figure 32). From the wetland most of the water flows north between the road and the dump and disappears a short distance away (Figure 38). Effluent near adit #101 supports abundant growth of filamentous algae and moss. Willows and grass grow in the wetlands. Evidence at the toe of the dump indicates that small seasonal seeps emerge and flow about 60 feet to the Alamosa River. During this investigation the seeps were dry.

Dump #101 contains about 1,000 cubic yards of mostly light yellow waste rock with some gray and reddish areas. The yellow and reddish areas appear mineralized; gray material appears to be barren country rock. The dump has several lobes with a large pile on the east, close to the Alamosa River (Figures 39 and 40). Dump material is highly variable in size.

Figure 37. Water from Eastern Star adit #101 and wetland on dump #201 bench.

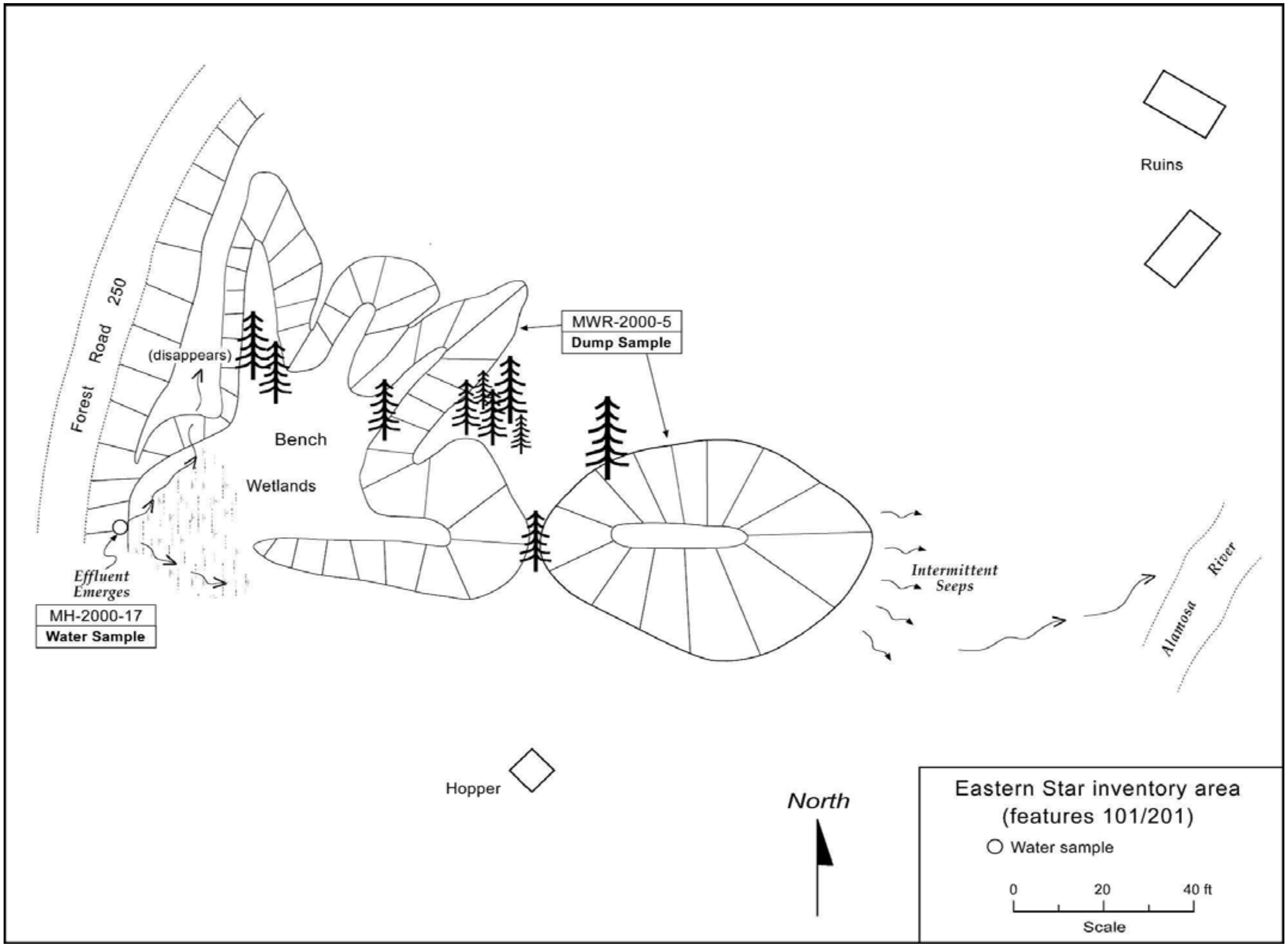


Figure 38. Surface map of Eastern Star dump #201 and sample sites.

Figure 39. Side view of Eastern Star dump #201 looking north.

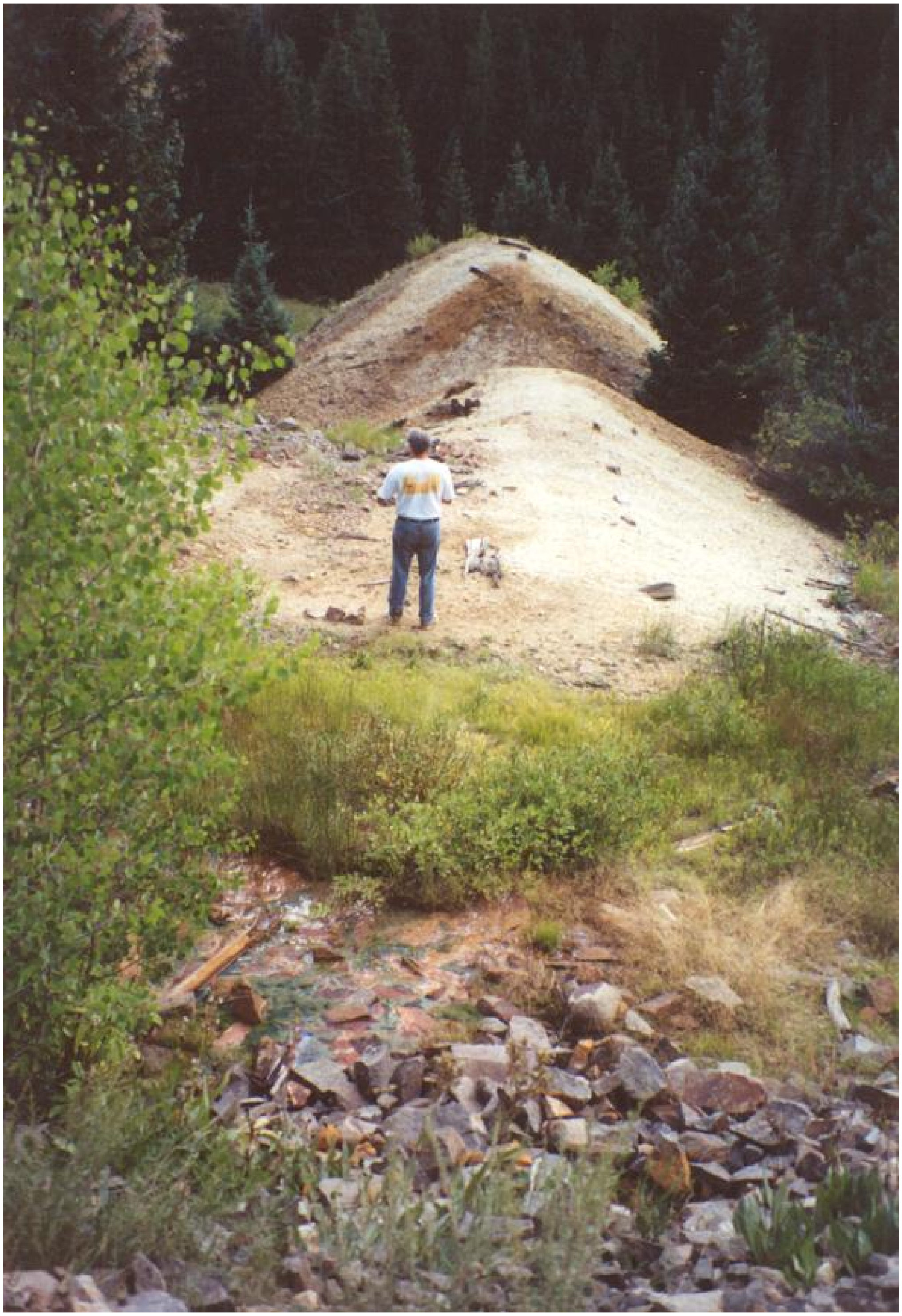


Figure 40. Eastern Star dump #201 bench.

WASTE AND HAZARD CHARACTERISTICS

The Eastern Star adit #101 has been designated as the most serious environmental hazard in the inventory area with an EDR of 3. Drainage from the adit was measured in August of 1993 at 1.0 and 1.1 gpm with pH of 6.91 and 7.0, and conductivity of 784 and 912 µS/cm. A pair of water samples collected in 1993 from the adit discharge had the chemical compositions shown on Table 9.

Table 9. Results of chemical analyses for Eastern Star Mine portal discharge from 1993 sampling event.

Analyte	Concentration (µg/L)	
	Total Recoverable	Dissolved
Al	1,400	600
Fe	12,100	17,000
Cr	11	<6
Mn	1,100	1,100
Mo	<50	70
Pb	<50	60
Zn	30	<10

The portal effluent was sampled during the 2000 investigation (sample number MH-2000-17), and had flow of 2 gpm with pH of 6.67 and conductivity of 787 µS/cm. The analytical data are shown in Table 10. Analytes exceeding State water quality standards include total recoverable arsenic and iron, and dissolved aluminum, iron, manganese, and sulfate. It should be noted that the detection limits for total recoverable thallium, and dissolved aluminum and chromium were greater than the State water quality standard. Water samples were also collected from the Alamosa River both upstream (sample MH-2000-16) and downstream (MH-2000-15) from the mine (Figure 35). Both the upstream and downstream samples exceeded State water quality standards in total recoverable iron and dissolved aluminum, copper, iron and manganese (Table 10). There is minimal difference between the chemical compositions of the two samples. Due to the relatively large flow of the Alamosa River (>10 cfs), the 2 gpm discharging from the Eastern Star Mine has negligible chemical effect on the river water.

The Eastern Star mine dump has been assigned an EDR of 4 (slight environmental degradation). A composite rock sample (NWR-2000-5) collected from the dump (Table 11) revealed no significant anomalies. The sample is slightly acid neutralizing as shown by the positive net acid base potential and the Paste pH of 6.65.

No drainage was evident from the two dumps in the area, however the combined surface area of the dumps is over 16,000 sq. ft. Assuming 45 inches of annual precipitation, up to 1 gpm of infiltration through the dumps is possible, with the potential for acidity and trace metal mobilization to ground water.

Table 10. Results of chemical analyses and measurement of field parameters for water samples MH-2000-15 to MH-2000-17 from the Eastern Star Mine area. All concentrations are dissolved unless identified as total recoverable (trec). < denotes concentration is below laboratory detection limit.

Sample	MH-2000-15, ALAMOSA BELOW EASTERN (8/23/00)				MH-2000-16, ALAMOSA ABOVE EASTERN (8/23/00)			
Parameter	Concentration/ measurement	Standard	Factor above standard	Load (grams/day)	Concentration/ measurement	Standard	Factor above standard	Load (grams/day)
Flow (gpm)	4,773				4,773			
pH (standard units)	5.21	6.5 – 9.0			5.10	6.5 - 9.0		
Conductivity (µS/cm)	213	None			212	None		
Alkalinity (mg/L CaCO3)	N/A	None			N/A	None		
Hardness (mg/L CaCO3)	68	None	N/A		66	None	N/A	
Aluminum (trec) (µg/L)	3,200	None	N/A	83,256	3,100	None	N/A	80,655
Antimony (trec) (µg/L)	<1.0	6	Not detected	N/A	<1.0	6	Not detected	N/A
Arsenic (trec) (µg/L)	<1.0	10	Not detected	N/A	<1.0	10	Not detected	N/A
Iron (trec) (µg/L)	6,700	1,000	6.7	174,318	6,300	1,000	6.3	163,911
Thallium (trec) (µg/L)	<1.0	0.5	Not detected	N/A	<1.0	0.5	Not detected	N/A
Zinc (trec) (µg/L)	60	2,000	Below standard	1,561	56	2,000	Below standard	1,457
Aluminum (µg/L)	1,100	87	12.6	28,619	1,000	87	11.5	26,018
Cadmium (µg/L)	<0.3	1.68	Not detected	N/A	<0.3	1.65	Not detected	N/A
Calcium (mg/L CaCO3)	50	None	N/A	1,300,881	49	None	N/A	1,274,864
Chloride (mg/L)	<10.0	250	Not detected	N/A	<10.0	250	Not detected	N/A
Chromium (µg/L)	<20	11	Not detected	N/A	<20	11	Not detected	N/A
Copper (µg/L)	9.0	6.41	1.4	234	9.0	6.30	1.4	234
Fluoride (mg/L)	0.18	2	Below standard	4,683	0.18	2	Below standard	4,683
Iron (µg/L)	4,100	300	13.7	106,672	4,000	300	13.3	104,071
Lead (µg/L)	<1.0	1.6	Not detected	N/A	<1.0	1.6	Not detected	N/A
Magnesium (mg/L)	4.30	None	N/A	111,876	4.20	None	N/A	109,274
Manganese (µg/L)	370	50	7.4	9,627	350	50	7.0	9,106
Nickel (µg/L)	<20	37.4	Not detected	N/A	<20	36.7	Not detected	N/A
Potassium (mg/L)	<1.0	None	N/A	N/A	<1.0	None	N/A	N/A
Silicon (mg/L)	6.8	None	N/A	176,920	6.7	None	N/A	174,318
Silver (µg/L)	<0.2	0.04	Not detected	N/A	<0.2	0.04	Not detected	N/A
Sodium (mg/L)	2.60	None	N/A	67,646	2.60	None	N/A	67,646
Sulfate (mg/L)	89	250	Below standard	2,315,568	90	250	Below standard	2,341,586
Zinc (µg/L)	59	85	Below standard	1,535	56	83	Below standard	1,457

Table 10. Results of chemical analyses and measurement of field parameters for water samples MH-2000-15 to MH-2000-17 from the Eastern Star Mine area – continued.

Sample	MH-2000-17, EASTERN STAR (8/23/00)			
Parameter	Concentration/ measurement	Standard	Factor above standard	Load (grams/day)
Flow (gpm)	2			
pH (standard units)	6.67	6.5 - 9.0		
Conductivity (µS/cm)	787	None		
Alkalinity (mg/L CaCO3)	125	None		
Hardness (mg/L CaCO3)	403	None	N/A	
Aluminum (trec) (µg/L)	<250	None	N/A	N/A
Antimony (trec) (µg/L)	<1.0	6	Not detected	N/A
Arsenic (trec) (µg/L)	21.0	10	2.1	0.2
Iron (trec) (µg/L)	8,200	1,000	8.2	89
Thallium (trec) (µg/L)	<1.0	0.5	Not detected	N/A
Zinc (trec) (µg/L)	63	2,000	Below standard	0.7
Aluminum (µg/L)	<250	87	Not detected	N/A
Cadmium (µg/L)	<0.3	6.26	Not detected	N/A
Calcium (mg/L CaCO3)	280	None	N/A	3,053
Chloride (mg/L)	<10.0	250	Not detected	N/A
Chromium (µg/L)	<100	11	Not detected	N/A
Copper (µg/L)	<20.0	29.47	Not detected	N/A
Fluoride (mg/L)	0.83	2	Below standard	9.0
Iron (µg/L)	7,400	300	24.7	81
Lead (µg/L)	<1.0	11.0	Not detected	N/A
Magnesium (mg/L)	30	None	N/A	327
Manganese (µg/L)	1,000	50	20.0	10.9
Nickel (µg/L)	<100	169.1	Not detected	N/A
Potassium (mg/L)	2.3	None	N/A	25.1
Silicon (mg/L)	12.0	None	N/A	131
Silver (µg/L)	<0.2	0.83	Not detected	N/A
Sodium (mg/L)	5.20	None	N/A	57
Sulfate (mg/L)	310	250	1.2	3,380
Zinc (µg/L)	68	385	Below standard	0.7

Table 11. Results of chemical analyses for waste-rock sample MWR-2000-5 from the Eastern Star Mine dump.

