TOEROEK ASSOCIATES, INC.

Bonita Peak Mining District Site

Site Research Summary for
Natalie-Occidental Mine

May 1, 2018

I. Introduction

On June 29, 2016, Toeroek Associates, Inc. (Toeroek) received Task Order (TO) No. 8001 from the U.S. Environmental Protection Agency (EPA), Region 8, under Superfund Enforcement Support Services Contract EP-S9-16-01. (b) (5), (b) (7)(A) [redacted]

The PRP investigations are focused in scope, and do not include full chain of title research. Findings from these abbreviated PRP reports include associated facility mine claim boundaries, current ownership information, and focused operational and corporate histories.

This report identifies PRPs that owned or operated the Natalie-Occidental mine, one of the 48 mining-related facilities being investigated under this TO. Figure 1 shows the location of the Natalie-Occidental mine, and the delineation of the Upper Animas Watershed, which generally corresponds to the Site area, approximately 140 square miles of the Silverton, Colorado volcanic caldera.

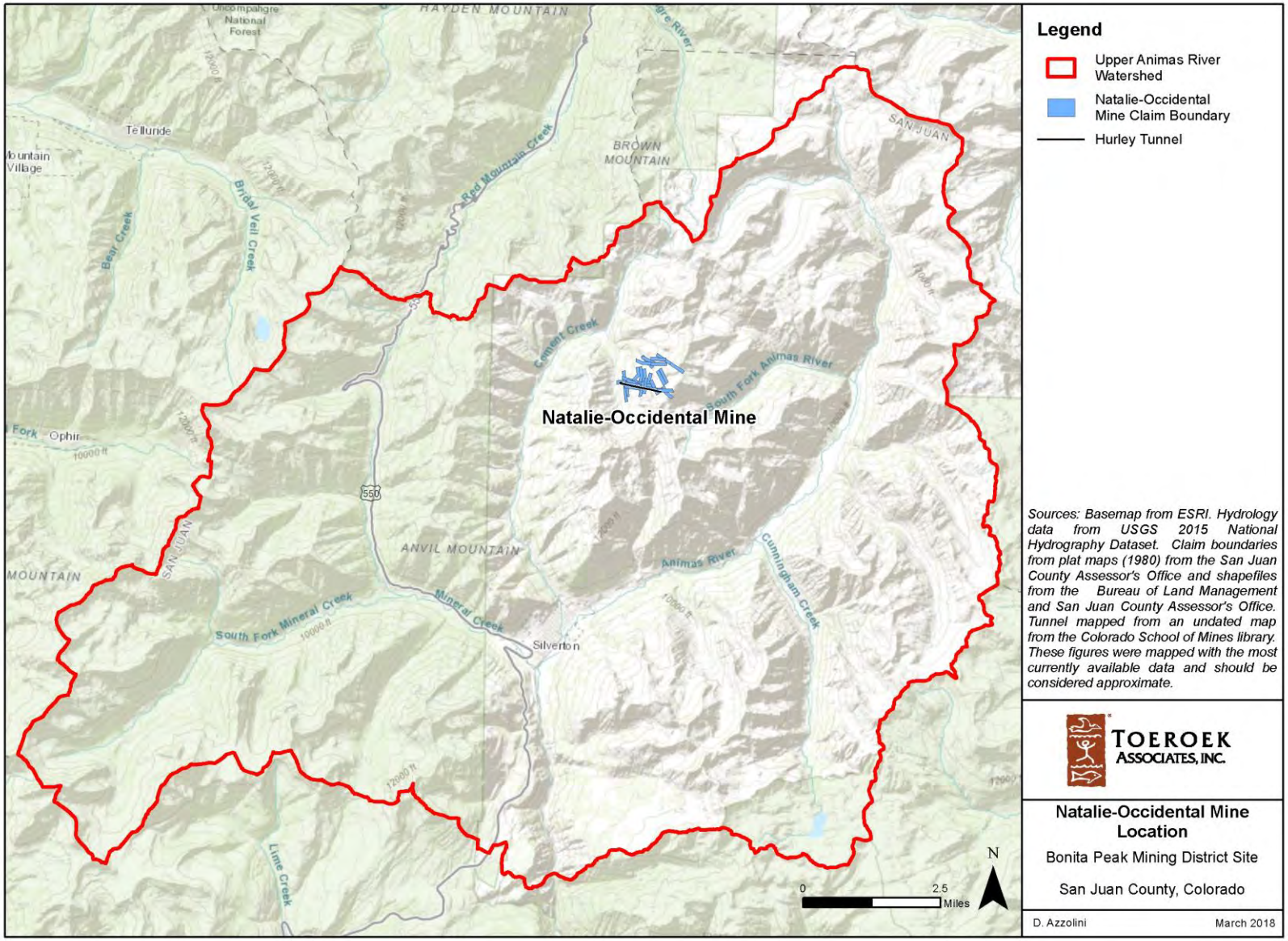

Figure 1: Natalie-Occidental Location Map

II. Methodology and Format

CERCLA Section 107(a) imposes liability (1) on current owners or operators of a facility where hazardous substances have been deposited, and (2) on any person or entity who at the time of disposal of hazardous substances owned or operated a facility where hazardous substances were deposited. Sources of information for the abbreviated PRP search investigations are limited to publically available operational records and online current ownership records obtained from the San Juan County Assessor's Office as the scope of this TO did not include a formal chain of title search.

The PRPs discussed in this report were identified through the review of records obtained from, but not limited to, the following sources: Colorado Bureau of Mines (CBM) annual publications and operator reports; United States Geological Survey (USGS) published reports and bulletins; various university and public historical record databases; and online records obtained from the San Juan County Assessor's Office.

Toeroek reviewed the data sources described in Table 1 for the purpose of identifying the ownership and operational history of the Natalie-Occidental mine. Toeroek conducted a data review to determine: 1) a general facility history that includes location, operations, and hazardous waste contamination; 2) patented mining claims associated with the facility; 3) information regarding past and current ownership; and 4) PRPs associated with the mining facility.

Table 1: Data Sources Reviewed

Abbreviation	Data Source	Record Description
CBM	Colorado Bureau of Mines	Published annual reports by the CBM and inspection reports conducted by agency geologists and/or facility operators obtained from the Colorado State Archives.
COSOS	Colorado Secretary of State	Online record obtained through Colorado Secretary of State Business Organizations searches.
CSA	Colorado State Archives	Corporate and operations records obtained from the Colorado State Archives.
GDOC	Google Historical Online Databases	Historical published documents that are stored within Google Books, Google Scholar, and Google News Archive.
INT	Internet	Documents and photographs obtained through general internet searches.
NEWS	Colorado Historical	Historical Colorado newspaper articles published prior to

Abbreviation	Data Source	Record Description
	Newspaper Collection	1922.
NEXIS	Nexis®	Public records obtained from the Nexis® Public Records Database.
SCA	San Juan County Assessor's Office	Online property records obtained from the San Juan County Assessor's Office.
SDMS	Superfund Document Management System	Records obtained from the EPA Superfund Document Management System.
USGS	United States Geological Survey	Records obtained from the USGS library located in Denver, Colorado and from publications stored on its online publications warehouse repository.
UTSOS	Utah Secretary of State	Online records obtained through Utah Secretary of State Utah Business Search

References to the numbered evidentiary documents within this report are made by a document number in parentheses following the sentence(s) to which the reference applies. The document number generally consists of a letter prefix followed by a number. The prefix abbreviation indicates the general source of the document and the numbers are sequential.

III. Research Findings: Natalie-Occidental Mine

A. Facility Description

San Juan County is in southwestern Colorado, encompassing approximately 388 square miles (SCA-00171). Cycles of geological uplift, subsidence, and glaciation contribute to the undulating terrain of the county, which lies entirely in the San Juan Mountains. Several streams originate in basins between principal mountain peaks and descend into the Animas River valley, a distinct drainage path. The Animas River flows south-southwest for several miles through the valley from the town of Animas Forks to the town of Silverton. The Animas River flows out of the valley and converges with Cement Creek at Silverton (INT-00006, pp. 6-7).

The Natalie-Occidental facility has been known by various names, including the Natalie group, Hurley tunnel, Occidental mine, Silver Ledge, and Orleans millsite (INT-00006, p. 114; GDOC-00029, p. 3; GDOC-00031, p. 51; CBM-00175; CBM-00350). The research for this report was conducted using all former names or variations thereof. For the purpose of clarity, this report uses the terms "Natalie-Occidental mine" to refer to the surface and underground mine workings, and "Natalie-Occidental mill" to refer to the ore treatment plant. This report generally refers to the mine and mill as "facility."

The Natalie-Occidental facility, is situated in Section 22, Township 41 North, Range 7 West of the New Mexico Principal Meridian at N 37º 52' 39.1" Latitude, W 107º 38' 38.6" Longitude. It is considered part of the Eureka Mining District (CBM-00178; USGS-00081, p. 31). The facility

is located adjacent to the South Fork of Cement Creek. Drainage from the mine adit flows directly into the creek, loading high concentrations of metal (USGS-00074, p. 24; SDMS-1260037, p. 45).

The Natalie-Occidental facility is located at an elevation of approximately 11,000 feet. It consists of a partially collapsed lower adit situated 35 feet above the creek level, a fully-collapsed upper adit 220 feet above the lower adit, and a large dump pile spread out along the creek banks. Although the creek has eroded much of the original dump pile, reclamation feasibility survey work in 1998 indicated that there were approximately 6,800 cubic yards of waste rock. The South Fork of Cement Creek runs through the dump pile for more than 270 feet, and the creek continues to actively erode the dump during high-flow (SDMS-1260037, pp. 96-97). Figure 2 is a sketch map of the facility produced for the 1998 reclamation feasibility ("RFR") study. The RFR report refers to the mine as Silver Ledge.