Constituent	Units	Concentration
Gold	oz/ton	0.002
Mercury	ppm	0.7
Silver	oz/ton	0.12
Neutralization Potential	Tons $CaCO_3$/ 1000 tons	13.6
Potential Acidity	Tons $CaCO_3$/ 1000 tons	6.9
Net Acid Base Potential	Tons $CaCO_3$/ 1000 tons	6.7
Paste pH	Standard Units	6.65
Na_2O	wt %	0.67
MgO	wt %	2.24
Al_2O_3	wt %	17.7
SiO_2	wt %	57.8
P_2O_5	wt %	0.24
S	wt %	0.79
Cl	wt %	<0.02
K_2O	wt %	4.13
CaO	wt %	1.67
TiO_2	wt %	0.85
MnO	wt %	0.07
Fe_2O_3	wt %	4.67
BaO	wt %	0.08
V	ppm	136
Cr	ppm	73
Co	ppm	<10
Ni	ppm	<10
W	ppm	<10
Cu	ppm	50
Zn	ppm	65
As	ppm	33
Sn	ppm	103
Pb	ppm	61
Mo	ppm	<10
Sr	ppm	196
U	ppm	<10
Th	ppm	<10
Nb	ppm	<10
Zr	ppm	234
Rb	ppm	139
Y	ppm	41

GRAPE MINE

The Grape Mine inventory area #361/4143-1 is in southern Rio Grande County. The Grape Mine (adit #102, Figure 2 & 41) lies along Wightman Fork about 3 miles upstream of its confluence with the Alamosa River (Figure 1). The portal of the mine is about 100 feet east of the stream and the access road is between the portal and the stream. Recent survey markers indicate that the mine and the road are on NFS land; the waste-rock pile and stream are on the privately owned Spar placer mining claim (Mineral Survey No. 5736). A site map was not prepared because the dump is small and on private property.

In 1993 when CGS inventoried the Grape Mine, a sign on the locked portal door read "Grape Mine, keep out, Miles Mining Company." According to Kirkham (oral commun., 2001), "Lucky" Miles operated the property most of his life, but died recently. Another name used by locals was the Fouquet (?) Mine, but was not found in the literature.

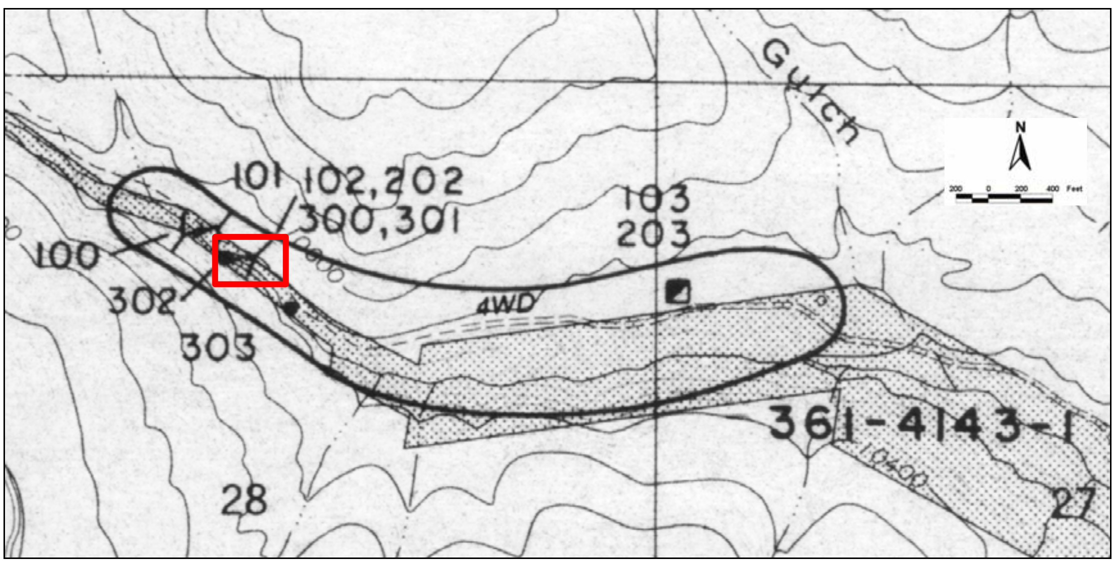


Figure 41. Grape Mine inventory area #361-4143-1 [Scale is approximate; numbered mine openings (100-series numbers), waste rock (200-series numbers), water test sites (300-series numbers, shown as dots if not associated with mine openings or dumps) are keyed to inventory forms in appendix; adit #102 and dump #202 are the Grape Mine].

MINING HISTORY

1888. Charles F. Palmer relocated the Spar Placer (BLM files). Current dump material from the Grape Mine is on the Spar Placer.

1889. Mineral Survey No. 5736 was conducted on the Spar Placer owned by Charles F. Palmer (BLM files). No information regarding the Grape Mine was noted on the Mineral Survey.

1891. Charles F. Palmer received a patent for the Spar Placer (BLM files).

1936-1939. E. Eichelberger located and worked a block of 21 claims (bk. 80, p. 324-329; bk. 203, p. 398-399; bk. 211, p. 23, 209, 335, 449; bk. 225, p. 31, 37; BLM files). The Grape Lode was eventually located over one claim within the 21-claim block.

1968. Wesley C. Miles, Sr. acquired the original 21 Eichelberger Lodes from Jim Lundberg (president of the First National Bank) through Floyd White (BLM files).

1968-1973. Miles filed on 4 of the 21 Eichelberger claims. No money or equipment was available to work the claims (BLM files).

1973. In April, Wesley C. Miles, Sr. located the Grape, Sharon, Three of a Kind, and High Lonesome claims near the center of section 28, T. 37 N., R. 4 E. over 4 of the Eichelberger claims (bk. 330, p. 491, 492, 631; bk. 331, p. 529; BLM files). Miles declared that the claims border the Spar placer and not the Rio Grand placer, located further down stream along Wightman Fork. In October, Wesley C. Miles, Sr. filed the Grape, Sharon, Three of a Kind, and High Lonesome claims with the BLM. No map was available although it is assumed that the Grape Mine is on the Grape Lode.

1984. Stephen Horvat located the Sue 1 through 6, Jena 9, and Rita 10 claims in the vicinity of the Grape Mine (BLM files).

1985. Apparently, waste rock from the Grape Mine and a cabin were on the Spar Placer owned by the Reynolds Mining Company. The cabin was relocated. Assessment work was performed for the last year on Stephen Horvat’s claims including the Grape Mine (BLM files).

1992. Wesley C. Miles Sr. Died. Assessment work was performed for the last year on the Sharon, High Lonesome, and Three of a Kind claims. Albert Blais filed the Grape Lode with the BLM. In December, Blais submitted a plan of operations to work the Grape Mine (BLM files).

1993. CGS inventoried the Grape Mine area (Inventory #361/4143-1). A sign on the locked portal door read “Grape Mine, keep out, Miles Mining Company.” According to Kirkham (oral commun. 12/7/01), “Lucky” Miles operated the property most of his life.

1996. Assessment work was performed for the last year on the Grape claim (BLM files).

1997. BLM officially declared the Grape claim abandoned (BLM files).

GEOLOGY

The Grape Mine was driven near the contact between the upper member of the Summitville Andesite and an unnamed monzonite unit (Figure 3), both Oligocene. The upper member of the Summitville Andesite consists of andesitic flows and breccias. The unnamed monzonite is a fine- to medium-grained, gray-colored intrusive rock containing altered pyroxene and sparse biotite (Lipman, 1974).

SITE DESCRIPTION

The Grape Mine (#102/202) is reached by traveling about 3 miles southwest of Jasper on FR 250 to Wightman Fork, then 3 miles northwest along Wightman Fork road. Adit #102 is on the northern side of the Wightman Fork road and dump #202 is on the southern side next to Wightman Fork. Dump #202 contained about 50 cubic yards of mostly brown and red oxidized volcanic rocks with minor pyrite. No waste-rock samples were taken. The dump was naturally revegetated (Figure 42) and apparently on a patented placer claim.

Water was pooled inside the Grape Mine. A small amount of algae lined the pool and minor red precipitate coated the rocks and algae. The mine water seeped through debris at the portal and emerged about 5 feet from the portal (Figure 43). Where the water reappeared, filamentous algae was abundant and the amount of red precipitate increased. The effluent flowed into the road and was diverted by tire tracks in the road for about 20 feet before running down the outslope of the road onto a small terrace between the road and Wightman Fork. The effluent soaked into the alluvium on the terrace, not reaching Wightman Fork at the surface.

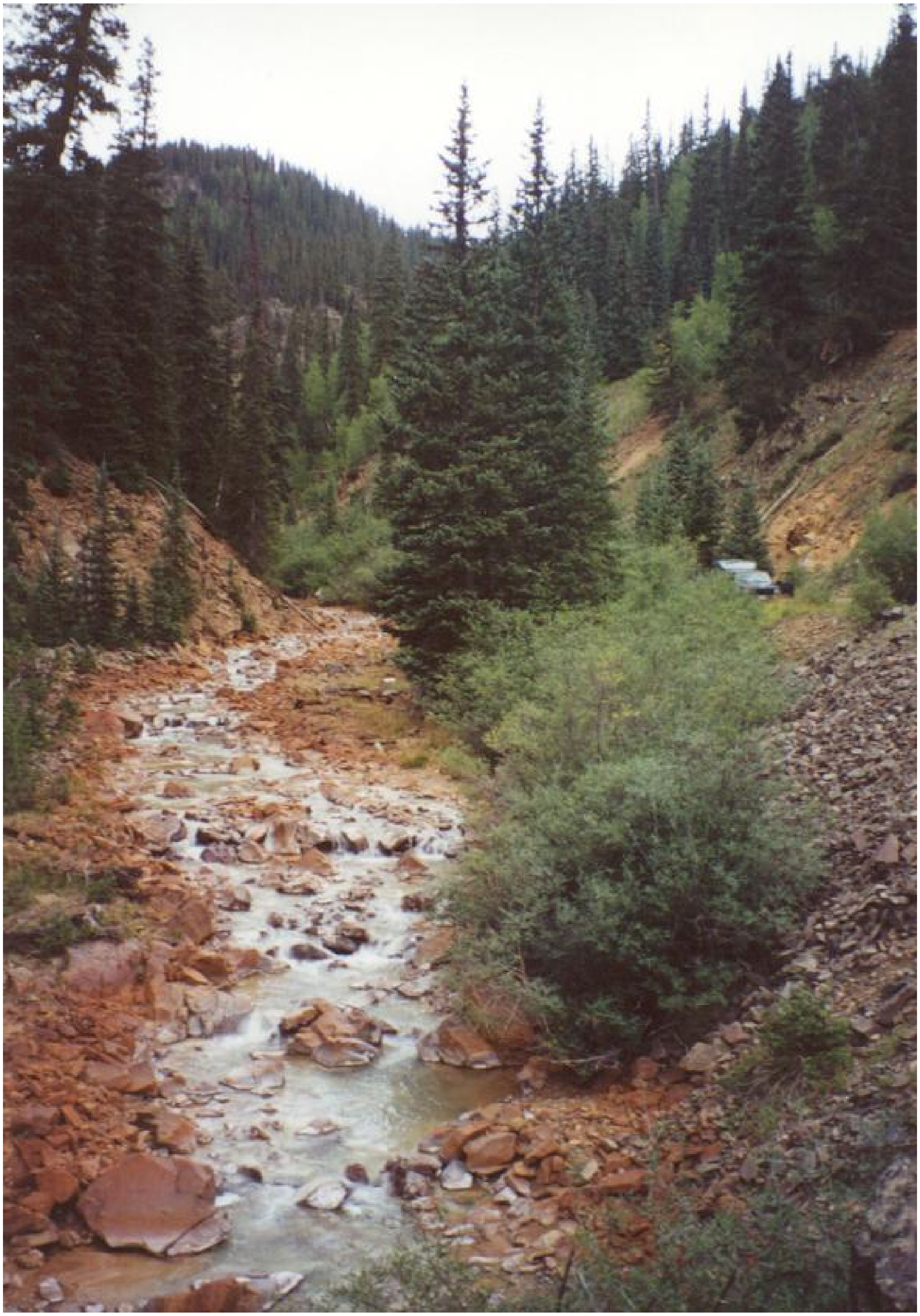


Figure 42. Wightman Fork below Grape Mine dump. The Grape Mine portal is to the right of the vehicle.

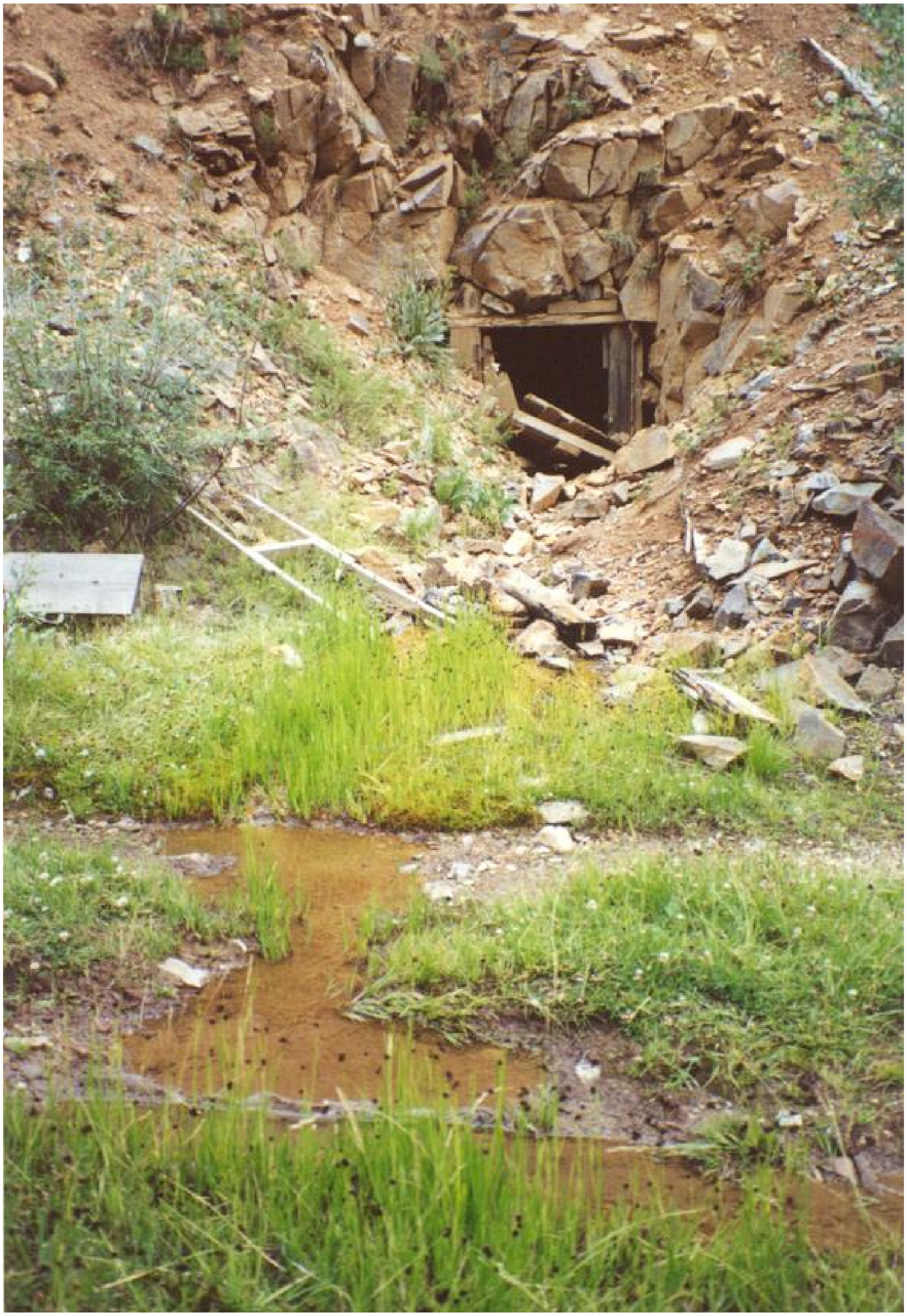


Figure 43. Grape Mine. Effluent crossing Wightman Fork road in the foreground.

WASTE AND HAZARD CHARACTERISTICS

The Grape Mine adit is considered to be the most significant environmental hazard in the inventory area, and has been assigned an EDR of 3 primarily due to the drainage effluent. When tested in July of 1993, the discharge was flowing an estimated 1.5 gpm with pH of 7.41 and conductivity of 615 µS/cm. A month later, testing showed a (measured) flow of 0.7 gpm with pH of 5.65 and conductivity of 277 µS/cm. A water sample in August 1993 carried the chemical composition shown in Table 12.