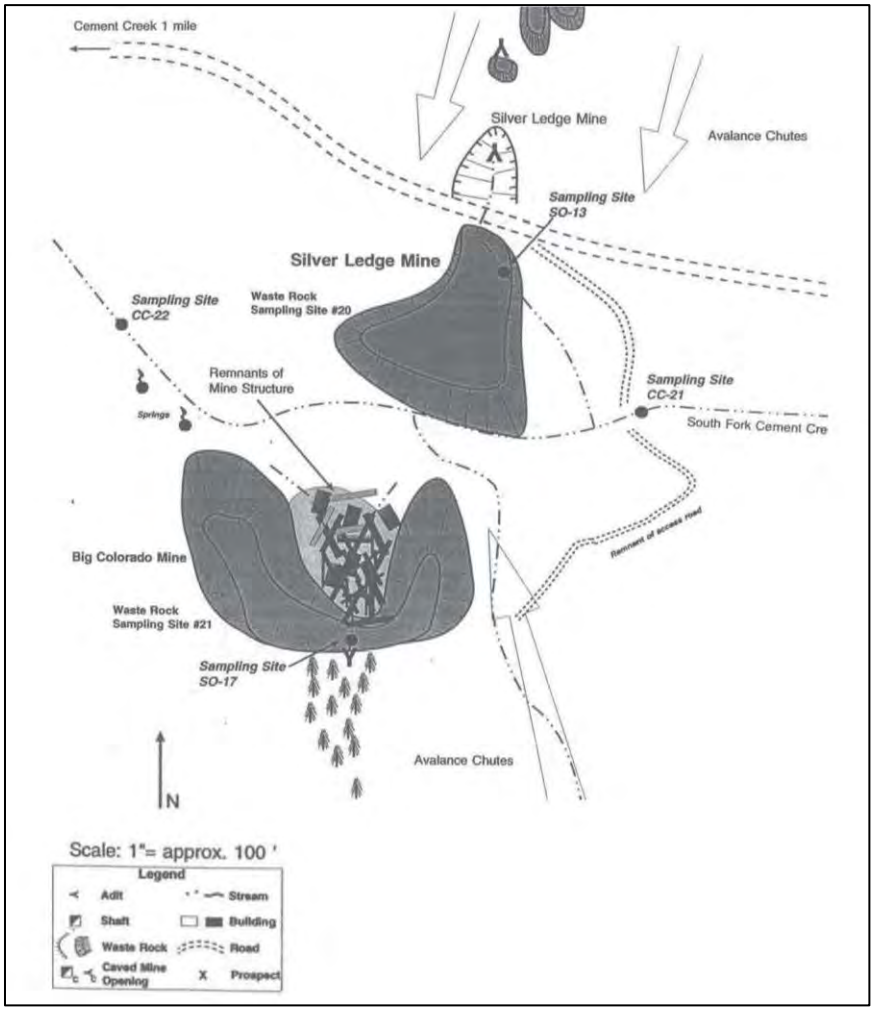

Figure 2: Sketch Map of the Natalie-Occidental Facility, 1998 (SDMS-1260037, p. 94)

During the 1998 survey work, the Colorado Division of Minerals and Geology identified the Natalie-Occidental facility as the largest mine drainage source of metals in Cement Creek. At low flow, the mine drained about 80 pounds of metals per day, including approximately 3.5 pounds of zinc, 61 pounds of iron, 11 pounds of manganese, and 3.5 pounds of aluminum per day. At high flow, the mine drained about 400 pounds of metals per day, including approximately 22 pounds of zinc, 304 pounds of iron, 1.5 pounds of copper, 38 pounds of aluminum, and 32 pounds of manganese per day (SDMS-1260037, p. 97). Figure 3 is a photograph of the draining mine adit taken during reclamation feasibility studies conducted in the Animas River Watershed between 1996 and 2000. Figure 4 is a photograph of the draining mine adit taken in 2016 (INT-00052, p. 2).

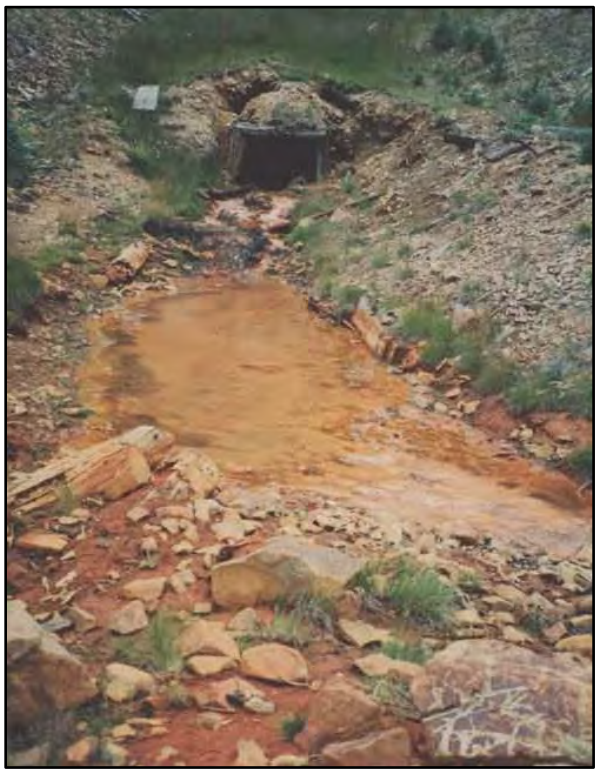

Figure 3: Draining Adit of the Natalie-Occidental Mine, Circa 2000 (USGS-00074, p. 25).

Figure 4: Drainage from the Natalie-Occidental Mine, 2016 (INT-00052, p. 2).

B. Current Owners

Toeroek obtained current ownership information for patented Natalie-Occidental mining claims through San Juan County Assessor online records. The names and locations of Natalie-Occidental mining claims were discovered through review of historical operational records that include USGS-published reports and bulletins, various university and public historical records databases, and corporate records obtained through 104(e) Information Requests.

Table 2 lists the properties and current owner information associated with the Natalie-Occidental mine. Figure 5 is the Natalie-Occidental Parcel Boundaries Map that shows the approximate location of Natalie-Occidental mining claims.

Table 2: Current Owner Information for Natalie-Occidental Mine

Mining Claim Name – Mineral Survey No.	Parcel No.	Current Owner	Current Address	Source
Big Indian – 14325	47750210050035	SJC Land and Cattle Company	P.O. Box 4991 Aspen, CO 81612	SCA-00252; COSOS-00145
Black Hawk – 14325	47750210050220	(b) (6)	(b) (6)	SCA-00253
Blue Bird – 15061 Claire March – 15061 Thomas Jefferson – 15504	47750280050021	Core Mountain Enterprises, LLC	1069 Greene St. 2nd Floor Silverton, CO 81433	SCA-00254; COSOS-00143

Mining Claim Name – Mineral Survey No.	Parcel No.	Current Owner	Current Address	Source
Camilla – 15061 Immatchock – 18849 Jo Pi – 14325 Newton – 15061 Tip Top – 18849 U. S. Grant – 15504 Confidence – 14325	47750220050007	BLM	2850 Youngfield St. Lakewood, CO 80215	SCA-00255; INT-00045
Hopeful – 15504 Murton – 14325	47750210050135	BLM	2850 Youngfield St. Lakewood, CO 80215	SCA-00256; INT-00045
Invincible – 15504 Klondike No. 2 – 15061 Louesia – 15061 Mountain Boy – 15061 Mountain Boy Ext. – 15061 Occidental No. 2 – 15504	47750210050036	Core Mountain Enterprises, LLC	1069 Greene St. 2nd Floor Silverton, CO 81433	SCA-00257; COSOS-00143
Sumner – 15061	47750270050002	BLM	2850 Youngfield St. Lakewood, CO 80215	SCA-00307; INT-00045
Natalie – 15061	47750270050003	BLM	2850 Youngfield St. Lakewood, CO 80215	SCA-00258; INT-00045
Orleans M. S. – 15061	47750210050021	(b) (6) [redacted]	(b) (6) [redacted]	SCA-00259
Occidental No. 3 – 15504	47750210050023	Core Mountain Enterprises, LLC	1069 Greene St. 2nd Floor Silverton, CO 81433	SCA-00324; COSOS-00143
Occidental – 15504 Silver Ledge – 15061	47750210050121	Core Mountain Enterprises, LLC	1069 Greene St. 2nd Floor Silverton, CO 81433	SCA-00260; COSOS-00143
Klondyke – 15061	47750280050001	Core Mountain Enterprises, LLC	1069 Greene St. 2nd Floor Silverton, CO 81433	SCA-00296; COSOS-00143
Silver Ledge Ext. – 15061	47750280050002	Core Mountain Enterprises, LLC	1069 Greene St. 2nd Floor Silverton, CO 81433	SCA-00261; COSOS-00143

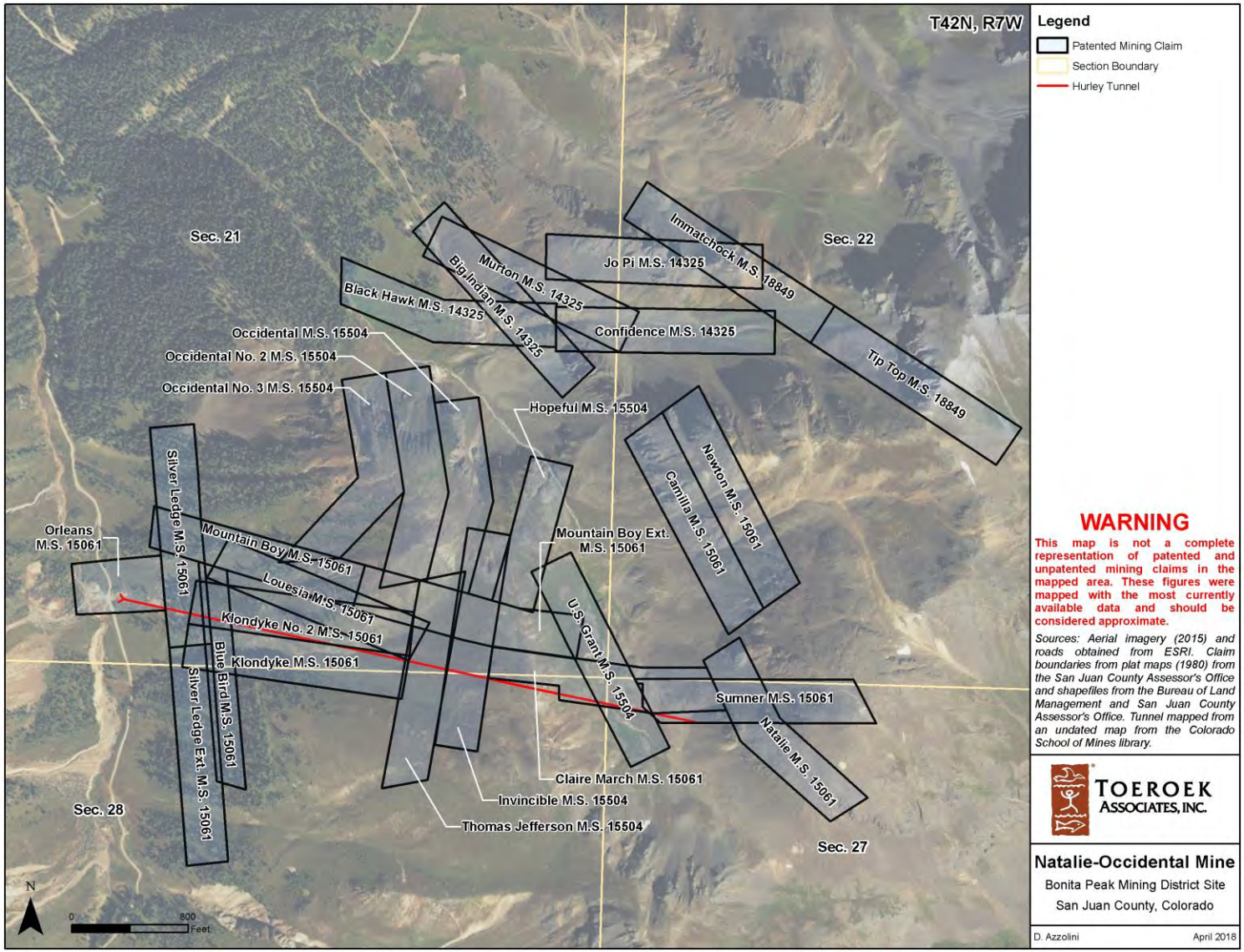

Figure 5: Natalie-Occidental Parcel Boundaries Map

C. Operations

Evidence of the earliest operations at Natalie-Occidental was found in a National Park Service (NPS) historical account of mining in San Juan County. According to the NPS account, (b) (6) located the Occidental and Silver Ledge veins on the South Fork of Cement Creek. In response to locating these veins, (b) (6) organized the Occidental Mining Company in 1895. (b) (6) then acquired and began to develop the adjoining Natalie group of claims in 1897.[1] In 1899, he conveyed the Natalie group of claims to the newly-incorporated Natalie Mining and Milling Company and, shortly thereafter, commissioned the Hurley tunnel. With a crew of approximately 20 men, the Natalie Mining and Milling Company excavated the Hurley tunnel and also produced a small amount of ore on the Occidental mining claim (INT-00006, pp. 113-114).

By June 8, 1901, the Hurley tunnel was "a good many hundred feet advanced in to Sampson Mountain," according to a *Silverton Standard* report (NEWS-00082, p. 1). On October 19, 1901, the *Silverton Standard* reported that the Hurley tunnel was in nearly 1,000 feet. It measured 7 ½ feet wide at the bottom, 6 ½ feet wide at the top, and 8 ½ feet tall (NEWS-00090, p. 1).

A *Silverton Standard* article, dated May 2, 1903, reported that "immense" bodies of ore had been opened up at the Natalie-Occidental mining claims. Specifically, work had recently begun on the Magnolia vein, a 14-foot-wide vein carrying gold, silver, copper, and lead ore. (b) (6) was also in the process of designing a mill and tramway at the Natalie-Occidental property (NEWS-00081, p. 1).

Although operations continued steadily, (b) (6) s operations were not as successful as he had anticipated. When stockholders of the Occidental Mining Company and the Natalie Mining and Milling Company began to demand returns on their investments, he was unable to meet the demands. In order to delay repayment of the investors, (b) (6) reorganized the two companies into the Natalie-Occidental Mining Company in 1903 (INT-00006, p. 114).

On January 30, 1904, the *Silverton Standard* reported that the main tunnel, presumably the Hurley tunnel, had intersected the Magnolia vein at a point 750 feet from the tunnel portal. At 900 feet from the portal, a crosscut was driven off of the main tunnel to intersect the Magnolia vein. These workings were 600 feet below ground surface (NEWS-00083, p. 1). Figure 6 is a diagram of the underground workings, as printed in the *Silverton Standard* article.

[1] The NPS account does not identify the mining claims in the Natalie Group. Based on the available documentation, it is not known which claims (b) (6) considered to be part of the Natalie Group.

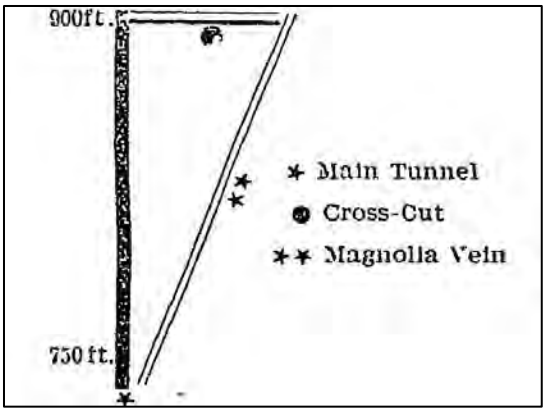

Figure 6: Diagram of Natalie-Occidental Workings, 1904 (NEWS-00083, p. 1)

(b) (6) 's investors eventually withdrew from the Natalie-Occidental Mining Company in 1904, causing (b) (6) to organize a fourth company, the Mines Securities Corporation.[2] A Mining American publication, entitled *Mining Reporter,* noted that on July 20, 1905, the "Natalie-Occidental Consolidated M. and M. Company" was drifting off of the Hurley tunnel at 1,200 feet (GDOC-00029).[3] According to the NPS account, the Mines Securities Corporation began development on the Occidental mining claim, but it quickly moved operations back to the Hurley tunnel. Operations continued at the Hurley tunnel until 1906 (INT-00006, p. 114). On October 20, 1906, the *Silverton Standard* reported that the Mines Securities Corporation "controlled" the Natalie-Occidental group of mining claims but did not indicate that the property was being operated (NEWS-00084, p. 5). (b) (6) permanently suspended all operation in 1906 (INT-00006, p. 114).

On August 26, 1971, an inspector for the CBM visited the Natalie-Occidental facility and reported that (b) (6) had reopened the abandoned Hurley tunnel on August 1, 1971.[4] "Silver Bay Mines" was the reported owner of the property. (b) (6) 's crew of three men was in the process of cleaning out the tunnel portal for sampling. They had cleaned out 200 feet of the

[2] A 1903 Silverton Standard report states that the Mines Securities Corporation held the controlling interests in the Occidental Mining Company and the Natalie Mining and Milling Company (NEWS-00092, p. 3). A *Silverton Standard* report from 1904 states that the operator at the Natalie-Occidental property was "Mines Surety Company" (NEWS-00091, p. 3).

[3] Based on the available evidence, it is not known whether a corporate relationship exists between the Natalie-Occidental Consolidated M. and M. Company and the Natalie-Occidental Mining Company. However, according to various sources, (b) (6) owned and operated both the Natalie-Occidental Consolidated M. and M. Company and the Natalie-Occidental Mining Company.

[4] CBM-00175 states that the mine was last worked in 1904; however, contemporary sources show that the mine was operated until at least 1905 and possibly during part of 1906 (INT-00006, p. 114; NEWS-00084, p.5).

tunnel by the end of August and planned to continue cleaning until they reached a tungsten vein 1,000 feet from the portal. Furman believed that the tunnel was 5,000 feet long (CBM-00175).[5]

When (b) (6) submitted his operator's report to CBM for 1971, he indicated that he had worked for only 20 days that year and had not produced any ore. (b) (6) stated that the total acreage of his lease from Silver Bay Mines, Inc. was approximately 50 acres. The lease comprised the following patented mining claims: Blue Bird, Klondyke #2, Louesia, Mountain Boy, Silver Ledge, Silver Ledge Extension, and Orleans Mill Site (CBM-00176).

On August 2, 1972, the CBM inspector reported that the Natalie-Occidental was owned and operated by "Silver Bay Mines." The inspector's report described the operations in the following way:

> The operator has cleaned out two cave areas in the tunnel and at the present time is repairing and replacing old timbers in this tunnel. The operator is waiting for a geologist to explore the veins exposed in this tunnel and to evaluate the economics of future mining operation. Approximately two acres of surface area has been disturbed. This consists of an open cut 15 ft. wide by 150 ft. long to drain water from the portal and an old millsite (CBM-00177).

In the operator's report to CBM for 1972, Silver Bay Mines, Inc. stated that the total acreage of Natalie-Occidental included 24 patented and 9 unpatented mining claims. The unpatented mining claims were listed as follows: Silver Bay, Silver Bay No. 1, Silver Bay No. 2, Silver Bay No. 3, Silver Bay No. 4, Big Indian No. 1, Big Indian No. 2, Big Indian Extension, and Blackhawk Extension.[6] The report named the principal products as gold, silver, lead, zinc, and tungsten, although it stated that the mine did not produce any ores in 1972 (CBM-00178).

D. Potentially Responsible Parties (PRPs)

Information on corporate and individual PRPs is summarized below in Table 3. The table lists both past and current corporate and individual owners / operators in chronological order based on their period of association with the Natalie-Occidental mine. Toeroek has assumed, for purposes of this report, that any individuals associated with the property prior to 1955 are deceased. For those individuals associated with the Site after 1955, Nexis public records searches were conducted to verify current residences. The addresses of these individuals, when available, are provided in the table. Following Table 3 are corporate history narratives for all Natalie-Occidental past and current corporate operators and owners.

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[5] In 1905, the *Mining Reporter* indicated that the tunnel was at least 1,200 feet, but no further information was found for the period between 1905 and 1960 (GDOC-00029). In 1960, The Colorado Metal Mining Fund Board reported that the "Natalie" was reached "through Occidental tunnel, about 5000 feet from portal" (GDOC-00031, p. 51).

[6] The patented mining claims are shown in Figure 5, Natalie-Occidental Parcel Boundaries Map.