Table 12. Results of chemical analyses for Grape Mine portal discharge from 1993 sampling event.

Analyte	Dissolved Concentration (µg/L)
Al	<100
Fe	220
Cu	2
Mn	120
Zn	370

Three water samples were collected during the 2000 investigation (Figure 44). A water sample collected from a pool inside the adit (MH-2000-6) had pH of 7.46 and conductivity of 469 µS/cm. Only dissolved zinc exceeded the State water quality standard (Table 13). The detection limit for chromium exceeds the State standard so comparison with the standard is not possible. The mine water seeped through the debris at the portal and emerged at a rate of 1.5 gpm about 5 feet from the portal.

Wightman Fork was sampled below (samples MH-2000-7) and above (MH-2000-8) the influence of the Grape Mine (Figure 44 and Table 13). At both sample sites, the water was murky with light brown turbidity. A thin layer of white and/or light red-brown precipitate coated the rocks of the channel. Flow was estimated at 600 gpm above the Grape Mine and was not noticeably different downstream. The pH was 4.65 at both locations; conductivity was 1,871 µS/cm upstream and 1,876 µS/cm downstream, suggesting little effect in the water chemistry as a result of the small inflow from the Grape Mine. As Table 13 shows, both samples exceed State water quality standards with respect to total recoverable iron and dissolved aluminum, copper, iron, manganese, sulfate, and zinc. There is minimal difference between the chemical compositions of the upstream and downstream water samples.

The Grape Mine Adit (#102) has been assigned a physical hazard rating of 3, due to the ineffective access deterrent. In spite of the sign warning visitors to keep out, the portal is open and accessible.

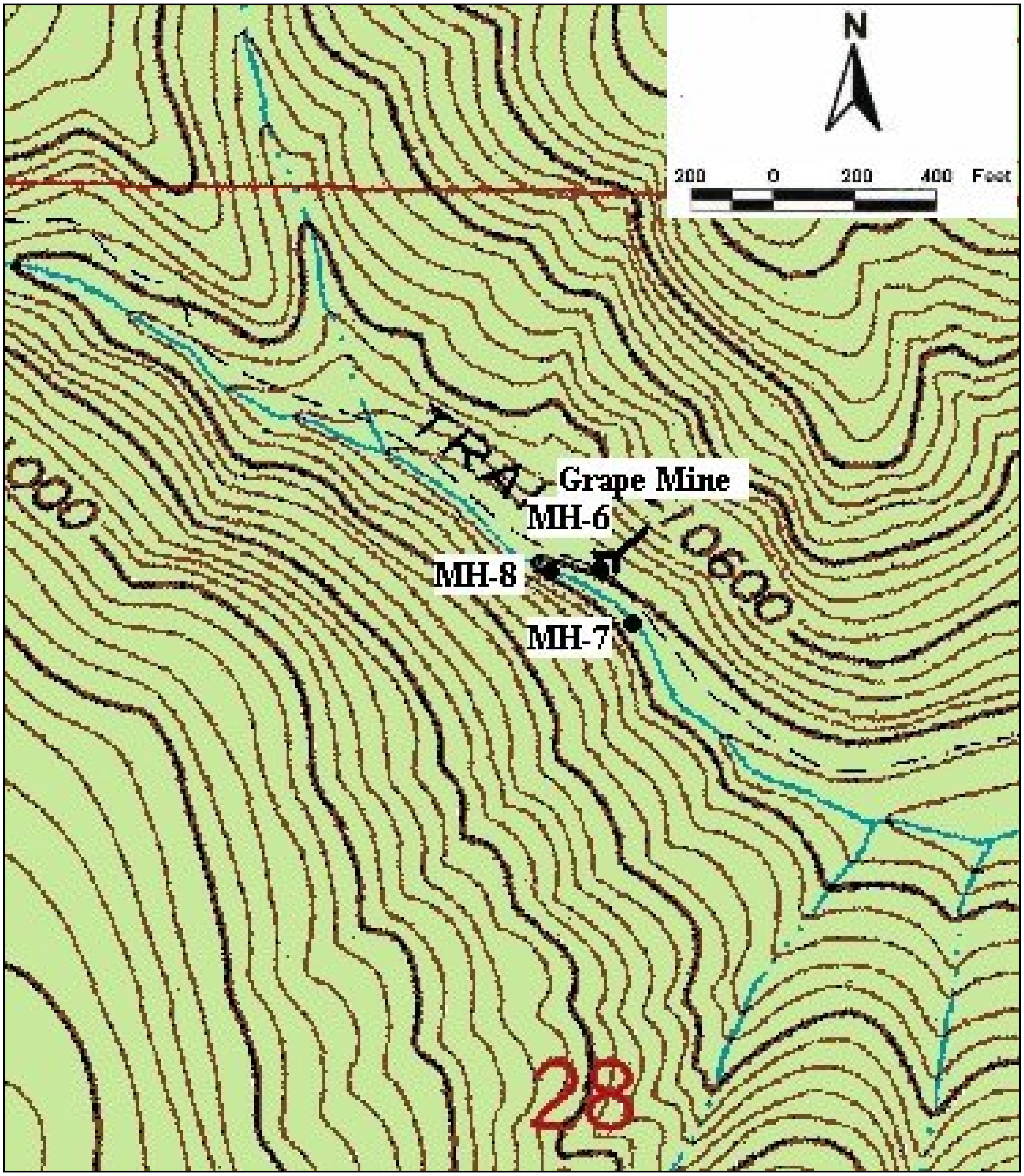


Figure 44. Water sample sites for the Grape Mine area (scale is approximate).

Table 13. Results of chemical analyses and measurement of field parameters for water samples MH-2000-6 to MH-2000-8 from the Grape Mine area. All concentrations are dissolved unless identified as total recoverable (trec). < denotes concentration is below laboratory detection limit.

Sample	MH-2000-6, GRAPE MINE PORTAL (8/21/00)				MH-2000-7, WIGHTMAN BELOW GRAPE (8/21/00)			
Parameter	Concentration/ measurement	Standard	Factor above standard	Load (grams/day)	Concentration/ measurement	Standard	Factor above standard	Load (grams/day)
Flow (gpm)	1.5				600			
pH (standard units)	7.46	6.5 - 9.0			4.65	6.5 - 9.0		
Conductivity (µS/cm)	469	None	N/A		1,876	None	N/A	
Alkalinity (mg/L CaCO3)	125	None	N/A		N/A	None	N/A	
Hardness (mg/L CaCO3)	227	None	N/A		1,087	None	N/A	
Aluminum (trec) (µg/L)	<50	None	N/A	N/A	13,000	None	N/A	42,518
Antimony (trec) (µg/L)	<1.0	6	Not detected	N/A	<2.0	6	Not detected	N/A
Arsenic (trec) (µg/L)	<1.0	10	Not detected	N/A	4.0	10	Below standard	13.1
Iron (trec) (µg/L)	260	1,000	Below standard	2.1	3,900	1,000	3.9	12,755
Thallium (trec) (µg/L)	<1.0	0.5	Not detected	N/A	<2.0	0.5	Not detected	N/A
Zinc (trec) (µg/L)	380	2,000	Below standard	3.1	1,300	2,000	Below standard	4,252
Aluminum (µg/L)	<50	87	Not detected	N/A	9,400	87	108.0	30,744
Cadmium (µg/L)	1.1	4.10	Below standard	0.009	6.7	12.97	Below standard	21.9
Calcium (mg/L CaCO3)	170	None	N/A	1,390	980	None	N/A	3,205,188
Chloride (mg/L)	<10.0	250	Not detected	N/A	19.0	250	Below standard	62,141
Chromium (µg/L)	<20	11	Not detected	N/A	<200	11	Not detected	N/A
Copper (µg/L)	4.0	18.07	Below standard	0.03	1,900.0	68.78	27.6	6,214
Fluoride (mg/L)	0.34	2	Below standard	2.8	0.28	2	Below standard	916
Iron (µg/L)	<10	300	Not detected	N/A	3,000	300	10.0	9,812
Lead (µg/L)	<1.0	6.1	Not detected	N/A	2.0	29.4	Below standard	6.5
Magnesium (mg/L)	14	None	N/A	115	26	None	N/A	85,036
Manganese (µg/L)	42	50	Below standard	0.3	5,000	50	100.0	16,353
Nickel (µg/L)	<20	104.2	Not detected	N/A	<200	391.4	Not detected	N/A
Potassium (mg/L)	<1.0	None	N/A	N/A	3.8	None	N/A	12,428
Silicon (mg/L)	7.1	None	N/A	58	5.6	None	N/A	18,315
Silver (µg/L)	<0.2	0.31	Not detected	N/A	<0.4	4.55	Not detected	N/A
Sodium (mg/L)	6.40	None	N/A	52	31	None	N/A	101,389
Sulfate (mg/L)	130	250	Below standard	1,063	1,100	250	4.4	3,597,660
Zinc (µg/L)	430	237	1.8	3.5	1,300	892	1.5	4,252

Table 13. Results of chemical analyses and measurement of field parameters for water samples MH-2000-6 to MH-2000-8 from the Grape Mine area – continued. Concentrations are dissolved unless identified as total recoverable (trec). < denotes concentration is below laboratory detection limit.

Sample	MH-2000-8, WIGHTMAN ABOVE GRAPE (8/21/00)			
Parameter	Concentration/ measurement	Standard	Factor above standard	Load (grams/day)
Flow (gpm)	600			
pH (standard units)	4.65	6.5 - 9.0		
Conductivity (µS/cm)	1,871	None	N/A	
Alkalinity (mg/L CaCO3)	N/A	None	N/A	
Hardness (mg/L CaCO3)	1,077	None	N/A	
Aluminum (trec) (µg/L)	14,000	None	N/A	45,788
Antimony (trec) (µg/L)	<2.0	6	Not detected	N/A
Arsenic (trec) (µg/L)	4.0	10	Below standard	13.1
Iron (trec) (µg/L)	4,000	1,000	4.0	13,082
Thallium (trec) (µg/L)	<2.0	0.5	Not detected	N/A
Zinc (trec) (µg/L)	1,300	2,000	Below standard	4,252
Aluminum (µg/L)	10,000	87	114.9	32,706
Cadmium (µg/L)	6.9	12.88	Below standard	22.6
Calcium (mg/L CaCO3)	970	None	N/A	3,172,482
Chloride (mg/L)	40.0	250	Below standard	130,824
Chromium (µg/L)	<200	11	Not detected	N/A
Copper (µg/L)	2,000.0	68.23	29.3	6,541
Fluoride (mg/L)	0.28	2	Below standard	916
Iron (µg/L)	3,100	300	10.3	10,139
Lead (µg/L)	2.0	29.1	Below standard	6.5
Magnesium (mg/L)	26	None	N/A	85,036
Manganese (µg/L)	5,000	50	100.0	16,353
Nickel (µg/L)	<200	388.3	Not detected	N/A
Potassium (mg/L)	3.8	None	N/A	12,428
Silicon (mg/L)	5.6	None	N/A	18,315
Silver (µg/L)	<0.4	4.47	Not detected	N/A
Sodium (mg/L)	33	None	N/A	107,930
Sulfate (mg/L)	1,100	250	4.4	3,597,660
Zinc (µg/L)	1,300	885	1.5	4,252

MIGRATION PATHWAYS

SURFACE WATER PATHWAY

All six of the inventory areas have adits that discharge contaminated water to the Alamosa watershed, with a combined total of about 34 gpm. The largest by far is the Pass-Me-By at 28 gpm, with the others discharging only 1-2 gpm apiece.

Exceedances of State water quality standards were noted at several sites. Analyses of the Pass-Me-By portal discharge in 1986 and 1993 did not include calcium and magnesium, so hardness data are not available. However, the 1986 and 1993 data indicate that both dissolved aluminum (59,000 μg/L) and dissolved iron (140,000 μg/L) greatly exceed their aquatic life standards (87 and 300 μg/L respectively). Concentrations of dissolved copper (80 μg/L), nickel (100 μg/L), and zinc (180 μg/L) from August 1993 have a high probability of exceeding the hardness-dependent aquatic life standards based on data from other sites in the area (see Tables 10 and 13), and dissolved manganese of 310 μg/L exceeds the secondary standard of 50 μg/L.

In both the Gilmore mine and Globe mine portal discharges, iron (trec), and dissolved chromium, iron, and manganese exceed State standards. At the Ferricrete mine, the portal discharge exceeds State standards in iron (trec) and dissolved aluminum, chromium, iron, manganese, sulfate, and zinc. The discharge from the Eastern Star adit exceeds State standards for arsenic (trec), iron (trec), and dissolved aluminum, chromium, iron, manganese, and sulfate. The Grape mine portal discharge exceeds State standards in dissolved chromium and zinc.

Although significantly less compared to the contamination already existing in the Alamosa River, the mine sites discussed in this report contribute significant metal loadings to the watershed. Estimated loadings up to 9 and 22 kg/day respectively of aluminum and iron are released from the Pass-Me-By mine. The Globe Mine contributes around 3 kg/day of sulfate to the watershed.

The Ferricrete Mine releases notable metal loadings to the watershed, even though the flow was measured at a modest 2.3 gpm. The aluminum and iron loadings are estimated at 163 and 865 grams per day respectively. Sulfate loading is estimated at 4.6 kg/day.

The Eastern Star discharge has seven analytes exceeding standard, but with a flow of only 1.1 gpm, the impacts due to metal loadings are insignificant. There is no adverse impact to pH in the Alamosa River due to the portal discharge, and the impacts from metals are barely discernible (Table 10). In most cases the variances in data upstream versus downstream appear to be within analytical uncertainty.

The Grape mine portal discharge has minimal impact on the Alamosa watershed, due to a small discharge of 1.5 gpm and the fact that only one analyte (zinc) exceeds State water quality standards. Sulfate loading is slightly over 1 kg/day, but the remaining environmentally significant elements are present at such low concentrations that loadings are not noteworthy.

Waste rock piles are visibly contributing contamination to the watershed at four of the six sites, either through direct contact with adjacent streams or from seeps discharging at the toe of the dumps. The Pass-Me-By dump releases an estimated 0.4 gpm from a seep at its toe with acidic pH and elevated conductivity. No sample was collected. The Gilmore mine dump releases an unmeasured quantity of water from a seep at its toe, but the seep was not regarded as substantial enough to warrant a sample. Dumps at the Globe and Ferricrete mines are likely releasing contaminants to the watershed, because the dumps have been partially removed by erosion from the adjacent streams. At the Ferricrete dump, the creek actually flows over part of the dump. The Eastern Star and Grape mine dumps do not release visible discharge.

GROUND WATER PATHWAY

The mines in the upper Alamosa River Watershed are developed in Oligocene monzonite or andesite. Structural disturbances, such as faults, fractures, or fissures were not documented to any significant extent by the investigators, and thus are presumed to be limited and localized. However, hydrothermal alteration is widespread in the watershed and secondary porosity associated with the alteration may enhance ground water movement. It is difficult to make any quantitative assessments of ground water flow at this time because no aquifer test data are available for the area. Seven wells are permitted in the vicinity of the inventory areas (State of Colorado - Division of Water Resources records), of which 6 are designated for household or domestic use. The availability of water quality data for these wells was not researched, so any influence from the nearby mining activity is unknown at this time. However, one of the wells is permitted to the USFS for the Stunner campground, so obtaining a sample would be a simple matter if taps or drinking fountains exist at the campground. The well is downgradient from the Pass-Me-By, Gilmore Meadow, and Globe mine areas, and thus should reflect any ground-water impacts from those sites.

Infiltration of precipitation through the various waste-rock dumps in the inventory area may be contributing an unseen quantity of contamination to ground water. Four of the six sites have documented seepage from the dumps, so it is conceivable that there is discharge to ground water as well. Multiplying the combined surface area of all the measured dumps in the area by the estimated annual precipitation equals a potential contribution of approximately 4 gpm of contaminated infiltration to ground water. This is comparable to the measured surface-water contribution from many of the sites. The Eastern Star and Grape mine dumps are not releasing visible discharge, but could be contributing contaminants to ground water via infiltration of precipitation.