Table 3: PRP Summary Table for Natalie-Occidental

PRP	Association to Facility	Known Year(s) of Activity	Status	Source
(b) (6)	Past Owner / Operator	1895 – 1906	Presumed Deceased	INT-00006, pp. 113-114; GDOC-00029
Occidental Mining Company	Past Owner / Operator	1897 – 1903	Unknown	INT-00006, pp. 113-114
Natalie Mining and Milling Company	Past Owner / Operator	1899 – 1903	Unknown	INT-00006, pp. 113-114
Natalie-Occidental Mining Company	Past Owner / Operator	1903 – 1904	Unknown	INT-00006, pp. 114
Mines Securities Corporation	Past Owner / Operator	1904 – 1906	Unknown	INT-00006, p. 114; NEWS-00084, p. 5
(b) (6)	Past Operator	1971	Unknown due to common name	CBM-00175; CBM-00176
Silver Bay Mines, Inc.	Past Owner / Operator	1971 – 1994	Inactive (Involuntarily Dissolved)	CBM-00175; CBM-00176; CBM-00177; CBM-00178; SCA-00253; SCA-00254; SCA-00258; SCA-00259; SCA-00260; SCA-00261
(b) (6)	Past Owner	1990 – 2007	Deceased	SCA-00252; SCA-00253; SCA-00254; SCA-00255; SCA-00256; SCA-00257; SCA-00258; SCA-00260; SCA-00261

PRP	Association to Facility	Known Year(s) of Activity	Status	Source
SJC Land and Cattle Company*	Current Owner	1993 – Present	Active	SCA-00252; SCA-00254; SCA-00255; SCA-00256; SCA-00257; SCA-00258; COSOS-00145
(b) (6) [redacted]	Past Owner	1994 – 2011	(b) (6) [redacted]	SCA-00259; SCA-00260; NEXIS-00105
(b) (6) [redacted]	Past Owner	1994 – 2011	(b) (6) [redacted]	SCA-00259; SCA-00260; NEXIS-00106
Core Mountain Enterprises, LLC*	Current Owner	2006 – Present	Active	SCA-00252; SCA-00254; SCA-00256; SCA-00257; SCA-00260; SCA-00261; COSOS-00143
(b) (6) [redacted]	Past Owner	2007 – 2009	Deceased	SCA-00253; NEXIS-102
(b) (6) [redacted]	Current Owner	2007 – Present	(b) (6) [redacted]	SCA-00253; NEXIS-00103
BLM*	Current Owner	2011 – Present	2850 Youngfield St. Lakewood, CO 80215	SCA-00255; SCA-00256; SCA-00258; INT-00045
(b) (6) [redacted]	Past Owner	2011	(b) (6) [redacted]	SCA-00260; SCA-00261; NEXIS-00104
(b) (6) [redacted]	Current Owner	2017 – Present	(b) (6) [redacted]	SCA-00259; NEXIS-00094
* Indicates past ownership based on San Juan County Assessor online records.				

The following past and current corporate operators and owners were identified through operational research and San Juan County Assessor online records. Corporate research with the Colorado Secretary of State was conducted for all companies listed in the PRP Summary Table.

Corporate records for companies found to be dissolved or declared defunct prior to 1975 required microfilm searches at the Colorado State Archives. Party information is also provided in chronological order based on their period of association, first addressing the past corporate operators and owners followed by the current owners. No current operator was identified through this investigation.

1. Past Corporate PRPs

PRP:	**OCCIDENTAL MINING COMPANY**
PRP Class:	Past Owner / Operator
Status:	Unknown
Current Address:	n/a
State of Formation:	n/a
Period of Activity:	1897-1903

The Colorado Secretary of State website does not contain any corporate information for a company named "Occidental Mining Company."

Further research at the Colorado State Archives is required to determine the PRP's corporate status.

PRP:	**NATALIE MINING AND MILLING COMPANY**
PRP Class:	Past Owner / Operator
Status:	Unknown
Current Address:	n/a
State of Formation:	n/a
Period of Activity:	1899-1903

The Colorado Secretary of State website does not contain any corporate information for a company named "Natalie Mining and Milling Company."

Further research at the Colorado State Archives is required to determine the PRP's corporate status.

PRP:	**NATALIE-OCCIDENTAL MINING COMPANY**
PRP Class:	Past Owner / Operator
Status:	Unknown
Current Address:	n/a
State of Formation:	n/a
Period of Activity:	1903 – 1904

The Colorado Secretary of State website does not contain any corporate information for a company named "Natalie-Occidental Mining Company."

Further research at the Colorado State Archives is required to determine the PRP's corporate status.

PRP:	**MINES SECURITIES CORPORATION**
PRP Class:	Past Owner / Operator
Status:	Unknown
Current Address:	n/a
State of Formation:	n/a
Period of Activity:	1904 – 1906

The Colorado Secretary of State website does not contain any corporate information for a company named "Mines Securities Corporation."

Further research at the Colorado State Archives is required to determine the PRP's corporate status.

PRP:	**SILVER BAY MINES, INC.**
PRP Class:	Past Owner / Operator
Status:	Inactive (Involuntarily Dissolved)
Current Address:	n/a
State of Formation:	Utah
Period of Activity:	1971 – 1994

Silver Bay Mines, Inc. was incorporated in Utah on August 18, 1948. The company's corporation status expired as of January 8, 1982. According to the Utah Secretary of State website, Silver Bay Mines, Inc. was involuntarily dissolved (UTSOS-00008).

In a CBM operator's report for 1972, Silver Bay Mines, Inc. listed its address as 2569 Wilshire Circle, Salt Lake City, Utah 84109. The officers of the corporation were listed as (b) (6) President; (b) (6), Vice President; (b) (6), Secretary and Treasurer; and (b) (6), Manager (CBM-00178).

The company's last known registered agent was (b) (6). Its last known address was 68 South Main Fifth Floor, Salt Lake City, Utah 84115 (UTSOS-00008).

2. Current Owner Corporate PRPs

PRP:	SJC LAND AND CATTLE COMPANY
PRP Class:	Current Owner
Status:	Active
Current Address:	P. O. Box 4991 Aspen, Colorado 81612
State of Formation:	Colorado
Period of Activity:	1993 – Present

SJC Land and Cattle Company was incorporated in Colorado on October 8, 1993. The incorporator was (b) (6), located at 201 North Mill Street, Suite 203, Aspen, Colorado 81611. The original director of the corporation was (b) (6), located at P. O. Box 9441, Aspen, Colorado 81612 (COSOS-00145; COSOS-00146).

According to records available online from the Colorado Secretary of State, SJC Land and Cattle Company is active and in good standing in Colorado. The principal office address is listed as P.O. Box 4991, Aspen, Colorado 81612. The registered agent is (b) (6), located at 101 South Mill Street, Suite 200, Aspen, Colorado 81611 (COSOS-00145).

PRP:	CORE MOUNTAIN ENTERPRISES, LLC
PRP Class:	Current Owner
Status:	Active
Current Address:	1069 Greene Street 2nd Floor Silverton, Colorado 81433
State of Formation:	Colorado
Period of Activity:	2006 – Present

Core Mountain Enterprises, LLC was formed in Colorado on May 21, 1999. The management of the company was vested in (b) (6), located at (b) (6). (b) (6) address was also listed as the address of the principal place of business (COSOS-00144).

According to records available online from the Colorado Secretary of State, Core Mountain Enterprises, LLC is active and in good standing in Colorado. The principal office street address for the company is 1069 Greene Street, 2nd Floor, Silverton, Colorado 81433. The registered agent is (b) (6), located at (b) (6) (COSOS-00143).

IV. Conclusions and Recommendations

According to historical accounts, the earliest operations at Natalie-Occidental facility occurred in circa 1895 when (b) (6) located the Occidental and Silver Ledge veins on the South Fork of Cement Creek, organizing the Occidental Mining Company that year. (b) (6) then

acquired and began to develop the adjoining Natalie group of claims in 1897. In 1899, (b) (6) conveyed the Natalie group of claims to the newly-incorporated Natalie Mining and Milling Company and, shortly thereafter, commissioned the Hurley tunnel. With a crew of approximately 20 men, the Natalie Mining and Milling Company excavated the Hurley tunnel and also produced a small amount of ore on the Occidental mining claim. Operations continued at the Hurley tunnel until 1906.

Based on available information, it appears that Natalie-Occidental remained idle between the 1910s and the 1970s. On August 26, 1971, a CBM inspector visited the Natalie-Occidental facility and reported that (b) (6) had reopened the abandoned Hurley tunnel on August 1, 1971. "Silver Bay Mines" was the reported owner of the property. (b) (6) 's crew of three men was in the process of cleaning out the tunnel portal for sampling. Furman's operations at the mine likely ended in 1972. Silver Bay Mines continued to own the property through 1994.

Natalie-Occidental now consists of a partially-collapsed lower adit, a fully-collapsed upper adit, and a large dump pile spread out along the banks of South Fork Cement Creek. The South Fork of Cement Creek runs through the dump pile for more than 270 feet, and the creek continues to actively erode the dump during high-flow. Drainage from the mine's adit flows directly into the creek. During the 1998 RFR survey work, the Natalie-Occidental facility was identified as the largest mine drainage source of metals in Cement Creek.

Listed below are recommendations for further research:

- (b) (5), (b) (7)(A) [redacted]

STATE OF COLORADO

1845 Sherman Street
Denver, Colorado 80203

FILED FOR RECORD

Date SEP 21 1971

Assistant Commissioner of Mines

BUREAU OF MINES

Department of Natural Resources

INFORMATION REPORT

No. I-123

Date August 26, 1971

County San Juan

SILVER LEDGE (Orleans Millsite)	Mine
Name of Operation	**Kind of Operation**
G. G. Furman	Box 445, Silverton, Colorado 81433
Operator	**Address of Operator**
Silver Bay Mines	Salt Lake City, Utah 84100
Owner	**Address of Owner**
G. G. Furman	Box 445, Silverton, Colorado 81433
Person Locally in Charge	**Address of Person in Charge**
G. G. Furman	August 1, 1971
To Whom Shall Annual Report Be Sent	**If New Operation, When Did Work Start**

Producing ..... Development ..... Exploration X Part Time X Idle .....

Products Tungsten, lead, and zinc. Monthly Rate of Production None

Value of Products $ Reported $20.00 ton Number of Days Operated 30 days 1971

Men Employed: Total 3 Underground ..... Surface 3 Other .....

Location The Silver Ledge Mine is located one mile south of Gladstone, Colorado: Sec 22 T41N R7W

Description of Property & Operation The operator is trying to clean out the portal to open the mine for sampling. The tunnel is supposed to be 7 ft. by 7 ft. by 5000 ft. long. The operator plans to sample a tungsten vein 1000 ft. from the portal. At present the operator has cleaned 200 ft. of the tunnel. This mine was last worked in 1904.

Surface Buildings None

Machinery, Compressors, Hoists, Etc.
1 - 315 cfm Ingersoll Compressor
1 - Ingersoll Slusher and Bucket
1 D-6 Cat Dozer

Type of Ground Support Square Sets in Portal

Ventilation Natural

Geological Formation Rhyolite

Size of Vein or Deposit Unknown

Miscellaneous (Obtain a Current Underground Map)

William E. Roe
Inspector

4

BM 2 (Rev. 3-70)

CBM-00175
Page 1 of 1

STATE OF COLORADO

BUREAU OF MINES

DEPARTMENT OF NATURAL RESOURCES
1845 Sherman Street
Denver, Colorado 80203

JAN 1[illegible] 1972

NORMAN R. BLAKE
DEPUTY COMMISSIONER

FILED FOR RECORD

Date APR 7 1972

Assistant Commissioner of Mines

Number 477
County SAN JUAN
Mining District Eureka

OPERATOR'S ANNUAL REPORT

for the Year 1971

Name of Operation SILVER LEDGE MINE Kind of Operation Dozer repair of roads & Mine- Portal of Tunnel (Mine, Mill, Quarry, etc.)

Operator G. G. Furman Ownership ( ) Lease (X) Contractor ( )

Address (Local) Box 445, Silverton 81433 Main Office Address Same

Owner Silver Bay Mines, Inc. Owner Address 2812 East Nora Drive Salt Lake City, Utah 84117

Location of Property Sections 27 & 28, T 42 N - R 7 W

Corporation ( ) Partnership ( ) Individual (X)
If a corporation, give name of state in which incorporated _____

President _____ Partner or Individual G. G. Furman

Vice-President _____ Partner _____

Secretary _____ Partner _____

Treasurer _____ Partner _____

Manager Same Address Same
or Person in Charge Telephone Number 303 - 387-5527

Producing ( ) Developing ( ) Prospecting ( ) Part Time (X) Idle ( )

Principal Products Lead-Zinc - Tungsten

Stabilization and Reclamation

Total Acres Mined 0 Acres Mined During Year 0 Acres Reclaimed During Year 0
Dump or Stockpile Area 0 (acres) Dump or Stockpile Area Reclaimed 0 (acres)

Production for the Year

Crude Tonnage (tons, yards, pounds) Produced during the Year None Value $ _____

List products separately, i.e., Gold, Silver, Copper, Lead, Zinc, or other minerals, Clay, Sand, Gravel, Stone, etc.

Product _____ (oz., lbs., tons) _____ Value $ _____
Product _____ (oz., lbs., tons) _____ Value $ _____
Product _____ (oz., lbs., tons) _____ Value $ _____
Product _____ (oz., lbs., tons) _____ Value $ _____
Product _____ (oz., lbs., tons) _____ Value $ _____

Labor Statistics

Number of Days Operated during the Year 20 Average No. of Men Employed: Undergd. _____ Surface 1

Number of Man-shifts (8 hours each) during the Year: Underground 0 Surface 160

Number of Lost-time accidents during the Year 0 Man-hours worked 160

Compensation Insurance Carrier None - Dozer operated by myself.

Date of this report January 11, 1972 Signed G. G. Furman

By: _____

Title Lessee

This report must be submitted to the Colorado Bureau of Mines by March 1, 1972.

BM 8 (Rev. 10-71)

(over)

Patented Claims

Unpatented Claims

Total Number of Patented Claims 7 Total Acreage ± 50

Total Number of Unpatented Claims 0 Total Acreage

(All Patented and Unpatented Claims which have not been shown on previous reports should be listed on the reverse side of this sheet or on a separate sheet.)

Name	Survey Number	Name	Book & Page No.
Blue Bird	15061		
Klondyke # 2	"		
Louesia	"		
Mountain Boy	"		
Silver Ledge	15061A		
Silver Ledge Extention	15061A		
Orleans Mill Site	15061B		

This space is to be used by diamond drill, highway, water and road tunnel contractors and other project contractors to list the name of the project and the number, if any, in Colorado in 19___. Complete vital information (Name, Operator, Addresses, Owner, etc.) and labor statistics on reverse side.

Name	County

1845 Sherman Street
Denver, Colorado 80203

STATE OF COLORADO

AUG 1 0 1972

FILED FOR RECORD

Date AUG 1 5 1972

Assistant Commissioner of Mines

BUREAU OF MINES
Department of Natural Resources

INFORMATION REPORT

No. I-60

Date August 2, 1972

County San Juan

SILVER LEDGE (Orlean's Millsite)
Name of Operation

Mine
Kind of Operation

Silver Bay Mines
Operator

2569 Wilshire Circle
Salt Lake City, Utah 84100
Address of Operator

Silver Bay Mines
Owner

2569 Wilshire Circle
Salt Lake City, Utah 84100
Address of Owner

Ed Shepard
Person Locally in Charge

2569 Wilshire Circle
Salt Lake City, Utah 84100
Address of Person in Charge

Silver Bay Mines
To Whom Shall Annual Report Be Sent

Reopened June 1972
If New Operation, When Did Work Start

Producing ..... Development ..... Exploration X Part Time X Idle .....

Products Tungsten, lead, and zinc. Monthly Rate of Production none

Value of Products $ unknown Number of Days Operated 60 days 19 72

Men Employed: Total 3 Underground ..... Surface 3 Other .....

Location

The Silver Ledge (Orlean's Millsite) Mine is located one mile south of Gladstone in the south fork of Cement Creek: Sec 22 T41N R7W

Description of Property & Operation

The operator has cleaned out two cave areas in the tunnel and at the present time is repairing and replacing old timbers in this tunnel. The operator is waiting for a geologist to explore the veins exposed in this tunnel and to evaluate the economics of future mining operation. Approximately two acres of surface area has been disturbed. This consists of an open cut 15 ft. wide by 150 ft. long to drain water from the portal and an old millsite.

Surface Buildings

None

Machinery, Compressors, Hoists, Etc.

Assorted hand tools.

Type of Ground Support

Square Sets

Ventilation

Natual - 3,000 cfm

Geological Formation

Rhyolite

Size of Vein or Deposit

Unknwon

Miscellaneous (Obtain a Current Underground Map)

Silver Ledge

William A Hoe
Inspector

4
District No.

BM 2 (Rev. 3-71)

STATE OF COLORADO

BUREAU OF MINES

DEPARTMENT OF NATURAL RESOURCES
1845 Sherman Street
Denver, Colorado 80203

COLORADO GEOLOGICAL SURVEY
MAR 5 1973

NORMAN R. BLAKE
DEPUTY COMMISSIONER

FILED FOR RECORD

Date MAY 2 9 1973

Assistant Commissioner of Mines

Number 390
County San Juan
Mining District Eureka

OPERATOR'S ANNUAL REPORT

for the Year 1972

Name of Operation SILVER LEDGE (Orlena's Mill-Site) Kind of Operation Mine (Mine, Mill, Quarry, etc.)

Operator Silver Bay Mines Ownership (✓) Lease ( ) Contractor ( )

Address (Local) 2569 Wilshire Circle, Salt Lake City, Utah 84109 Main Office Address Silver Bay Mines, Inc

Owner Silver Bay Mines, Inc ~~Owner~~ Address C/ University Club Bldg. S.L.C. Utah c/o Robt. Liljenqvist

Location of Property San Juan County, Colo. — See Recorders office Sections 22, 27 and 28, Township 42 N. Range 7 West

Corporation (✓) Partnership ( ) Individual ( )
If a corporation, give name of state in which incorporated Utah

President Chester Van Scoter Partner or Individual

Vice-President John Dayton Partner

Secretary Robert Liljenqvist Partner

Treasurer Robert Liljenqvist Partner

Manager or Person in Charge Ed Shepard Address 2569 Wilshire Circle - SLC Ut. 84109
Telephone Number 801-485-0833

Producing ( ) Developing (✓) Prospecting ( ) Part Time ( ) Idle ( )

Principal Products Gold - Silver - Lead - Zinc - Tungsten

Stabilization and Reclamation — None - other than tunnel access.

Total Acres Mined ____ Acres Mined During Year ____ Acres Reclaimed During Year ____
Dump or Stockpile Area ____ (acres) Dump or Stockpile Area Reclaimed ____ (acres)

Production for the Year — None

Crude Tonnage (tons, yards, pounds) Produced during the Year None Value $ ____

List products separately, i.e., Gold, Silver, Copper, Lead, Zinc, or other minerals, Clay, Sand, Gravel, Stone, etc.

Product ____ (oz., lbs., tons) ____ Value $ ____
Product ____ (oz., lbs., tons) ____ Value $ ____
Product ____ (oz., lbs., tons) ____ Value $ ____
Product ____ (oz., lbs., tons) ____ Value $ ____
Product ____ (oz., lbs., tons) ____ Value $ ____

Labor Statistics

Number of Days Operated during the Year 60 Average No. of Men Employed: Undergd. 3 Surface 0

Number of Man-shifts (8 hours each) during the Year: Underground 1 Surface 0

Number of Lost-time accidents during the Year 0 Man-hours worked 1,440

Compensation Insurance Carrier St. of Colo. Comp. Ins. Fund.

Date of this report 1/15/73 Signed Edgar B. Shepard
By: ____
Title Supt.

This report must be submitted to the Colorado Bureau of Mines by March 1, 1973.

BM 8 (Rev. 10-71)

(over)

Patented Claims

Total Number of Patented Claims 24

Total Number of Unpatented Claims 9

Unpatented Claims

Total Acreage 9700

Total Acreage See County Treas.

(All Patented and Unpatented Claims which have not been shown on previous reports should be listed on the reverse side of this sheet o
on a separate sheet.)