SOIL EXPOSURE PATHWAY

The possibility of ingesting toxic levels of metals is the primary concern regarding this pathway. Nobody is known to live in the immediate area, but there appears to be occasional work performed at one or more sites, and some areas are apparently used intermittently by the public for recreational activities such as camping, target shooting, and off-road vehicles. Metal concentrations in the waste rock are relatively low. A detailed assessment of soil exposure pathways is beyond the scope of this primarily hydrogeologic and geochemical investigation, but health risks from soil ingestion appear to be low.

AIR EXPOSURE PATHWAY

No evidence of windblown particulates or wind erosion was observed at the mine sites. Although much of the dump consists of small fragments, abundant coarse material is intermixed with the finer particles. The larger pieces help to anchor the finer material during high winds that frequently blow through this area. No residences are within ½ mile of each mine site. A detailed assessment of air exposure pathways is beyond the scope of this investigation, but this pathway appears to be a minimal health risk.

SUMMARY AND CONCLUSIONS

The Pass-Me-By adit is considered the most serious environmental hazard in this investigation. About 28 gpm of acidic, metal-laden water discharges from the mine to Iron Creek. The concentration of iron triples and the concentration of aluminum nearly doubles in Iron Creek due to Pass-Me-By mine inputs. Additional acid rock drainage in smaller quantities is contributed by a seep from the dump. The Gilmore mine adit has been assigned an EDR of 3 (potentially significant environmental degradation), with total recoverable iron and dissolved chromium, iron, and manganese exceeding State water quality standards. Mine effluent is adversely impacting the watershed at a rate of 1 gpm. The Ferricrete Mine adit has been assigned an EDR of 2 (significant degradation), with iron (trec), and dissolved aluminum, chromium, iron, manganese, sulfate and zinc exceeding State standards. The Eastern Star adit has been assigned an EDR of 3, with total recoverable arsenic and iron, and dissolved aluminum, chromium, iron, manganese, and sulfate exceeding State standards. However, water samples collected from the Alamosa River both upstream and downstream from the mine drainage indicate minimal impact from the effluent. The Grape Mine adit has been assigned an EDR of 3 owing to drainage effluent, which exceeded State standards in zinc. Wightman Fork shows minimal impact from the Grape Mine effluent. The impacts to the watershed from these sites might vary from year to year depending on streamflows.

Metal concentrations and loadings in the Alamosa River increase significantly below the inflow of Iron Creek (Table 2 in Kirkham and Lovekin, 1995). An even greater increase in metal concentrations and loadings occurs in the segment of the Alamosa River that extends from below Iron Creek to below Alum Creek. Metal loadings continue to rise in the section of the river from below the Alum Creek inflow to below the inflow from Bitter Creek, but concentrations and loads remain relatively constant between the inflows of Bitter Creek and Wightman Fork, based on data in USGS, CDMG, and USEPA (1994; as cited in Kirkham and Lovekin, 1995). Water chemistry data from the Alamosa River (Table 2 in Kirkham and Lovekin, 1995) suggest that the inflow of Wightman Fork significantly increases copper and zinc concentrations and loadings in the Alamosa River. Wightman Fork also increases the loadings and concentrations of other metals to the Alamosa River, although the dissolved aluminum concentrations and loads for the August sampling are contrary to this trend. The headwaters of the Alamosa River between Iron Creek and Wightman Fork show elevated concentrations of iron and aluminum, and to a lesser extent manganese, and copper, zinc, and manganese concentrations become significantly elevated below Wightman Fork.

To better understand the role of the drainage from the Pass-Me-By mine in the degradation of the upper Alamosa River, a comparison between the dissolved metal loads of Iron, Alum, and Bitter Creeks and that of the mine drainage should be made. Analytical results and calculated loadings for samples collected by the USF&WS and USEPA (1994) in August and October at the mouths of these tributaries are shown in Table 3 of Kirkham and Lovekin (1995). Metal loads in Alum and Bitter Creeks appear to be due entirely to naturally occurring degradation from natural acid rock drainage, while that in Iron Creek is a result of both natural and mining-related degradation.

A worst-case estimate of the relative contribution of the Pass-Me-By mine effluent to the Alamosa River can be developed by comparing the loads in the mine drainage to the loads in the mouths of Iron, Alum, and Bitter Creeks. Under such a scenario, the dissolved iron loading in the Pass-Me-By effluent amounts to about 3.1 to 4.3% of the combined dissolved iron from the three tributaries. For dissolved aluminum, the Pass-Me-By drainage comprises around 2.8 to 3.3% of the combined loadings from the three tributaries. Dissolved manganese, copper, and zinc loadings from the mine effluent amount to only 0.2%, 0.4 to 0.7%, and 0.6 to 1.5%, respectively, of the combined loadings from the three tributaries. A similar comparison using total recoverable metal loadings results in even lower percentages.

Another interesting comparison can be made between the dissolved metal loadings in the Pass-Me-By drainage and those in the Alamosa River above Wightman Fork using the data reported for August by the USGS, CDMG, and USEPA (1994). The dissolved iron loading from the Pass-Me-By drainage is equal to 10.5% of the dissolved iron load in the Alamosa River above Wightman Fork at station AR-45.5; for dissolved aluminum the proportion is 2.4%; for dissolved manganese it is 0.2%; for dissolved copper it is 1.2%; and for dissolved zinc it is 0.7%. If the Pass-Me-By drainage was eliminated as a source of metals, the loads in the Alamosa River could at best be improved only by about these amounts. Degradation of the river resulting from the inflow of Wightman Fork and its metal loads further diminishes the potential benefit of remediating the Pass-Me-By drainage.

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APPENDIX: ABANDONED MINE INVENTORY FORMS FOR SELECTED MINES IN THE UPPER ALAMOSA RIVER BASIN

CODES FOR TABULAR INFORMATION

ALL TABLES: If appropriate code is not listed, use: **N** = none or no; **N/A** = not applicable; **UNK** = unknown; **O** = other, explain in #84

ADITS, SHAFTS, & OPENINGS

- Type of feature: **A** = adit; **S** = vertical shaft; **I** = incline shaft; **P** = prospect hole; **ST** = stope; **G** = glory hole; **SU** = subsidence feature; **PT** = open pit; **O** = other, explain in #84.
- Condition: **I** = intact; **P** = partially collapsed or filled; **F** = filled or collapsed; **N** = feature searched for but not found (mine symbol on map)
- Drainage: **N** = no water draining; **W** = water draining; **S** = standing water only (note at what depth below grade)
- Access deterents: **N** = none; **S** = sign; **F** = fence; **C** = sealed or capped; **D** = open door or hatch; **L** = locked door or hatch; **G** = open grill; **O** = other, explain in #84.
- Deterent condition: **P** = prevents access; **D** = discourages access; **I** = ineffective
- Ratings: Hazard: **E** = emergency; **1** = extreme danger; **2** = dangerous; **3** = potential danger; **5** = no significant hazard
  Env. Deg.: **1** = extreme; **2** = significant; **3** = potentially significant; **4** = slight; **5** = none
- Comments?: **Y** = yes; **N** = no

DUMPS, TAILINGS, AND SPOIL AREAS

- Type of feature: **D** = mine dump; **T** = mill tailings; **W** = coal waste bank; **S** = overburden or development spoil pile; **DS** = dredge spoil; **HD** = placer or hydraulic deposit; **H** = highwall; **P** = processing site
- Size of materials: **F** = fine; **S** = sand; **G** = gravel; **L** = cobbles; **B** = boulders
- Cementation: **W** = well cemented; **M** = moderately cemented; **U** = uncemented
- Vegetation Type: **G** = mixed grass; **S** = sagebrush/oakbrush/brush; **J** = juniper/piñon; **A** = aspen; **P** = pine/spruce/fir; **T** = tundra; **R** = riparian; **F** = tilled crops; **B** = barren/no vegetation; **W** = weeds
- Vegetation Density: **D** = dense; **M** = moderate; **S** = sparse; **B** = barren
- Drainage: **N** = no water draining; **W** = water draining across surface; **S** = standing water only; **SP** = water seeping from side of feature
- Stability: **U** = unstable; **P** = potentially unstable; **S** = stable
- Water erosion: of Feature: **N** = none; **R** = rills; **G** = gullies; **S** = sheet wash
  Storm Runoff: **C** = in contact with normal stream; **S** = near stream or gully, but only eroded during storm or flood; **N** = no storm/flood runoff erosion
- Wind erosion: **N** = none; **D** = dunes; **B** = blowouts; **A** = airborne dust
- Radiation Count: **N** = none taken; record value of reading if taken
- Access deterents: **N** = none; **S** = sign; **F** = fence; **O** = other, explain in #84
- Ratings: Hazard: **E** = emergency; **1** = extreme danger; **2** = dangerous; **3** = potential danger; **5** = no significant hazard
  Env. Deg.: **1** = extreme; **2** = significant; **3** = potentially significant; **4** = slight; **5** = none
- Comments?: **Y** = yes; **N** = no

DRAINAGE/WATER SAMPLES

- Adit/Shaft/Dump No./Other: Indicate Feature No. associated with water information; **0** = other, explain in comments
- Flow (cfs): record seeps as 0.01 cfs (Rule of Thumb: a cfs= one full-blast garden hose)
- Method of flow measure: **E** = estimate; **T** = bobber/stopwatch/x-section; **W** = weir; **D** = catchment; **F** = flow meter
- Location of sample and flow: **A** = immediately adjacent to adit/shaft; **B** = below dump/tailings; **C** = immediately above confluence with receiving stream; **SW** = standing water in/on feature; **RU** = receiving stream upstream of feature; **RD** = receiving stream dowmstream of feature;
- Evidence of toxicity: **N** = none; **A** = absence of benthic organisms; **W** = opaque water; **P** = yellow or red precipitate; **S** = suspended solids; **D** = salt deposits
- Comments?: **Y** = yes; **N** = no

USFS-AMLI FIELD DATA FORM

Plotted ok
slides ok

LOCATION AND IDENTIFICATION

(1) **ID#:** 02- 08- 09 - 03 - 357 / 4138 - 4
rgn st fst rd xutm yutm area#

(2) **Sitename:** Pass Me By Mine

(3) **Other name/reference:**

1 (4) **Highest priority Environmental Degradation occurring in this area:**
1=extreme; 2=significant; 3=potentially significant; 4=slight; 5=none

5 (5) **Highest priority Mine Hazard noted in this area:**
E=emergency; 1=extreme danger; 2=dangerous; 3=potentially dangerous;
5=no significant hazard

M (6) **Commodity:** C=coal; U=uranium; M=metals; I=industrial material.
(Metal or Indust. material type: ______)

(7) **Quad name and date:** Summitville 1989

(8) **County:** Conejos

(9) **2° map:** Durango

(10) **Water Cataloguing Unit #:** 13010002

(11) **Mining district/coal field:**

(12) **Land survey location:** - NE - NE sec 12, T 36N, R 3E

(13) **Receiving stream:** Iron Creek flowing into Alamosa River
nearest named stream next named

(14) **Elevation (ft):** 11,000

1 (15) **General Slope:** 1=0-10°; 2=11-35°; 3=greater than 35°

M (16) **Regional terrain:** R=rolling or flat; F=foothills; T=mesa; H=hogback;
M=mountains; S=steep/narrow canyon

J (17) **Type of access:** N=no trail; T=trail; J=jeep road; G=gravel road;
M=paved road; P=private/restricted road

M (18) **Quality of access for construction vehicles:** G=good; M=moderate; P=poor;
X=very poor

(19) **Nearest town on map:** Platoro

0.1 (20) **Road distance from nearest town (#.# miles)**

(21) **Nearest road** (name and/or #): Iron Creek Road
FR=forest rd; CR=county rd; SH=state highway; I=interstate

Distance to following types of public uses (#.# miles):

7.8 (22) Road
(23) Dwelling (year-round)
(24) Campground/picnic area
(25) Marked trail
(26) Other public use (explain)

ENVIRONMENTAL INFORMATION

D (27) **Vegetation density adjacent to site:** D=dense; M=moderate; S=sparse;
B=barren

PG (28) **Vegetation type adjacent to site:** B=barren; W=weeds; G=grass; R=riparian
S=sagebrush/oakbrush/brush; J=juniper/piñon; A=aspen; P=pine/spruce/fir;
T=tundra

N (29) **Evidence of intentional reclamation:** Y=yes; N=no (if yes, use comments)

5.0 (30) **Size of disturbed area in acres**

Y (31) **Potential historical structures in area:** Y=yes; N=no (if yes, use comments)

N (32) **Evidence of bats:** G=guano; I=insect remains; B=bat sighting; O=other(use comments); N=no (use comments to expand on any positive evidence)

(33) **Recorded by/date:** 8/5/93 Kirkham & Lovekin

on roll 4 Iron Spring

ADITS, SHAFTS, AND OPENINGS													
Feature Nos.		100	101	102	103	104	105	106	107	108	109	110	111
Type of Feature		A	A	A	A	P							
Opening Size (ft)	H	–	–	–	–	–							
	W	–	–	–	–	–							
Depth (ft)		–	–	–	–	–							
Condition		F	F	F	F	N							
Drainage		W	W	N	N								
Access Deterents													
Deterent Condition													
Ratings	Env. Deg.	1	5	5	5								
	Hazard	5	5	5	5								
Photo	Roll No.												
	Frame No.	7,8,9	N	28									
Comments?		Y	Y	Y	N	Y							

11, 10 = dump's water bubbling up out of ground

14, 15 of Seep 302 foot of dump

19, 20 of P.M.B drainage below road

21 & 28 of ...

DUMPS, TAILINGS, AND SPOIL BANKS										
Feature No.		200	~~201~~ 202	~~202~~	~~203~~	204	205	206	207	208
Type of Feature		D	D							
Plan view Dimension (ft.)	L	400	30							
	W	125	20							
Volume (yds)		12000	50							
Steepest Slope Angle (dgr)			33							
Steepest Slope Length (ft)			15							
Size of Materials			GS							
Cementation			M							
Vegetation Type		P	B							
Vegetation Density		S	B							
Drainage		SP	N							
Stability		S	S							
Water Erosion	of Feature	S	S							
	Storm Runoff	N	S							
Wind Erosion		N	N							
Radiation Count		N	N							
Access Deterents		N	N							
Deterent Condition										
Ratings	Env. Deg.	3	5							
	Hazard	5	5							
Photo	Roll No.									
	Frame No.	12,13								
Comments?		Y	N							
Soil Sample No.										

DRAINAGE/WATER SAMPLES

Item Nos.	300	301	302	303	304	305
Adit/Shaft/Dump No./Other=0 (If other location, describe in comments)	100	100	200	100	100	0
pH (standard units)	3.24	3.20	2.45	4.25	4.22	3.71
Conductivity (uS)	1410	1360	2430	181	210	348
Flow (cfs)	1gpm	26.9	0.4	1500	1500	22
Method of Flow Measure	E	Flume	E	E	E	E
Date Flow/Sample (m/d/y)	8/5 93	8/5 93	8/5 93	8/5 93	8/5 93	8/5 93
Location of Sample/Flow	A	A	B	RJ	RD	
Evidence of Toxicity in Site Drainage	P	P	P	P	P	P
Evidence of Toxicity in Receiving Stream	P.A	PA	-	P	P	
Distance from Stream (ft)	1200	1200	1200	0	0	0
Comments?	Y	Y	Y	Y	Y	Y
Lab Water Sample No.	N	N	N	Y	Y	N

GPS READINGS

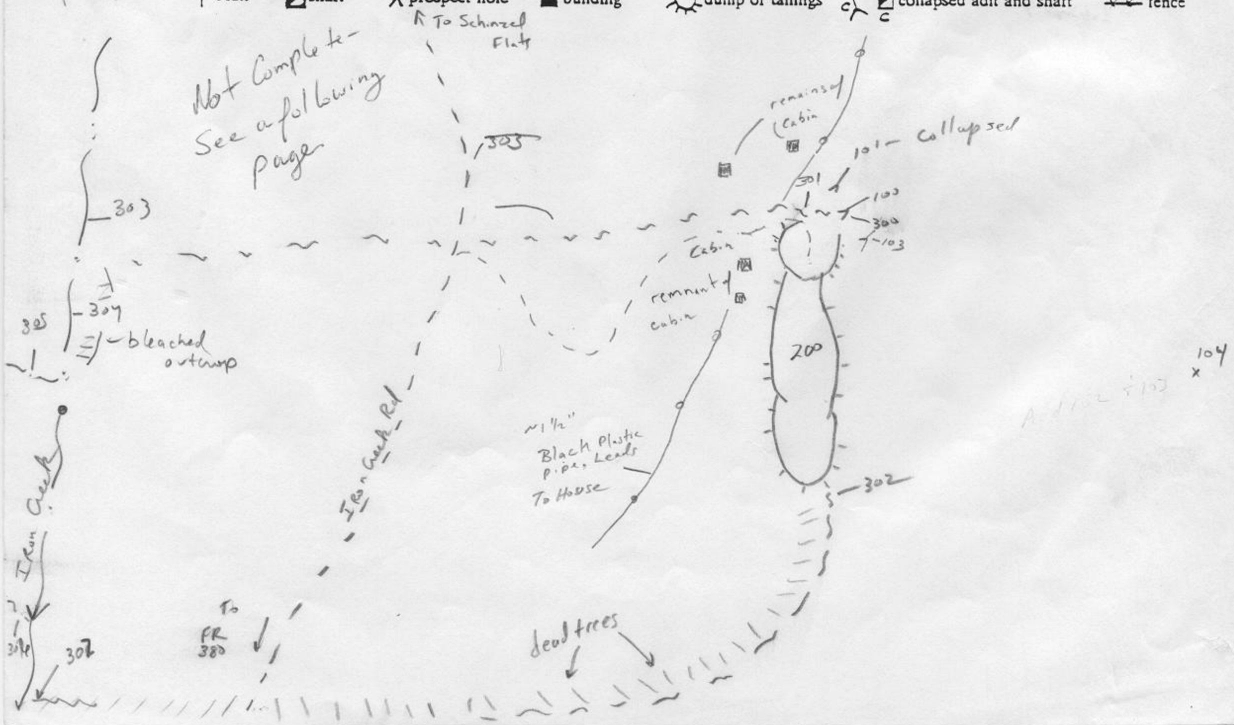
Ftr. No.	Location
100	Lat. 37° 23' 15.1" 5 sat Long. 104 36 14.0 PDOP 5.9
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.

App to bottom of map

DIAGRAM OF PROBLEM AREA (Locate all adits, shafts, dumps, prospects, etc. on topo map.)

Check off upon completion: __ north arrow; __ scale bar or general size noted; __ direction to nearest trail/road/town noted; __ significant mine features numbered

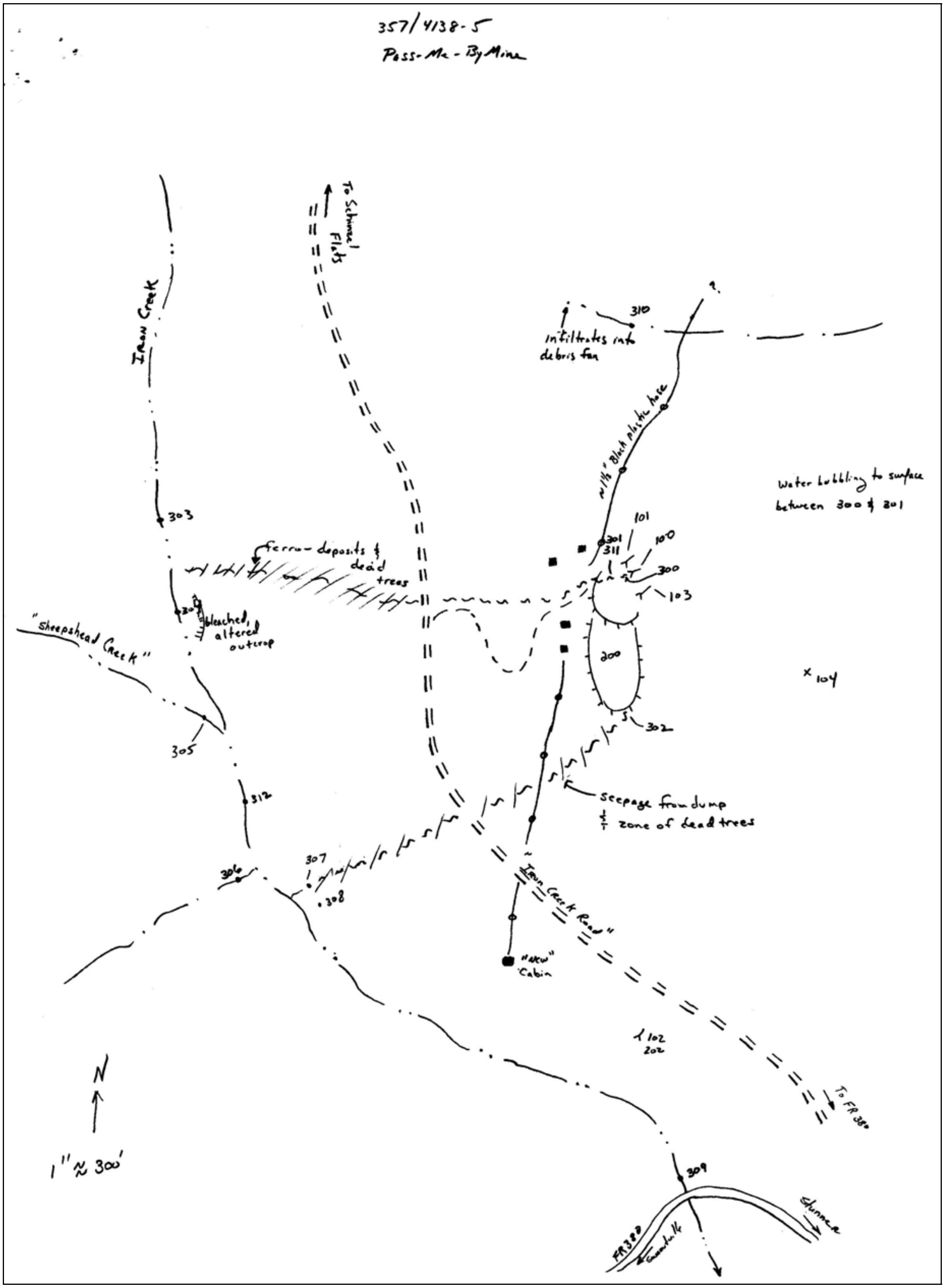
Adit   shaft   prospect hole   building   dump or tailings   collapsed adit and shaft   fence



357/4138-5

DRAINAGE/WATER SAMPLES							¡GE/WATER SAMPLES					
Item Nos.	306	307	308	309	310	311	312					
Adit/Shaft/Dump No./Other=0 (If other location, describe in comments)	0	200	0	0	0	100	0					
pH (standard units)		2.71	2.57	3.89	3.38	3.02						
Conductivity (uS)		1190	1630	235	.403	1100						
Flow (cfs)		2	2	1600	0.2							
Method of Flow Measure		E	E	E	E							
Date Flow/Sample (m/d/y)	8/5 93	8/5 93	8/5 93	8/5 93	8/5 93	8/11 93						
Location of Sample/Flow	–	B	–			A						
Evidence of Toxicity in Site Drainage	–	A,P	P		P	P						
Evidence of Toxicity in Receiving Stream		P	P	P		P						
Distance from Stream (ft)		20	40	0		1100						
Comments?	Y	Y	Y	Y	Y	Y						
Lab Water Sample No.						Y						

DRAINAGE/WATER SAMPLES							¡GE/WATER SAMPLES					
Item Nos.												
Adit/Shaft/Dump No./Other=0 (If other location, describe in comments)												
pH (standard units)												
Conductivity (uS)												
Flow (cfs)												
Method of Flow Measure												
Date Flow/Sample (m/d/y)												
Location of Sample/Flow												
Evidence of Toxicity in Site Drainage												
Evidence of Toxicity in Receiving Stream												
Distance from Stream (ft)												
Comments?												
Lab Water Sample No.												



357/4138-5
Pass-Me-By Mine
To Schimmel Flats
Iron Creek
310
infiltrates into debris fan
~1½" Black plastic hose
Water bubbling to surface between 300 & 301
303
ferro-deposits & dead trees
101
301
311
100
300
103
304
bleached, altered outcrop
"Sheepshead Creek"
200
104
302
305
312
Seepage from dump & zone of dead trees
307
306
308
"Iron Creek Road"
"New" Cabin
102
202
N
1" ≈ 300'
To FR 380
309
FR 388
Stunner

●81. Local person interviewed ______________________
Name Address

●82. Name and address of person desiring a copy of this form:

●83. Describe the minimum work needed to mitigate any public health, safety, welfare, or environmental problems observed at the site. Note specific reclamation activities along with an estimated cost and time period to implement each activity described. Code <u>costs</u> as: 1= less $10,000; 2= $10,000 to $100,000; 3= $100,000 to $500,000; 4= more than $500,000. Code estimated <u>time</u> to complete the activity as: 1= less than 1 month; 2= 1 to 12 months; 3= 1 to 3 years; 4= over 3 years

Cost	Time	Recommended reclamation activity

●84. Comments relating to health, safety, welfare, environmental, or restoration problems and any general comments. All comments must be keyed to mine feature # or drainage/water sample item #.

Gen Comm: According to CGS Bulletin 13 the Pass-Me-By funnel was 3,600 Feet long in 1913. Upon a return visit in 1915 the mine was found to be closed, reportedly because of "foul air". The mine was reported to be discharging water "very highly charged with ferrous sulphate and contains considerable arsenic."

104 - We found only a faint cut slope @ the end of an old road at this location

301 Flow measured by 4" Cutthroat flume about 60FT from portal of 10 water is obviously bubbling up out of ground about 25FT in front up portal face. Flow below this point is much greater. Collected filtered neutral & acidified samples. Ha = 0.17 FT = 26.9 gpm. Samples not submitted for analysis

300 Water flows out of collapsed debris about 3 FT above portal floor. Flow is estimated. Collected filtered & acidified & neutral samples. Ran DO test. Sample did not even turn blue. Assume this means 0 ppm DO. - Samples not submitted for lab analysis.

302 - Seep out toe of dump. There's a zone of dead trees that follows the flow down to the road. Extensive ferrocrete. Could indicate pre-mine acid drainage. Flow is intermittent below dump

101 could be a collapsed adit adjacent to draining 100. 101 may have discharged water in past.
100 is close to boundary, but appears to be on private land. This is the main portal for the Pass-Me-By Mine — OK
102 is a small prospect adit into altered outcrop about 20FT above creek. Is in 2nd Altered outcrop above road. Good exposure altered & weathering
303 Run on Iron Creek above Pass-Me-By drainage. Moderate red brown & cream precip. Took filtered neutral & acidified. Macro Inverts noted. Sampled sent to CDH
304 Run on Iron Cr below P-M-B. Heavy bright orange & cream precip. Big Ferrocrete ledge on W. Took filtered neutral & acidified. Samples sent to CDH
200 - Water seeps out toe of dump, & may at times also flow on uphill side. Part of 200 may be on USFS. Only pyrite noted in breccia on dump.
202 - Dump is gray & bedrock outcrop is yellow brown
305 - Trib from west that drains strongly altered area. DK red brown stain on rocks. Several acidic looking seeps on E bank just below 305, Precip in Iron Creek becomes more red brown below 305. Many ferrocrete ledges below 305
306 - Small trib from west drains altered rock area. Damp but no surface flow @ Iron Cr.
307 - Very small trib from east, immediately below cabin & upstream from outcrop of bleached rock on E bank of Creek. Appears to be drainage from toe of P-M-B dump 200.
308 - Several seeps from this prominent altered outcrop. Tested only one w/ adequate flow
309 - Iron Creek @ road. Heavy orange precip

OFFICE/LITERATURE INFORMATION

310. Flow in creek draining W slope of Lookout Mtn. Flow infiltrates into debris fan immediately below test site. Heavy ferrocrete in creek bottom

●41. Owner of surface ______________________

311 Testing and sampling of Pass-Me-By drainage (100) by USGS (Plumlee, Smith & Ficklin). Fe+2 = 120ppm Fe Total = 142ppm. D.O. = 0.1ppm Samples called PMB193 FA.2 & PMB193 RA. Flow out of collapse debris not occurring today. All discharge occurring where water bubbles up out of ground.

●42. Last known operator ______________________

●43. Estimated production ______________________

312 Run on Iron Creek below inflow from Sheepshead Creek by Lovekin

●44. Dates of production ______________________

OK

●45. Literature not cited in comments ______________________

●46. Citation of any historical register listing ______________________ sl.des.ok

USFS-AMLI FIELD DATA FORM

LOCATION AND IDENTIFICATION

(1) **ID#:** 02- 08- 09 - 03 - 359 / 4136 - 1
rgn st fst rd xutm yutm area#

(2) **Sitename:** Gilmore Meadow

(3) **Other name/reference:** ______

3 (4) **Highest priority Environmental Degradation occurring in this area:**
1=extreme; 2=significant; 3=potentially significant; 4=slight; 5=none

5 (5) **Highest priority Mine Hazard noted in this area:**
E=emergency; 1=extreme danger; 2=dangerous; 3=potentially dangerous; 5=no significant hazard

M (6) **Commodity:** C=coal; U=uranium; M=metals; I=industrial material.
(Metal or Indust. material type: ______)

(7) **Quad name and date:** Platoro 1989

(8) **County:** Conejos

(9) **2° map:** Durango

(10) **Water Cataloguing Unit #:** 13010005

(11) **Mining district/coal field:** ______

(12) **Land survey location:** ___-___- N/2 sec 17 ,T 36N ,R 4E

(13) **Receiving stream:** Alamosa River flowing into ______
nearest named stream next named

(14) **Elevation (ft):** 10,000

1 (15) **General Slope:** 1=0-10°; 2=11-35°; 3=greater than 35°

M (16) **Regional terrain:** R=rolling or flat; F=foothills; T=mesa; H=hogback; M=mountains; S=steep/narrow canyon

J (17) **Type of access:** N=no trail; T=trail; J=jeep road; G=gravel road; M=paved road; P=private/restricted road

M (18) **Quality of access for construction vehicles:** G=good; M=moderate; P=poor; X=very poor

(19) **Nearest town on map:** Platoro

3.5 (20) **Road distance from nearest town** (#.# miles)

(21) **Nearest road** (name and/or #): FR 250.6G
FR=forest rd; CR=county rd; SH=state highway; I=interstate

Distance to following types of public uses (#.# miles):

0.0 (22) Road
___ (23) Dwelling (year-round)
0.2 (24) Campground/picnic area
___ (25) Marked trail
___ (26) Other public use (explain) ______

ENVIRONMENTAL INFORMATION

M (27) **Vegetation density adjacent to site:** D=dense; M=moderate; S=sparse; B=barren

PA (28) **Vegetation type adjacent to site:** B=barren; W=weeds; G=grass; R=riparian S=sagebrush/oakbrush/brush; J=juniper/piñon; A=aspen; P=pine/spruce/fir; T=tundra

Y (29) **Evidence of intentional reclamation:** Y=yes; N=no (if yes, use comments)

2.0 (30) **Size of disturbed area in acres**

N (31) **Potential historical structures in area:** Y=yes; N=no (if yes, use comments)

N (32) **Evidence of bats:** G=guano; I=insect remains; B=bat sighting; O=other(use comments); N=no (use comments to expand on any positive evidence)

___ (33) **Recorded by/date:** Bob Kirkham 8/6/93

ADITS, SHAFTS, AND OPENINGS

Feature Nos.		100	101	102	103	104	105	106	107	108	109	110	111
Type of Feature		A	P	P	P	P	R	A					
Opening Size (ft)	H	5	-		6	12							
	W	3			15	15							
Depth (ft)		100'+			7	8							
Condition		I	F	F	P	P	F						
Drainage		W			N	N	N	N					
Access Deterents		L			N	N							
Deterent Condition		P											
Ratings	Env. Deg.	3	5	5	5	5	5						
	Hazard	5	5	5	5	5	5						
Photo	Roll No.												
	Frame No.	33,34											
Comments?		Y	Y	Y	N	Y	N	Y					

DUMPS, TAILINGS, AND SPOIL BANKS

Feature No.		200	~~201~~	~~202~~	203	204	205	206	207	208
Type of Feature		D								
Plan view Dimension (ft.)	L	100								
	W	50								
Volume (yds)		800								
Steepest Slope Angle (dgr)		26								
Steepest Slope Length (ft)		15								
Size of Materials		G S F								
Cementation		M								
Vegetation Type		P G								
Vegetation Density		S								
Drainage		W								
Stability		S								
Water Erosion	of Feature	S								
	Storm Runoff	S								
Wind Erosion		N								
Radiation Count		N								
Access Deterents		N								
Deterent Condition										
Ratings	Env. Deg.	5								
	Hazard	5								
Photo	Roll No.									
	Frame No.									
Comments?		Y								
Soil Sample No.										