Name	Survey Number	Name	~~Book &~~ Page No.
Patented			
Big Indian	14325	Eureka Dist.	82
Black Hawk	"	"	"
Blue Bird	15061	"	"
Camilla	"	"	"
Claire March	"	"	"
Confidence	14325	"	"
Hopeful	15504	"	"
Immatchock	18849	"	"
Invincible	15504	"	"
Jo Pi	14325	"	"
Klondike No 2	15061	"	"
Lovesia	"	"	"
Mountain Boy	"	"	"
" " Ext.	"	"	"
Murton	14325	"	"
Natalie	15061	"	"
Newton	"	"	"
Occidental No 2	15504	"	"
Thomas Jefferson	"	"	"
Tip Top	18849	"	"
U.S. Grant	15504	"	"
Orleans M.S.	15061	"	"
Silver Ledge	"	"	"
" " Ext.	"	"	"
Unpatented			
Silver Bay		Silver Bay	172 - 214
" " No 1		" " No. 1	172 - 367
" " No 2		" " No. 2	172 - 215
" " No 3		" " No 3	142 - 239
" " No 4		" " No 4	142 - 238
Big Indian No 1		Big Indian No 1	172 - 241
" " No 2		" " No. 2	172 - 242
" " Extension		" " Extension	172 - 217
Blackhawk Extension		Blackhawk Extension	142 - 238

This space is to be used by diamond drill, highway, water and road tunnel contractors and other project contractors to list the name of the project and the number, if any, in Colorado in 19___. Complete vital information (Name, Operator, Addresses, Owner, etc.) and labor statistics on reverse side.

Name	County

Not previously reported by me

STATE OF COLORADO

BUREAU OF MINES

INSPECTOR'S REPORT

District No. Four

Silverton Colorado

October 4th, 1948, ~~1932~~

THE OCCIDENTAL MINE (of the Silver Bay Group)
Eureka Mining District
Name of Mine, Quarry or Plant

Location 13 miles northerly from Silverton County of San Juan
(Nearest Post Office)

Reached by auto and truck to Gladstone 9 mi., thence 4 mi. by truck and trail to mine.

Owner Silver Boy Mines, Inc.,

Address Silverton, Colorado

Operator Silver Boy Mines, Inc.,
(Owner or ~~Lessee~~)
Rolland Ames, President, Bayfield, Colo.
Ernest Hoffman, Manager, Silverton, Colo.

Address

Name of Agent, General Manager or other officer on whom to serve notices
Ernest Hoffman, Manager, Silverton, Colo.

Notification of Annual Report should go to Ernest Hoffman, Mgr. Silverton Colorado

Name and address of local manager or person in direct charge of operations at mine, quarry or plant
Ernest Hoffman, Manager, Silverton, Colorado

Character of ore or other products gold, silver, copper, lead and zinc.
No production. Development only.

Number employed underground and On surface 4 ~~Mill~~ Miscellaneous 1

Remarks Compensation Insurance is carried.
Accident Report Blanks are on hand. No Telephone.
First Aid Supplies are provided.
Safety and Sanitary Conditions, in general, are satisfactory.

DESCRIPTION OF MINE:- This mine is developed by two tunnels which are drifts on the vein, running southwesterly. The length of these tunnels is unknown at this time. No.1 Tunnel, which is the main haulageway

is now cleaned out and retimbered a distance of 500 ft. from the portal.

A 425 ft. raise connects this No.1 Level with No. 2 Level above, which opens to the surface. The point of this raise is approximately 700 feet from the portal of main No.1 Level.

This raise is open and ventilation is good.

The veins are fissures, varying in width, and carry values in gold, silver, copper, lead and zinc. There is no production.

Wet drilling is practiced exclusively. Detachable bits are used.

SURFACE PLANT at present consists of a 12' x 16' tent used as a cover for mine supplies, etc. A gas-driven Air Compressor now stands in the open, and will be housed in later. Moving parts of machinery are guarded and protected. They are building Ore Bins and Trestles. Men live in Silverton.

UNDERGROUND HAULAGE is man power. Cars and Track are in good condition.

TIMBERING:- Considerable timbering is necessary and is well installed.

EXPLOSIVES:- A small amount of Explosives is carried and safely stored.

VENTILATION is natural and good.

MISCELLANEOUS:- Operations were carried on intermittently in this mine since 1946 or 1947, and consisted of building 3 miles of access road which serves both the Blackhawk and Occidental Mines. Also considerable surface prospecting was done.

The mine was closed during the winter of 1947-8, and operations were resumed June 15th this year. They will operate as long as weather conditions permit.

This is an old mine and was last operated about 1907 or 1908, as far as I know. I have no knowledge of the shipping record at that time.

Everything is clean and orderly about the property.

Respectfully submitted

D. C. McNaughton

State Metal Mine Inspector, District No. 4

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FAQs, Glossary and Information

Summary

Details			
Name	CORE MOUNTAIN ENTERPRISES LLC		
Status	Good Standing	**Formation date**	05/21/1999
ID number	19991097917	**Form**	Limited Liability Company
Periodic report month	May	**Jurisdiction**	Colorado
Principal office street address	1069 Greene Street, 2nd Floor, Silverton, CO 81433, United States		
Principal office mailing address	n/a		

Registered Agent	
Name	Jennifer A Brill
Street address	811 GREENE ST, SILVERTON, CO 81433, United States
Mailing address	n/a

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ARTICLES OF ORGANIZATION
OF
CORE MOUNTAIN ENTERPRISES LLC

FILED
VICTORIA BUCKLEY
COLORADO SECRETARY OF STATE
19991097917
$ 65.00
SECRETARY OF STATE
05-21-1999 14:57:15

The undersigned natural person of the age of eighteen years or more, acting as organizer of a limited liability company under the Colorado Limited Liability Company Act, adopts the following Articles of Organization for such limited liability company.

FIRST: The name of the limited liability company is: Core Mountain Enterprises LLC.

SECOND: The address of the initial registered office of the Limited Liability Company is 410 17th Street, 22nd Floor, Denver, Colorado 80202, and the name of its initial registered agent at such address is Ronald B. Merrill.

THIRD: The address of the principal place of business of the Limited Liability Company is 1881 Quinn Creek Road, Bozeman, Montana 59715.

FOURTH: The management of the Company shall be vested in a manager, rather than the members. The name and address of the initial manager is:

Aaron Brill
1881 Quinn Creek Road
Bozeman, Montana 59715

IN WITNESS WHEREOF, the undersigned has hereunto set his hand as of this 21st day of May, 1999.

Ronald B. Merrill, Organizer

99999\9\516277.1

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FAQs, Glossary and Information

Summary

Details			
Name	SJC LAND & CATTLE COMPANY		
Status	Good Standing	**Formation date**	10/08/1993
ID number	19931112967	**Form**	Corporation
Periodic report month	June	**Jurisdiction**	Colorado
Principal office street address	PO BOX 4991, ASPEN , CO 81612, United States		
Principal office mailing address	n/a		

Registered Agent	
Name	HERBERT S. KLEIN
Street address	101 S Mill St #200, ASPEN, CO 81611, United States
Mailing address	101 S Mill St Suite 200, Aspen, CO 81611, United States

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ARTICLES OF INCORPORATION
OF
SJC LAND & CATTLE COMPANY

931112967 $50.00
SOS 10-08-93 11:15

The undersigned, being more than eighteen years of age, acting as incorporator in order to organize and establish a corporation under and pursuant to the Colorado Corporation Code, hereby adopts the following Articles of Incorporation:

ARTICLE I

The name of the Corporation is SJC Land & Cattle Company.

ARTICLE II

The period of duration of the Corporation shall be perpetual.

ARTICLE III

The purpose for which the Corporation is organized is to engage in all business or activity in which a corporation may engage under the laws of the State of Colorado or any other applicable jurisdiction, pursuant to the Colorado Corporation Code.

ARTICLE IV

In furtherance of the purpose set forth in Article III of these Articles of Incorporation the Corporation shall have and may exercise all of the rights, powers and privileges now or hereafter conferred upon corporations organized under the laws of the State of Colorado and may conduct its business in the State of Colorado and other parts of the United States or any foreign jurisdiction.

ARTICLE V

A. Authorized Shares - The aggregate number of shares which the Corporation shall have authority to issue is 50,000 shares of common stock of no par value.

B. Transfer Restrictions - The Corporation shall have the right by appropriate action to impose restrictions upon the transfer of any shares of its common stock, or any interest therein, whenever issued, provided that such restrictions or notice thereof shall be set forth upon the face or back of the certificate or certificates representing such shares.

C. Pre-emptive Rights - The holders of the shares of common stock of the Corporation shall be entitled as of right to purchase,

COMPUTER UPDATE COMPANY

PT

or subscribe for, any unissued or treasury shares of any class, or any additional shares of any class to be issued by reason of any increase of the authorized shares of the Corporation of any class, or any bonds, certificates of indebtedness, debentures or other securities, rights, warrants or options convertible into shares of the Corporation or carrying any right to purchase shares of any class in accordance with their proportionate equity in the Corporation.

D. Cumulative Voting - The cumulative system of voting for directors or for any other purpose shall not be allowed.

E. Quorum. At all meetings of shareholders, a majority of the shares entitled to vote at such meetings, represented in person or by proxy, shall constitute a quorum.

ARTICLE VI

The Board of Directors may from time to time distribute to the shareholders in partial liquidation, out of stated capital or capital surplus of the Corporation a portion of its assets, in cash or property, subject to the limitations contained in the statutes of Colorado.

ARTICLE VII

The number of directors of this corporation shall be fixed in accordance with the bylaws. So long as the number of directors shall be less than three: (1) No shares of this corporation may be issued and held of record by more shareholders than there are directors; (2) Any shares issued in violation of this paragraph shall be null and void; (3) This provision shall also constitute a restriction on the transfer of shares and the legend shall be conspicuously placed on each certificate respecting shares preventing transfer of the shares to more shareholders than there are directors.

The names and addresses of the persons who are to serve as directors of the corporation until the first annual meeting of shareholders, and until their successors shall be elected and shall qualify, are as follows:

James K. Jackson
P.O. Box 4991
Aspen, Colorado 81612

ARTICLE VIII

The name of the registered agent of the Corporation and the registered office of the Corporation are as follows:

Registered Agent	Registered Office
Herbert S. Klein	201 North Mill Street Suite 203 Aspen, Colorado 81611

The Corporation may conduct part or all of its business in any other part of Colorado, of the United States or of the world. It may hold, purchase, mortgage, lease and convey real and personal property in any of such places.