DRAINAGE/WATER SAMPLES						
Item Nos.	300	301	302	303	304	305
Adit/Shaft/Dump No./Other=0 (If other location, describe in comments)	100	100	100			
pH (standard units)	5.29	5.91	5.80			
Conductivity (uS)	276	135	148			
Flow (cfs)	0.8	1.5	2.3			
Method of Flow Measure	Flume O	E	E			
Date Flow/Sample (m/d/y)	8/6 93	8/6 93	8/6 93			
Location of Sample/Flow	A	RU	RD			
Evidence of Toxicity in Site Drainage	P	P	P			
Evidence of Toxicity in Receiving Stream	P	N	N			
Distance from Stream (ft)	50	0	0			
Comments?	Y	Y	Y			
Lab Water Sample No.	Y	N	N			

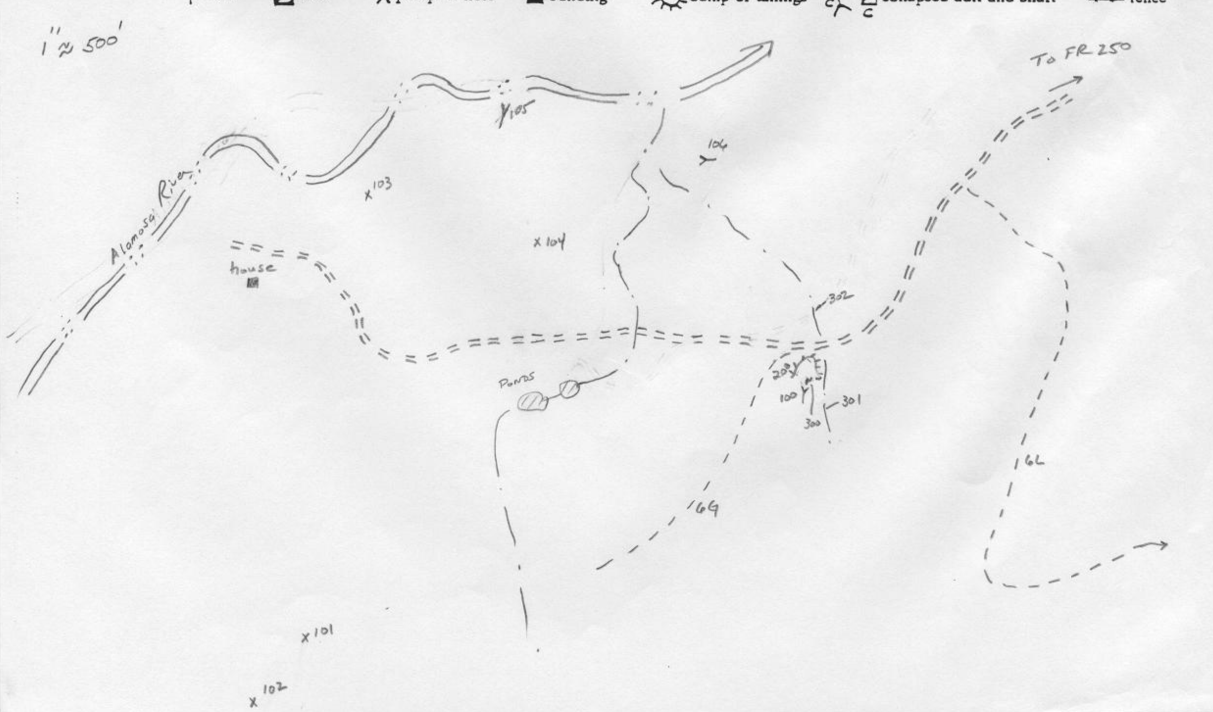
GPS READINGS	
Ftr. No.	Location
100	Lat. 37° 22' 17.6 PDOP 3.8 Long. 106° 34' 25.0
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.

N

DIAGRAM OF PROBLEM AREA (Locate all adits, shafts, dumps, prospects, etc. on topo map.)

Check off upon completion: ___ north arrow; ___ scale bar or general size noted; ___ direction to nearest trail/road/town noted; ___ significant mine features numbered

Adit   shaft   X prospect hole   building   dump or tailings   collapsed adit and shaft   fence



●81. Local person interviewed ____________________
Name Address

●82. Name and address of person desiring a copy of this form:

____

●83. Describe the minimum work needed to mitigate any public health, safety, welfare, or environmental problems observed at the site. Note specific reclamation activities along with an estimated cost and time period to implement each activity described. Code costs as: 1= less $10,000; 2= $10,000 to $100,000; 3= $100,000 to $500,000; 4= more than $500,000. Code estimated time to complete the activity as: 1= less than 1 month; 2= 1 to 12 months; 3= 1 to 3 years; 4= over 3 years

Cost	Time	Recommended reclamation activity
		Investigate significance of drainage out of 100

●84. Comments relating to health, safety, welfare, environmental, or restoration problems and any general comments. All comments must be keyed to mine feature # or drainage/water sample item #.

29 - 100 was safeguarded by CDMG using a grated culvert. Adit is east of Road intersection of FR 250.6G with the main road back to the home, and it is on the west side of the small creek. Location of road intersection does not appear to be in quite the right spot. Plotted the adit at what I think is the correct location.
101 Was viewed by binoculars from Gilmore meadow Looks like a tiny prospect
102 " " " " " " " " " " " "
104 includes 4 small pits

200 - Drainage 300 flows across head of dump & into ?

106 is shown as an adit on I-828, but was not found during my recon of the area

300 flow measured using 4" cutthroat flume. Ha = 0.03 FT
test run on discharge out of adit 100. Sample collected of this discharge & sent to CDH (FU & FA)

301 Run on small unnamed stream above inflow from 100
302 Run " " " " below " " "

29 - CDMG installed a grated CSP @ 100 during Conejos River Project as opening 12.

OFFICE/LITERATURE INFORMATION

●41. Owner of surface ____________________

●42. Last known operator ____________________

●43. Estimated production ____________________

●44. Dates of production ____________________

●45. Literature not cited in comments ____________________

●46. Citation of any historical register listing ____________________

slides.k

USFS-AMLI FIELD DATA FORM

LOCATION AND IDENTIFICATION

(1) **ID#:** 02- 08- 09 - 03 - 360 / 4137 - 2
rgn st fst rd xutm yutm area#

(2) **Sitename:** Globe Mine

(3) **Other name/reference:**

3 (4) **Highest priority Environmental Degradation occurring in this area:**
1=extreme; 2=significant; 3=potentially significant; 4=slight; 5=none

5 (5) **Highest priority Mine Hazard noted in this area:**
E=emergency; 1=extreme danger; 2=dangerous; 3=potentially dangerous;
5=no significant hazard

M (6) **Commodity:** C=coal; U=uranium; M=metals; I=industrial material.
(Metal or Indust. material type: ______)

(7) **Quad name and date:** Summitville 1989

(8) **County:** Conejos

(9) **2° map:** Durango

(10) **Water Cataloguing Unit #:** 13010002

(11) **Mining district/coal field:** Stunner

(12) **Land survey location:** ___ - ___ - SE sec 8 ,T 36N ,R 4E

(13) **Receiving stream:** Globe Creek flowing into Alamosa River
nearest named stream next named

(14) **Elevation** (ft): 9900

1 (15) **General Slope:** 1=0-10°; 2=11-35°; 3=greater than 35°

M (16) **Regional terrain:** R=rolling or flat; F=foothills; T=mesa; H=hogback;
M=mountains; S=steep/narrow canyon

J (17) **Type of access:** N=no trail; T=trail; J=jeep road; G=gravel road;
M=paved road; P=private/restricted road

M (18) **Quality of access for construction vehicles:** G=good; M=moderate; P=poor;
X=very poor

(19) **Nearest town on map:** Platoro

4.8 (20) **Road distance from nearest town** (#.# miles)

(21) **Nearest road** (name and/or #): FR 250
FR=forest rd; CR=county rd; SH=state highway; I=interstate

Distance to following types of public uses (#.# miles):

0.1 (22) Road
4.8 (23) Dwelling (year-round)
0.3 (24) Campground/picnic area
___ (25) Marked trail
___ (26) Other public use (explain)

ENVIRONMENTAL INFORMATION

M (27) **Vegetation density adjacent to site:** D=dense; M=moderate; S=sparse;
B=barren

PG (28) **Vegetation type adjacent to site:** B=barren; W=weeds; G=grass; R=riparian
S=sagebrush/oakbrush/brush; J=juniper/piñon; A=aspen; P=pine/spruce/fir;
T=tundra

Y (29) **Evidence of intentional reclamation:** Y=yes; N=no (if yes, use comments)

2.0 (30) **Size of disturbed area in acres**

N (31) **Potential historical structures in area:** Y=yes; N=no (if yes, use comments)

___ (32) **Evidence of bats:** G=guano; I=insect remains; B=bat sighting; O=other(use comments); N=no (use comments to expand on any positive evidence)

___ (33) **Recorded by/date:** 8/11/93 Kirkham & Lovekin

ADITS, SHAFTS, AND OPENINGS													
Feature Nos.		100	101	102	103	104	105	106	107	108	109	110	111
Type of Feature		A	A	A	r	D							
Opening Size (ft)	H	6	-	-	-								
	W	5	-	-	-								
Depth (ft)		200'+	-	-	-								
Condition		I	F	F	F								
Drainage		W	W	N	N								
Access Deterents		L	-										
Deterent Condition		P	-										
Ratings	Env. Deg.	3	4	5	5	5							
	Hazard	5	5	5	5	5							
Photo	Roll No.												
	Frame No.	19,20	24										
Comments?		Y	Y	N	Y	Y							

DUMPS, TAILINGS, AND SPOIL BANKS											
Feature No.		200	201	202	203	204	205	206	207	208
Type of Feature		D	D							
Plan view Dimension (ft.)	L	150	27							
	W	40	12							
Volume (yds)		1200	15							
Steepest Slope Angle (dgr)		24								
Steepest Slope Length (ft)		10								
Size of Materials		GF	FG							
Cementation		M	M							
Vegetation Type		GS	GS							
Vegetation Density		S	S							
Drainage		W	W							
Stability		P	S							
Water Erosion	of Feature	S	S							
	Storm Runoff	C	C							
Wind Erosion		N	N							
Radiation Count		N	N							
Access Deterents		N	N							
Deterent Condition		N	N							
Ratings	Env. Deg.	3	4							
	Hazard	5	5							
Photo	Roll No.									
	Frame No.	21,22	25							
Comments?		Y	Y							
Soil Sample No.										

DRAINAGE/WATER SAMPLES						
Item Nos.	300	301	302	303	304	305
Adit/Shaft/Dump No./Other=0 (If other location, describe in comments)	100	101	100	100	101	0
pH (standard units)	6.40	5.60	6.47	5.29	5.98	6.53
Conductivity (uS)	304	389	128	141	137	170
Flow (cfs)	H=0.04 1.5	0.1	400	425	425	25
Method of Flow Measure	Flume 10	E	E	E	E	E
Date Flow/Sample (m/d/y)	8/11 93	8/11 93	8/11 93	8/11 93	8/11 93	
Location of Sample/Flow	A	A	RU	RD	RD	
Evidence of Toxicity in Site Drainage	P	P				
Evidence of Toxicity in Receiving Stream				N	N	
Distance from Stream (ft)	100	30		0	0	
Comments?	Y	Y	Y	Y	Y	
Lab Water Sample No.	Y	N	N	N	N	

GPS READINGS	
Ftr. No.	Location
(5) 100	Lat. N 37° 22' 36.2" 9800 Long. W106° 34' 04.5" PDOP 3.4
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.

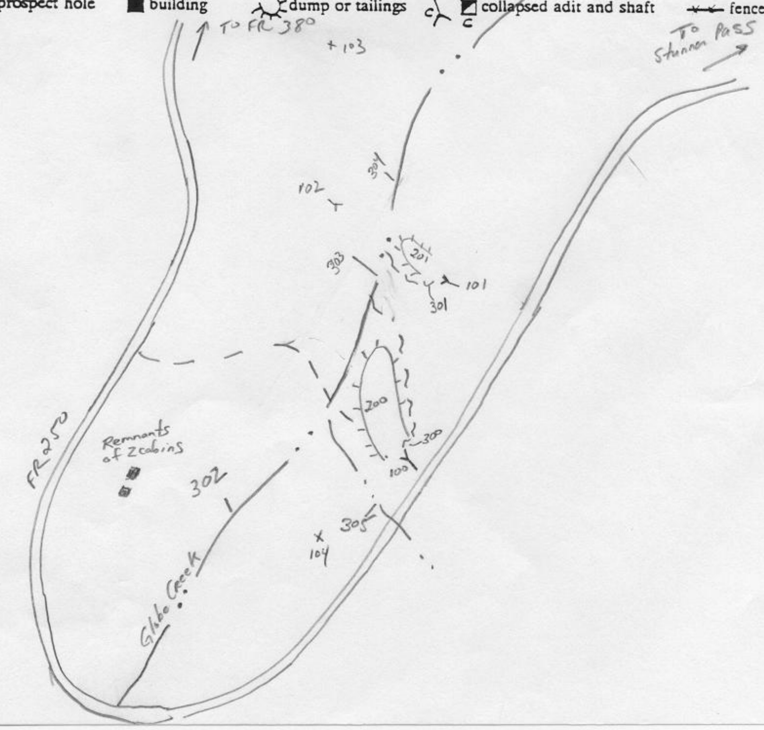
DIAGRAM OF PROBLEM AREA (Locate all adits, shafts, dumps, prospects, etc. on topo map.)

N

Check off upon completion: __ north arrow; __ scale bar or general size noted; __ direction to nearest trail/road/town noted; __ significant mine features numbered

Adit   shaft   X prospect hole   building   dump or tailings   C collapsed adit and shaft   fence

1" ≈ 200'



●81. Local person interviewed ____________________
Name Address

●82. Name and address of person desiring a copy of this form:

____

●83. Describe the minimum work needed to mitigate any public health, safety, welfare, or environmental problems observed at the site. Note specific reclamation activities along with an estimated cost and time period to implement each activity described. Code costs as: 1= less $10,000; 2= $10,000 to $100,000; 3= $100,000 to $500,000; 4= more than $500,000. Code estimated time to complete the activity as: 1= less than 1 month; 2= 1 to 12 months; 3= 1 to 3 years; 4= over 3 years

Cost	Time	Recommended reclamation activity
		Consider remediation of mine drainage out of 100

●84. Comments relating to health, safety, welfare, environmental, or restoration problems and any general comments. All comments must be keyed to mine feature # or drainage/water sample item #.

29 - 100 was safeguarded by CDMG using Grated culvert. Hasp was cut off in 1992. Was replaced w/ chain & lock, which was intact today.
100 - Lock on 100 not CDMG. Could not open locked door & enter mine.
master lock.
101 is a collapsed, tiny adit
103 appears to be on private land
104 is an adit symbol on topo. Nothing found at this location. Probably represents Globe mine, which is north, on other side of small drainage

Sampled collected on

and sent to CDH
edge of dump 200
~~Run on~~
300 water discharging out of 100; flows along. Moderate orange precip. Ha = 0.04 FT w/ 4" cutthroat flume.
301 " " out 101. Very light red-orange precip.
302 Run on Globe Creek above mine
303 " " " " below 100 & above 101
304 " " " " below 101
305 " " tributary creek W of 100. Flows thru CSP under Stunner Pass Road
and above

D.O. = 7.8 ppm, but was run outside of CSP

200 - toe of dump is adjacent to creek. Moderately well vegetated along creek, but it looks as if a small part of the dump has been removed by stream erosion
201 - " " " " " " " . Water flows on W edge of dump
200 has qtz, pyrite, white bleached rock in dump

OFFICE/LITERATURE INFORMATION

●41. Owner of surface ____________________

●42. Last known operator ____________________

●43. Estimated production ____________________

●44. Dates of production ____________________

●45. Literature not cited in comments ____________________

●46. Citation of any historical register listing ____________________

USFS-AMLI FIELD DATA FORM

LOCATION AND IDENTIFICATION

(1) **ID#:** 02- 08- 07 - 03 - 361 / 4138 - 1
rgn st fst rd xutm yutm area#

(2) **Sitename:** "Ferricrete" "Mine"

(3) **Other name/reference:** Gild tunnel and Eastern (?) tunnel

2 (4) **Highest priority Environmental Degradation occurring in this area:**
1=extreme; 2=significant; 3=potentially significant; 4=slight; 5=none

3 (5) **Highest priority Mine Hazard noted in this area:**
E=emergency; 1=extreme danger; 2=dangerous; 3=potentially dangerous; 5=no significant hazard

M (6) **Commodity:** C=coal; U=uranium; M=metals; I=industrial material.
(Metal or Indust. material type: ______)

(7) **Quad name and date:** Summitville 1989

(8) **County:** Conejos

(9) **2° map:** Durango

(10) **Water Cataloguing Unit #:** 13010002

(11) **Mining district/coal field:** Stunner

(12) **Land survey location:** ____ - SE - SE sec 5 ,T 36N ,R 4E

(13) **Receiving stream:** Alamosa River flowing into ______
nearest named stream next named

(14) **Elevation** (ft): 9900

2 (15) **General Slope:** 1=0-10°; 2=11-35°; 3=greater than 35°

M (16) **Regional terrain:** R=rolling or flat; F=foothills; T=mesa; H=hogback; M=mountains; S=steep/narrow canyon

J (17) **Type of access:** N=no trail; T=trail; J=jeep road; G=gravel road; M=paved road; P=private/restricted road

P (18) **Quality of access for construction vehicles:** G=good; M=moderate; P=poor; X=very poor

(19) **Nearest town on map:** Platoro

6.0 (20) **Road distance from nearest town** (#.# miles)

(21) **Nearest road** (name and/or #): FR 250
FR=forest rd; CR=county rd; SH=state highway; I=interstate

Distance to following types of public uses (#.# miles):

0.1 (22) Road
____ (23) Dwelling (year-round)
0.0 (24) Campground/picnic area
____ (25) Marked trail
____ (26) Other public use (explain) ______

ENVIRONMENTAL INFORMATION

D (27) **Vegetation density adjacent to site:** D=dense; M=moderate; S=sparse; B=barren

A,P,G (28) **Vegetation type adjacent to site:** B=barren; W=weeds; G=grass; R=riparian S=sagebrush/oakbrush/brush; J=juniper/piñon; A=aspen; P=pine/spruce/fir; T=tundra

N (29) **Evidence of intentional reclamation:** Y=yes; N=no (if yes, use comments)

0.3 (30) **Size of disturbed area in acres**

N (31) **Potential historical structures in area:** Y=yes; N=no (if yes, use comments)

N (32) **Evidence of bats:** G=guano; I=insect remains; B=bat sighting; O=other(use comments); N=no (use comments to expand on any positive evidence)

____ (33) **Recorded by/date:** Bob Kirkham 8/12/93 slide 4 of 104 on roll w/ upper Burnt Gulch

ADITS, SHAFTS, AND OPENINGS													
Feature Nos.		100	101	102	103	104	105	106	107	108	109	110	111
Type of Feature		P	A	P	P	A							
Opening Size (ft)	H	20	3	7	8	-							
	W	12	1	6	4	-							
Depth (ft)		7	10+	5	17	-							
Condition		P	P	P	P	F							
Drainage		N	W	N	N	N							
Access Deterents		N		N	N								
Deterent Condition													
Ratings	Env. Deg.	5	2	5	5	5							
	Hazard	5	3	5	3	5							
Photo	Roll No.												
	Frame No.		5,6,7,8 10 ✓			4 ✓							
Comments?		Y	Y	Y	Y	Y							

DUMPS, TAILINGS, AND SPOIL BANKS										
Feature No.		200	201	202	203	204	205	206	207	208
Type of Feature			D	D	D	D				
Plan view Dimension (ft.)	L		75	25	40	20				
	W		40	15	20	10				
Volume (yds)			600	50	120	25				
Steepest Slope Angle (dgr)			28	26	30	30				
Steepest Slope Length (ft)			15	15	30	6				
Size of Materials			GFC	LGS	GSF	GSF				
Cementation			M	M	M	M				
Vegetation Type			APG	P	B	AG				
Vegetation Density			M	D	B	M				
Drainage			W	N	N	N				
Stability			P	S	S	S				
Water Erosion	of Feature		S	S	S	S				
	Storm Runoff		S	N	N	N				
Wind Erosion			N	N	N	N				
Radiation Count			N	N	N	N				
Access Deterents			N	N	N	N				
Deterent Condition										
Ratings	Env. Deg.		4	5	5	5				
	Hazard		5	5	5	5				
Photo	Roll No.									
	Frame No.									
Comments?			Y	N	N	N				
Soil Sample No.										

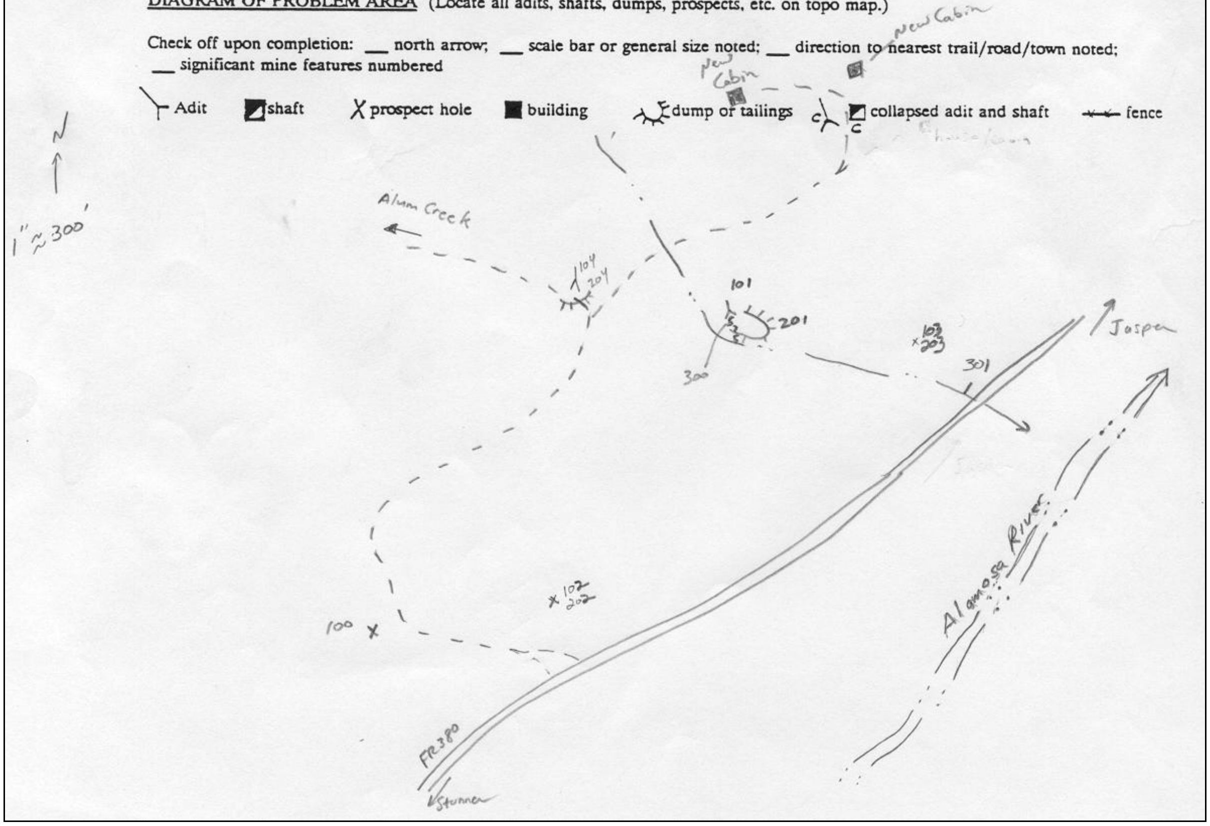
DRAINAGE/WATER SAMPLES						
Item Nos.	300	301	302	303	304	305
Adit/Shaft/Dump No./Other=0 (If other location, describe in comments)	101	101				
pH (standard units)	3.98	3.35				
Conductivity (uS)	682	439				
Flow (cfs) H. = 0.03	0.8	1.5				
Method of Flow Measure	O flume	E				
Date Flow/Sample (m/d/y)	8/12 93	8/12 93				
Location of Sample/Flow	A	RD				
Evidence of Toxicity in Site Drainage	P	P				
Evidence of Toxicity in Receiving Stream	P	P				
Distance from Stream (ft)	20	0				
Comments?	Y	Y				
Lab Water Sample No.	Y	N				

GPS READINGS	
Ftr. No.	Location
101	Lat. 37° 23′ 09.2″ Long. 106° 33′ 48.3″
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.

DIAGRAM OF PROBLEM AREA (Locate all adits, shafts, dumps, prospects, etc. on topo map.)

Check off upon completion: __ north arrow; __ scale bar or general size noted; __ direction to nearest trail/road/town noted; __ significant mine features numbered

Adit — shaft — prospect hole — building — dump or tailings — collapsed adit and shaft — fence



●81. Local person interviewed ________________
Name Address

●82. Name and address of person desiring a copy of this form:

●83. Describe the minimum work needed to mitigate any public health, safety, welfare, or environmental problems observed at the site. Note specific reclamation activities along with an estimated cost and time period to implement each activity described. Code costs as: 1= less $10,000; 2= $10,000 to $100,000; 3= $100,000 to $500,000; 4= more than $500,000. Code estimated time to complete the activity as: 1= less than 1 month; 2= 1 to 12 months; 3= 1 to 3 years; 4= over 3 years

Cost	Time	Recommended reclamation activity
1	1	Investigate 101 & 103. Backfill if on USFS & if felt
		warranted.
2	2	Consider remediating drainage from 101

●84. Comments relating to health, safety, welfare, environmental, or restoration problems and any general comments. All comments must be keyed to mine feature # or drainage/water sample item #.

100 is very near the boundary line, but appears to be on private land

101 is a partially collapsed adit draining water. Sits adjacent to dry creek. It is very near the property boundary. Private land to east owned by John Throckmorton – Stinnett TX or Jim? There is a small opening thru which standing water ponded by collapse debris is visible. Mine could be open beyond. Was called "Ferrocrete" mine when sampled, due to presence of ferrocrete ledge, into which the adit was driven.

201 - Toe of dump abuts creek and has been eroded by it. Drainage 300 flows over part of dump 201. There is a tiny prospect pit on hillside across creek from 201.

102 – There is a tiny prospect pit just west of 102

103 – This looks like a prospect pit with a winze on the vein. Portal & adit portion of working is caved, leaving only a shaft-like winze open. This feature is only slightly hazardous

300 - drainage out of 100. Heavy bright orange precip. Lots of ferrocrete in area. Looks like adit was driven into ferrocrete ledge. Creek is dry above 300. Drainage constitutes creek flow. There is piping at site suggesting someone is trying to use the water. Drainage is forming ferrocrete mound. Pipe is entombed by new ferrocrete. Ferrocrete is soft for 1st 30 FT then begins to harden up. Flow measured using 4" cutthroat flume. Ha = 0.03 Collected filtered neutral & acidified samples for analysis and sent it to CDH D.O. = 0.0 ppm

301 run on creek just above road. Flow seems greater. May be seepage from ferrocrete ledge entering creek here. Moderate red-orange precip.

101 - Continued. This adit may possibly be the Eastern tunnel shown on Plate 1 of CGS Bulletin 13. It is difficult to tell which adit this name is associated with on Plate 1, but 101 does seem to be the adit shown in the drainage east of the Gilda tunnel.

104 - This adit may be the Gild tunnel (CGS Bull. 13). Roof has collapsed to ground surface for a length of 30 feet in from portal

OFFICE/LITERATURE INFORMATION

●41. Owner of surface ________________

●42. Last known operator ________________

●43. Estimated production ________________

●44. Dates of production ________________

●45. Literature not cited in comments ________________

●46. Citation of any historical register listing ________________

Note: Water Sample sent to USGS labeled 361/4138-1 before I realized it was a duplicate ID#.

— Plotted
ok
slides ok

USFS-AMLI FIELD DATA FORM

LOCATION AND IDENTIFICATION

(1) **ID#:** 02- 08- 09 - 03 - 361 / 4138 - 2
rgn st fst rd xutm yutm area#

(2) **Sitename:** Eastern Star Tunnel

(3) **Other name/reference:** Snowslide Tunnel

3 (4) **Highest priority Environmental Degradation occurring in this area:**
1=extreme; 2=significant; 3=potentially significant; 4=slight; 5=none

5 (5) **Highest priority Mine Hazard noted in this area:**
E=emergency; 1=extreme danger; 2=dangerous; 3=potentially dangerous; 5=no significant hazard

M (6) **Commodity:** C=coal; U=uranium; M=metals; I=industrial material.
(Metal or Indust. material type: ______)

(7) **Quad name and date:** Summitville 1989

(8) **County:** Conejos

(9) **2° map:** Durango

(10) **Water Cataloguing Unit #:** 13010002

(11) **Mining district/coal field:** Stunner

(12) **Land survey location:** ___-___- SW sec 4 ,T 36N ,R 4E

(13) **Receiving stream:** Alamosa River flowing into ______
nearest named stream next named

(14) **Elevation (ft):** 9700

2 (15) **General Slope:** 1=0-10°; 2=11-35°; 3=greater than 35°

M (16) **Regional terrain:** R=rolling or flat; F=foothills; T=mesa; H=hogback; M=mountains; S=steep/narrow canyon

G (17) **Type of access:** N=no trail; T=trail; J=jeep road; G=gravel road; M=paved road; P=private/restricted road

M (18) **Quality of access for construction vehicles:** G=good; M=moderate; P=poor; X=very poor

(19) **Nearest town on map:** Jasper

7.5 (20) **Road distance from nearest town** (#.# miles)

(21) **Nearest road** (name and/or #): FR 250
FR=forest rd; CR=county rd; SH=state highway; I=interstate

Distance to following types of public uses (#.# miles):

0.0 (22) Road
___ (23) Dwelling (year-round)
___ (24) Campground/picnic area
___ (25) Marked trail
___ (26) Other public use (explain) ______

ENVIRONMENTAL INFORMATION

D (27) **Vegetation density adjacent to site:** D=dense; M=moderate; S=sparse; B=barren

GPS (28) **Vegetation type adjacent to site:** B=barren; W=weeds; G=grass; R=riparian S=sagebrush/oakbrush/brush; J=juniper/piñon; A=aspen; P=pine/spruce/fir; T=tundra

Y (29) **Evidence of intentional reclamation:** Y=yes; N=no (if yes, use comments)

2.0 (30) **Size of disturbed area in acres**

Y (31) **Potential historical structures in area:** Y=yes; N=no (if yes, use comments)

N (32) **Evidence of bats:** G=guano; I=insect remains; B=bat sighting; O=other(use comments); N=no (use comments to expand on any positive evidence)

___ (33) **Recorded by/date:** Bob Kirkham 7/22/93

ADITS, SHAFTS, AND OPENINGS													
Feature Nos.		100	101	102	103	104	105	106	107	108	109	110	111
Type of Feature		A	A	A	A	A							
Opening Size (ft)	H	-	-	-	-	-							
	W	-	-	-	-	-							
Depth (ft)		-	-	-	-	-							
Condition		F	F	F	F	F							
Drainage		N	W	N	N	N							
Access Deterents		C											
Deterent Condition		P											
Ratings	Env. Deg.	5	3	5	5	5							
	Hazard	5	5	5	5	5							
Photo	Roll No.												
	Frame No.		34										
Comments?		Y	Y	Y	Y	Y							

DUMPS, TAILINGS, AND SPOIL BANKS										
Feature No.		200	201	202	203	204	205	206	207	208
Type of Feature			D		D					
Plan view Dimension (ft.)	L		150		50					
	W		100		25					
Volume (yds)			1000		125					
Steepest Slope Angle (dgr)			32		27					
Steepest Slope Length (ft)			20		10					
Size of Materials			CGF		CGF					
Cementation			M		M					
Vegetation Type			PG		G					
Vegetation Density			S		M					
Drainage			W		N					
Stability			S		S					
Water Erosion	of Feature		S		S					
	Storm Runoff		N		N					
Wind Erosion			N		N					
Radiation Count			N		N					
Access Deterents			N		N					
Deterent Condition										
Ratings	Env. Deg.		4		5					
	Hazard		5		5					
Photo	Roll No.									
	Frame No.									
Comments?			N		N					
Soil Sample No.										