ARTICLE IX

The following provisions are inserted for the management of the business and for the conduct of the affairs of the Corporation, and the same are in furtherance of and not in limitation or exclusion of the powers conferred by law.

A. Contracts with Directors - No contract or any other transaction of the Corporation with any person, firm or corporation, or in which this Corporation is interested shall be affected or invalidated by: (i) the fact that any one or more of the directors or officers of the Corporation is interested in or is a director or officer of another corporation; or (ii) the fact that any director or officer, individually or jointly with others, may be a party to or may be interested in any such contract or transaction. Each person who may become a director or officer of the Corporation is hereby relieved from any liability that might otherwise arise by reason of his or her contracting with the Corporation for the benefit of himself or herself any firm or corporation in which he or she may be in any way interested.

B. Negation of Equitable Interests - The Corporation shall be entitled to treat the registered holder of any shares of the Corporation as the owner thereof for all purposes, including all rights deriving from such shares, and shall not be bound to recognize any equitable or other claim to, or interest in, such shares or rights deriving from such shares, on the part of any other person including, but without limiting the generality hereof, a purchaser, assignee or transferee of such shares or rights deriving from such shares, unless and until such purchaser, assignee, transferee or other person becomes the registered holder of such shares, whether or not the Corporation shall have either actual or constructive notice of the interest of such purchaser, assignee, transferee or other person. The purchaser, assignee or

transferee of any of the shares of the Corporation shall not be entitled: to receive notice of the meetings of the shareholders; to vote at such meetings; to examine a list of the shareholders; to be paid dividends or other sums payable to shareholders; or to own, enjoy and exercise any other property or rights deriving from such shares against the Corporation, until such purchaser, assignee or transferee has become the registered holder of such shares.

ARTICLE X

The Corporation reserves the right to amend, alter, change or repeal any provisions contained in, or to add any provisions to, its Articles of Incorporation from time to time, in any manner now or hereafter prescribed or permitted by the Colorado Corporation Code, and all rights and powers conferred upon directors and shareholders hereby are granted subject to this reservation.

ARTICLE XI

The name and address of the incorporator of the Corporation are:

William L. Lawrence
201 North Mill Street
Suite 203
Aspen, Colorado 81611

IN WITNESS WHEREOF, the undersigned, being the incorporator designated in Article XI of the annexed and foregoing Articles of Incorporation, has executed said Articles of Incorporation as of the 7th day of October, 1993.

William L. Lawrence

STATE OF COLORADO)
) ss.
COUNTY OF PITKIN)

I hereby certify that William L. Lawrence, known to me to be the person whose name is subscribed to the annexed and foregoing Articles of Incorporation, appeared before me this day, in person and being by me first duly sworn, acknowledged and declared that said person's execution of said Articles of Incorporation was a

free and voluntary act and deed done for the uses and purposes therein set forth and that the statements therein contained are true.

My commission expires: August 6, 1997.

Witness my hand and official seal this 7th day of October, 1993.

Notary Public

jackson\arts.ajc

2297

MINING REPORTER

VOLUME LII.

JULY TO DECEMBER.

1905.

The Industrial Printing & Publishing Company,

DENVER, COLORADO.

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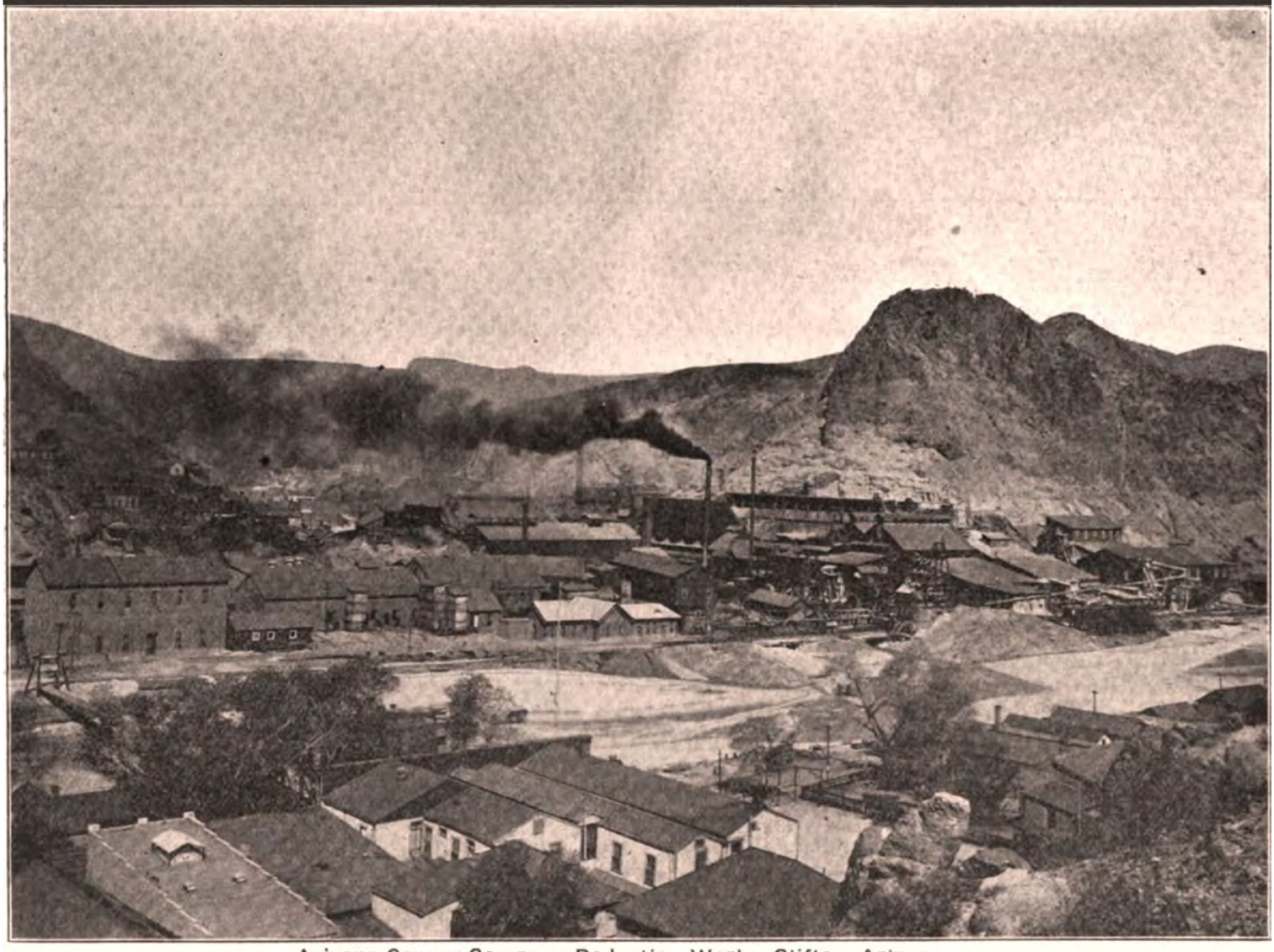

Arizona Copper Company Reduction Works, Clifton, Arizona.

Mining American

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Joseph H. Turnback is the resident manager of the San Pedro Company, as well as of the Terry & Tench Development Company. Temple electric drills are used in the work. Col. F. S. Mallory of New York City is the president and general manager of the San Pedro Company.

Atlas M. & M. Company. Thirty claims lying in a group north of the Revenue mine and northwest of the San Pedro Company's property are under tunnel development by this company, the president of which is J. P. Sidwell of Chicago. Fred Carroll of Ouray is the manager in charge. A 2,000-foot crosscut, now in 600 feet, is in progress to cut the ledge system at a depth of 500 feet below the old Atlas workings, which extend to a depth of over 600 feet. The older workings, aggregating over 300 feet, were productive of high grade shipping ore, and there is said to be large bodies of both milling and shipping grade ore blocked out. The gross returns from twenty-two cars of ore shipped was $30,000. This main working tunnel is 6½x7½ feet in the clear. Temple electric drills, type A, size 5, are used. The operating power is secured from the Telluride Power Company.

Pitkin County.

Smuggler.—It is reported that the Smuggler Mining Company will place in position four new 250 H. P. boilers. This move is regarded as evidence that the unwatering of this property will proceed as rapidly as possible.

Percy La Salle.—The owners of this property have instituted a departure from their usual course by securing a lease on the Little Annie mine. A tunnel will be run to the new property and the Little Annie mill will be started up at once. It is reported that there are large bodies of mill ore now awaiting removal. The terms of the lease are not made public.

Saguache County.

(Staff Correspondence.)

Bonanza District.—In this region distant sixteen miles from Villa Grove station on the R. G. & S. railway there is more or less activity this season. The Bonanza mine is making regular shipments of high grade lead ore. The Morning Star property has lately been taken over by parties who have inaugurated development and installed machinery. Frank Flatz of Salida had lately done assessment work on a promising claim situated close by. The Shawmut Gold, Silver and Copper M. and M. Company, W. P. Black manager, has recently installed a hoisting plant preparatory to sinking a deep shaft.

San Juan County.

(Staff Correspondence.)

Eldorado.—In the vicinity of Elk creek J. J. Pierson is developing a property known as the Eldorado.

Shenandoah No. 3.—Leasers are making occasional shipments. F. J. Campbell of Durango is the manager and George Hill is superintendent.

Delayed M. and M. Company.—It is stated that this company, operating in the vicinity of Rockwood, is contemplating the addition of a compressor and power drills. Edgar L. Thompson of Silverton is the manager.

Stoney Pass M. Company.—Under the superintendency of J. W. Dolan the company is making good progress in the driving of its 6,000-foot crosscut. The breast is now in over 1,300 feet and has a surface depth of 1,000 feet. The objective point of this bore is Prospect basin, where a vein carrying lead-silver ore has been exploited to a depth of 150 feet by shaft work. A. W. Hall of Dexter, Maine, the company's manager, is expected on the ground shortly.

Natalie-Occidental.—This company is running drifts on the Magnolia vein reached at a point 1,200 feet in by the Hurley tunnel by which bore the company's entire holdings, situated about a mile above the Gold King mill at Gladstone, will be opened up. Rand drills are in use. M. M. Gregg is the superintendent in charge. T. Jay Hurley is the general manager of the Natalie-Occidental Consolidated M. and M. Company.