DRAINAGE/WATER SAMPLES						
Item Nos.	300	301	302	303	304	305
Adit/Shaft/Dump No./Other=0 (If other location, describe in comments)	101	101				
pH (standard units)	6.98	6.91				
Conductivity (uS)	912	784				
Flow (cfs)	1.0	1.1				
Method of Flow Measure	E	O flume				
Date Flow/Sample (m/d/y)	9/22 93	8/27 93				
Location of Sample/Flow	A	A				
Evidence of Toxicity in Site Drainage	P	P				
Evidence of Toxicity in Receiving Stream	P	P				
Distance from Stream (ft)	200	200				
Comments?	Y	Y				
Lab Water Sample No.	N	Y				

GPS READINGS	
Ftr. No.	Location
(S) 101	Lat. 37° 23' 18.8" Long. 106° 33' 42.9 PDOP 3.5
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.

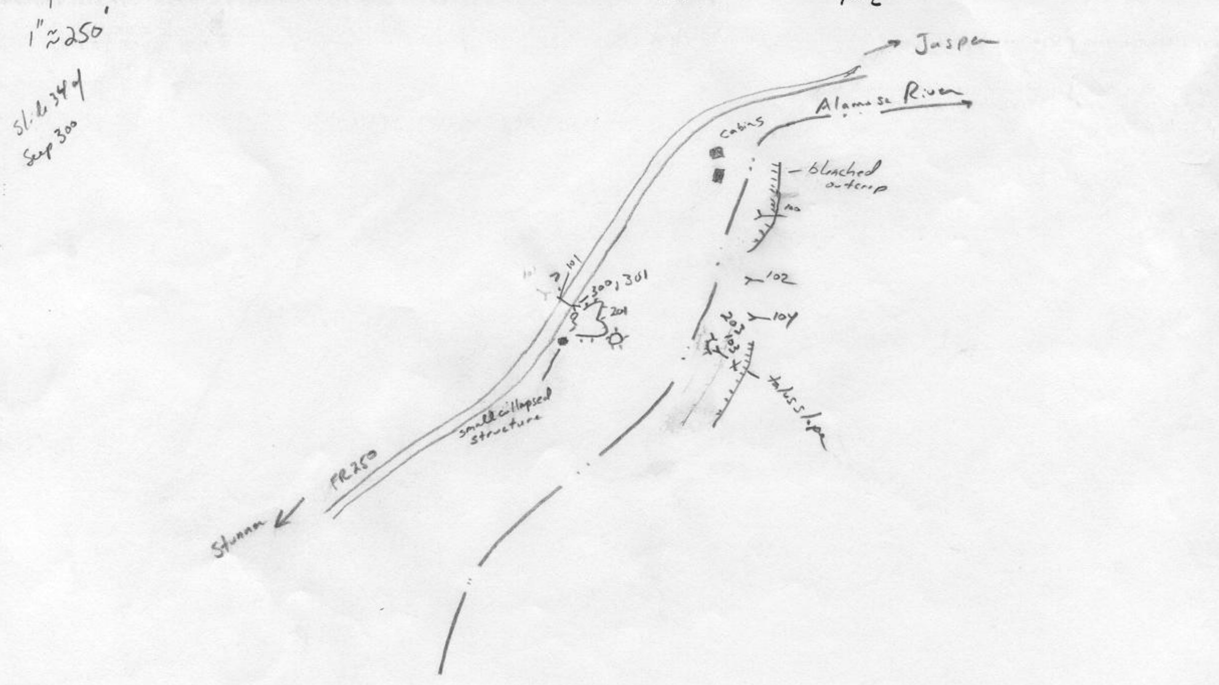
DIAGRAM OF PROBLEM AREA (Locate all adits, shafts, dumps, prospects, etc. on topo map.)

Check off upon completion: ✓ north arrow; ✓ scale bar or general size noted; ✓ direction to nearest trail/road/town noted; ✓ significant mine features numbered

Adit; shaft; prospect hole; building; dump or tailings; collapsed adit and shaft; fence

N

1" ≈ 250'



●81. Local person interviewed ______________________________
Name Address

●82. Name and address of person desiring a copy of this form:

____

●83. Describe the minimum work needed to mitigate any public health, safety, welfare, or environmental problems observed at the site. Note specific reclamation activities along with an estimated cost and time period to implement each activity described. Code costs as: 1= less $10,000; 2= $10,000 to $100,000; 3= $100,000 to $500,000; 4= more than $500,000. Code estimated time to complete the activity as: 1= less than 1 month; 2= 1 to 12 months; 3= 1 to 3 years; 4= over 3 years

Cost	Time	Recommended reclamation activity

●84. Comments relating to health, safety, welfare, environmental, or restoration problems and any general comments. All comments must be keyed to mine feature # or drainage/water sample item #.

100 was safeguarded by CDMG using a bulkhead seal w/out access
This may be the EASTERN Star tunnel
101 is not obvious on hillslope. Could be buried beneath road or the small collapsed structure could have been a shaft.

102 appears to have been a very small prospect adit

103 is hidden by willows. There is a tiny prospect hole on slope above 103
This could be the Snowslide Tunnel

104 is well hidden also. It possibly is the Lone Pine Tunnel.

300 discharges from toe of road fill opposite of adit 101. Infiltrates into ground within 30 FT
301 – Re-test & sampling @ flow out of collapsed debris at 101. Collected RU, RA, FU & FA samples for USGS – Hannah & Katie Walton-D
D.O. ≥ 20.0 ppm flow measured w/ 4" cutthroat flume, Ha = 0.035 FT
Sample called Adit under FR250.
Sample called adit under FR250.

hand freezing!

Did not turn blue w/ starch indicator

29 – 100 safeguarded by CDMG. See Comments for 100
31 – cabins in area

Gen. Comment: Water sample from 301 sent to USGS (Katie Walton-Day) labeled 361/4138-1 #301 before I realized this was a duplicate ID# (same as Ferrocrete Mine).

OFFICE/LITERATURE INFORMATION

●41. Owner of surface ______________________________

●42. Last known operator ______________________________

●43. Estimated production ______________________________

●44. Dates of production ______________________________

●45. Literature not cited in comments ______________________________

●46. Citation of any historical register listing ______________________________

USFS-AMLI FIELD DATA FORM

LOCATION AND IDENTIFICATION

(1) **ID#:** 02- 08- 09 - 03 - 361 / 4143 - 1
rgn st fst rd xutm yutm area#

(2) **Sitename:** Grape Mine

(3) **Other name/reference:** FOUQUET(?)MINE

3 (4) **Highest priority Environmental Degradation occurring in this area:**
1=extreme; 2=significant; 3=potentially significant; 4=slight; 5=none

3 (5) **Highest priority Mine Hazard noted in this area:**
E=emergency; 1=extreme danger; 2=dangerous; 3=potentially dangerous; 5=no significant hazard

M (6) **Commodity:** C=coal; U=uranium; M=metals; I=industrial material.
(Metal or Indust. material type: ______)

(7) **Quad name and date:** Summitville 1989

(8) **County:** Rio Grande

(9) **2° map:** Durango

(10) **Water Cataloguing Unit #:** 13010002

(11) **Mining district/coal field:** ______

(12) **Land survey location:** C - N/2 - N/2 sec 28 ,T 37N ,R 4E

(13) **Receiving stream:** WIGHTMAN Fork flowing into ALAMOSA RIVER
nearest named stream next named

(14) **Elevation (ft):** 10,400

2 (15) **General Slope:** 1=0-10°; 2=11-35°; 3=greater than 35°

M (16) **Regional terrain:** R=rolling or flat; F=foothills; T=mesa; H=hogback; M=mountains; S=steep/narrow canyon

J (17) **Type of access:** N=no trail; T=trail; J=jeep road; G=gravel road; M=paved road; P=private/restricted road

P (18) **Quality of access for construction vehicles:** G=good; M=moderate; P=poor; X=very poor

(19) **Nearest town on map:** Jasper

8.0 (20) **Road distance from nearest town (#.# miles)**

(21) **Nearest road (name and/or #):** WIGHTMAN FORK ROAD
FR=forest rd; CR=county rd; SH=state highway; I=interstate

Distance to following types of public uses (#.# miles):

0.0 (22) Road

8.0 (23) Dwelling (year-round)

3.0 (24) Campground/picnic area

____ (25) Marked trail

____ (26) Other public use (explain) ______

ENVIRONMENTAL INFORMATION

D (27) **Vegetation density adjacent to site:** D=dense; M=moderate; S=sparse; B=barren

PAG (28) **Vegetation type adjacent to site:** B=barren; W=weeds; G=grass; R=riparian S=sagebrush/oakbrush/brush; J=juniper/piñon; A=aspen; P=pine/spruce/fir; T=tundra

Y (29) **Evidence of intentional reclamation:** Y=yes; N=no (if yes, use comments)

1.0 (30) **Size of disturbed area in acres**

X (31) **Potential historical structures in area:** Y=yes; N=no (if yes, use comments)

N (32) **Evidence of bats:** G=guano; I=insect remains; B=bat sighting; O=other(use comments); N=no (use comments to expand on any positive evidence)

____ (33) **Recorded by/date:** Bob Kirkham 7/22/93 John Lovekin 8/10/93

ADITS, SHAFTS, AND OPENINGS

Feature Nos.		100	101	102	103	104	105	106	107	108	109	110	111
Type of Feature		A	A	A	S								
Opening Size (ft)	H	6	-	5	-								
	W	5	-	4	-								
Depth (ft)		15	-	30'+	-								
Condition		I	F	I	F								
Drainage		N	N	W	N								
Access Deterents		N		L									
Deterent Condition				D									
Ratings	Env. Deg.	5	5	3	5								
	Hazard	5	5	3	5								
Photo	Roll No.												
	Frame No.			31									
Comments?		Y	Y	Y	Y								

DUMPS, TAILINGS, AND SPOIL BANKS

Feature No.		200	201	202	203	204	205	206	207	208
Type of Feature				D	D					
Plan view Dimension (ft.)	L			15	50					
	W			20	30					
Volume (yds)				50	300					
Steepest Slope Angle (dgr)				20	20					
Steepest Slope Length (ft)				10	15					
Size of Materials				GF	FS					
Cementation				U	M					
Vegetation Type				G	G					
Vegetation Density				M	D					
Drainage				W	N					
Stability				S	S					
Water Erosion	of Feature			S	N					
	Storm Runoff			N	N					
Wind Erosion				N	N					
Radiation Count				N	N					
Access Deterents				N	N					
Deterent Condition										
Ratings	Env. Deg.			5	5					
	Hazard			5	5					
Photo	Roll No.									
	Frame No.									
Comments?				N	N					
Soil Sample No.										

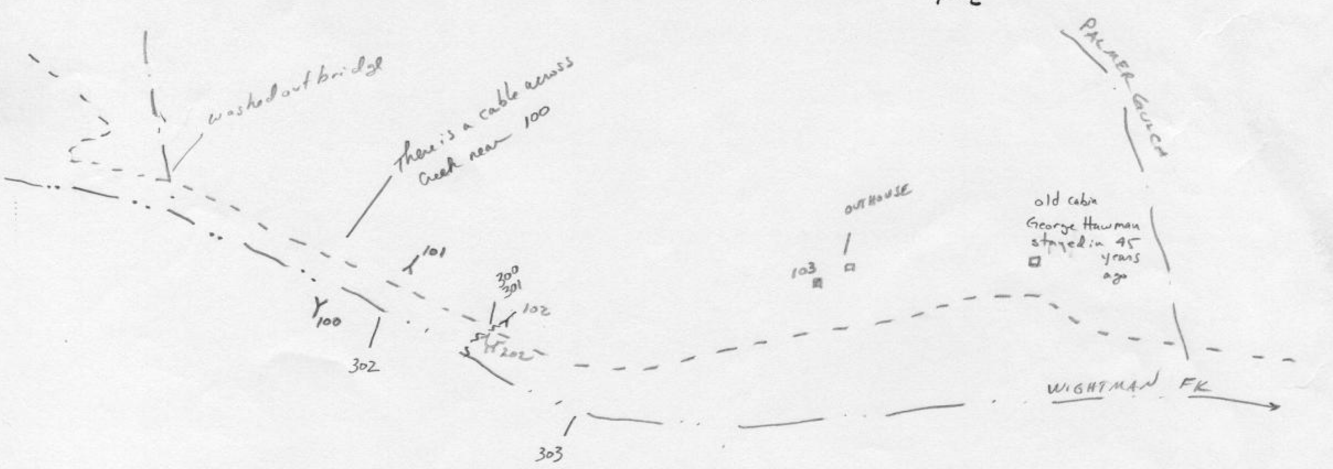
DRAINAGE/WATER SAMPLES						
Item Nos.	300	301	302	303	304	305
Adit/Shaft/Dump No./Other=0 (If other location, describe in comments)	102	102				
pH (standard units)	7.41	5.65	4.97	4.80		
Conductivity (uS)	615	277	890	881		
Flow (cfs)	1.5	0.7	1346	1346		
Method of Flow Measure	E	O Flume	E	E		
Date Flow/Sample (m/d/y)	7/22 93	8/10 93	8/10 93	8/10 93		
Location of Sample/Flow	A	A	RU	RD		
Evidence of Toxicity in Site Drainage	P	P	P	P		
Evidence of Toxicity in Receiving Stream	P	P	P	P		
Distance from Stream (ft)	75	100	0	0		
Comments?	Y	Y	Y	Y		
Lab Water Sample No.		Y				

GPS READINGS	
Ftr. No.	Location
102 7/22/93	Lat. 37° 25' 41.6 Long. 106 33' 24.6 4 sat
102 8/10/93	Lat. 37° 25' 43.2 Long. 106° 33' 24.2 PDOP 5.6
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.
	Lat. Long.

DIAGRAM OF PROBLEM AREA (Locate all adits, shafts, dumps, prospects, etc. on topo map.)

Check off upon completion: __ north arrow; __ scale bar or general size noted; __ direction to nearest trail/road/town noted; __ significant mine features numbered

Adit shaft prospect hole building dump or tailings collapsed adit and shaft fence



●81. Local person interviewed ____________________
Name Address

●82. Name and address of person desiring a copy of this form:

●83. Describe the minimum work needed to mitigate any public health, safety, welfare, or environmental problems observed at the site. Note specific reclamation activities along with an estimated cost and time period to implement each activity described. Code costs as: 1= less $10,000; 2= $10,000 to $100,000; 3= $100,000 to $500,000; 4= more than $500,000. Code estimated time to complete the activity as: 1= less than 1 month; 2= 1 to 12 months; 3= 1 to 3 years; 4= over 3 years

Cost	Time	Recommended reclamation activity
		Consider remediation of drainage out of the Grape Mine

●84. Comments relating to health, safety, welfare, environmental, or restoration problems and any general comments. All comments must be keyed to mine feature # or drainage/water sample item #.

100 appears to be a short adit across creek from road. Did not cross creek, but shined a mirror into adit & could see face. No apparent dump. Near USFS boundary

101. collapsed adit Near USFS boundary

102. Has wooden, locked door. Drains water, Old sign on paper reads "GRAPE MINE, KEEP OUT. Miles Mining Company." Door is locked but ineffective if you wanted to get in. Can see pick & shovel, wire & wheel barrow inside. Have heard locals refer to this area as FOUQUET MINE

300, surprisingly high pH for water w/ precipitate & high conductivity. Collected 2 sets of filtered samples (FA & FU). One set was sent to USGS (Geoff Plumlee) for analysis. Plots right on the USFS boundary

Run on discharge out of Grape Mine (102)

103 appears to be a collapsed head frame over a shaft, but is shown as a cabin on topo. Does not appear to be a open hole under debris. Could be old Lucky Miles cabin.

31 - Faint remnant of cabin which George Hawman stayed in one summer 45 years ago (he was 19) while working on upper switch backs. It is shown on topo map north of Wightman Fork and west of Palmer Gulch. Cable across creek to adit 100

301 - Retest of water draining out of Grape Mine (102). John Lovekin conducted this sampling. Collected 2 sets of filtered acidified and filtered unacidified samples. One set was sent to USGS (Geoff Plumlee) for analysis. Used 4" Cutthroat flume to measure discharge. Ha = 0.025 FT

302 - Run on Wightman Fork above Grape Mine

303 - Run on Wightman Fork below Grape Mine

29 - Locked wooden door on 102

31 - Outhouse is only standing building, near 103

OFFICE/LITERATURE INFORMATION

●41. Owner of surface ____________________

●42. Last known operator ____________________

●43. Estimated production ____________________

●44. Dates of production ____________________

●45. Literature not cited in comments ____________________

●46. Citation of any historical register listing ____________________