Green Mountain M. and M. Company.—This company, of which Ed J. Walters of Silverton is manager, is erecting a 200-ton milling plant on its property in Cunningham gulch, about two miles above Howardsville. The plant was designed and is being erected by the Colorado Iron Works Company of Denver. The equipment consists of a gyratory crusher, Blake crusher, trommels, two sets 16x36 rolls, one set 8x20 rolls, eighteen Traylor centripact screens, twelve Hartz jigs, two 6-foot Chilean mills and Wilfley tables.

San Miguel County.

(Staff Correspondence.)

John D. Gale M. Company.—This company is developing a group of claims in Swamp Canyon. James O'Brien of Ophir is in charge.

Suffolk.—Several sets of leasers are extracting ore which is treated at the company's mill at Ophir. James Real is the superintendent in charge of the mine and mill.

Yellow Mountain Mines Company.—This company's mill below Ophir is in steady operation, the ores milled being from the Montezuma-Cariboo mines. Otto Erickson is the superintendent in charge. E. K. Austin is the general manager of the company.

Bayfield.—Occasional shipments of ore extracted from the upper levels are made by August Anderson and associates, the operating owners. A larger mine force has been put on during the past week. The mine is situated in Waterfall Basin south of Ophir Loop.

Butterfly Terrible.—The upper levels of this property are now worked entirely by leasers, the ore being treated at the company's milling plant. The work of driving the long crosscut tunnel will be continued under the direction of General Manager James F. Keating.

Ophir Consolidated Mines Company.—Operations have been resumed by this company, this time by eastern directors under the direction of W. B. Ladd. Ten stamps are now dropping and an experimental run to determine the most economical method of handling the ore is being made. The milling operations are in charge of George E. Driscoll, a metallurgist of experience lately returned from South America.

Carbinero.—Shipments of $75 ore are made regularly from this mine situated on Carbinero mountain, three miles from Ophir. John R. Pickett is the manager in charge. The owners of this mine are George B. Pickett (the original locator under whose direction the property was developed from a prospect to a paying mine) of Ophir, Frank L. Rouse, H. H. Stevens and Prof. William Strieby of Colorado Springs.

Summit County.

Reliance Dredge.—The initial run of the new machine of the Reliance Gold Dredging Company has just been made, under the direction of General Manager Revett. Operations will be continued without further interruption throughout the season.

Midnight Placer.—Operations on this property in Brown's gulch are well under way under the superintendency of John Sweeney. A new 1,000-foot flume has just been completed, and it is reported that good values are being extracted from the gravel.

North American Mines.—The main tunnel being driven by this company, near Frisco, is going rapidly ahead. The tunnel is now in 160 feet, and has cut several mineralized veins. It is anticipated that the Red Lion vein will be encountered in the next thirty or forty feet. The company

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Tungsten Mines of Colorado

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January 1, 1960

Tungsten Mines of Colorado

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January 1, 1960

To His Excellency, The Honorable Stephen L. R. McNichols, Governor of the State of Colorado; Dr. Edward L. Clark, Director of Natural Resources; and Members of the Forty-second General Assembly:

I have the honor to transmit herewith, the Bulletin of the Metal Mining Fund on the subject, "Tungsten Mines of Colorado."

It is hoped that this publication will help to revitalize interest in Colorado mining, and that it will simplify future quests for at least one of our domestic minerals, thereby assisting Colorado's Mining Industry.

COLORADO STATE METAL MINING FUND

Harrison S. Cobb

204 State Office Building

1960

STATE OF COLORADO
METAL MINING FUND

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TUNGSTEN MINES OF COLORADO

Introduction

The history of tungsten in the United States is a history of "boom and bust," with periods of intense exploration and production followed by periods of almost complete abandonment of the mines. During these periods of non-operation, facts relating to the mines often become distorted or completely forgotten; indeed, the actual location of mines sometimes becomes lost, as witness a large group of small mines listed in this report, mines which were designated prospects upon a large agricultural patent, but which now appear to be completely lost, unknown even to the owning company and to its previous mine superintendents.

For reasons such as this, the Metal Mining Fund of the State of Colorado has deemed it advisable to compile certain basic facts concerning the tungsten mines of the state. This tabulation is not to be considered an evaluation of any property, but is limited to brief essential information which would offer a starting point in future mine investigations.

Information tabulated in this report is as of January 1, 1960. It will be realized that ownerships change from time to time, and that, in periods of production, the physical workings of the mines are gradually altered, as well as records of production.

An effort has been made to tie each property to some generally known landmark, so that its position may be recognized even after the lapse of several years.

Owner addresses have not been given, as ownerships are subject to change. Ordinarily such addresses may be obtained from county records.

Remarks under "Potential" have, in the main, been avoided, as there is no intention or desire to promote or discredit any property. If the last operator offered a factual observation which could be utilized as a clue in future exploration, this has been listed, otherwise "Potential" has been given as "Unknown."

When properties have been operated under DMEA contracts, maps were filed with both the United States Bureau of Mines, and with the United States Geological Survey. The notation "USGS" refers to this, but does not ensure availability of the maps to the general public.

Acknowledgements

Information contained in this report has been compiled from U.S.G.S. Professional Paper 245, "Geology and Ore Deposits, Boulder County Tungsten District, Colorado," by T. S. Lovering and Ogden L. Tweto; U. S. Bureau of Mines Information Circular, "Tungsten in Colorado," by W. J. Tesch, Jr.; U. S. Bureau of Mines Information Circular No. 7721, "Study of Tungsten Potential in Boulder County, Colorado," by Carl Belser; and from statements made by owners, ore purchasers, most recent operators, and by those few remaining who have passed most of their lives in and about the tungsten districts, and who have examined, inspected, and worked in the various mines.

Appreciation is expressed to authors of the above mentioned reports; to Mr. John H. East, Regional Director of the Bureau of Mines; to Dr. A. H. Koschmann, Liaison Officer of the United States Geological Survey, and to the many residents of the mining districts, all of whom were especially helpful in the gathering of information for this report.

ADAMS

LOCATION: SE¼ Section 16, T42N, R7W, about eight miles north of Silverton, at Gladstone, San Juan County.
OWNER: T. J. and D. A. Mahoney.
PRODUCTION: Some production as early as 1899; substantial production during World War I; small amount in 1955.
WORKINGS: Old entries are adits on the vein. Under a DMEA contract in 1954, a crosscut was driven 220 feet to the vein; 160 feet of drifting and 93 feet of raising was done.
ORE OCCURRENCE: 3 to 4-foot vein contains some hubnerite. The best occurrences were irregular cavity fillings.
POTENTIAL: Unknown.
LAST OPERATOR: Ben Allen.
MAP SOURCES: Warren C. Prosser report.

ALBERT

LOCATION: Sec. 17, T43N, R7W. Poughkeepsie gulch, Como Lake district, Ouray County.
OWNER: Pat Fleming.
PRODUCTION: None recorded.
WORKINGS: Short adit on vein.
ORE OCCURRENCE: Spotty streaks showing tungsten mineralization.
POTENTIAL: Unknown.
LAST OPERATOR: No producing operator.
MAP SOURCES: No maps.

AMZY

LOCATION: Sec. 20, T1N, R71W, on N. slope of Arkansas mountain, south of Fourmile Creek, Boulder County.
OWNER: Skydale, Inc.
PRODUCTION: None.
WORKINGS: Short adit.
ORE OCCURRENCE: Shows large vein of very horny ore.
POTENTIAL: Unknown.
LAST OPERATOR: Doc Hill.
MAP SOURCES: None.

ANDES

LOCATION: Sec. 33, T8S, R78W, about 7½ mi. N. of Alma, Park County.
OWNER: G. L. Colburn.
PRODUCTION: 6 tons of 15% ore recorded.
WORKINGS: 25 and 50-foot adits, 35 feet apart.
ORE OCCURRENCE: Wolframite and scheelite occur in 2 to 8-inch streaks in a 4″ to 4′ vein. Very large hubnerite crystals are found. The vein is in quartz monzonite gneiss.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Unknown.

ANGELUS

LOCATION: NW¼ Sec. 5, T1S, R72W, N. of Sugarloaf road, at top of hill 1 mile east of junction with Ward-Nederland road. Boulder County.
OWNER: Ernest Ross.
PRODUCTION: Very small production.
WORKINGS: 20′ shaft, caved. Two other shallow shafts.
ORE OCCURRENCE: Horn-type ore.
POTENTIAL: Unknown.
LAST OPERATOR: Ernest Ross.
MAP SOURCES: No maps.

ANGLO-SAXON

LOCATION: Sec. 31, T42N, R7W, in Minnesota gulch, about 5 mi. NW of Silverton, San Juan County.
OWNER: San Juan Gold King Co.
PRODUCTION: Some production during World War I.
WORKINGS: Surface workings. Caved adit.
ORE OCCURRENCE: Hubnerite in pyrite vein.
POTENTIAL: Unknown. Has been caved for 40 years.
LAST OPERATOR: Louis Schaeffer.
MAP SOURCES: No maps.

ANNA Nos. 1 and 2

LOCATION: Sec. 11, T1S, R73W, Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: 175 units of WO_3.
WORKINGS: One of several named prospects on an agricultural patent.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: Owner.

ANNA C.

LOCATION: SW¼ Sec. 11, T1S, R73W, 1¾ mi. NW of Nederland, Boulder County.
OWNER: O. B. Scott, Rye, Colo.
PRODUCTION: Less than 500 units of WO_3.
WORKINGS: 155′ shaft; levels at 90, 115, and 155 feet. A later shallow shaft was sunk at the east edge of the dump, from which ore was stoped.
ORE OCCURRENCE: Most of the production was taken from above the 115′ level.
POTENTIAL: Unknown.
LAST OPERATOR: M. W. MacKenzie, 1955.
MAP SOURCES: No maps.

ANNIE L.

LOCATION: SE¼ Sec. 36, T1N, R72W, 900′ S67°W of the Roosevelt tunnel, Boulder County.
OWNER: Joseph Rafter.
PRODUCTION: About 3500 units.
WORKINGS: 120′ shaft, with two levels, turned east.

ORE OCCURRENCE: On the Roosevelt vein. Horn and crystalline ore.
POTENTIAL: Unknown.
LAST OPERATOR: Thayer and McClellan.
MAP SOURCES: No maps.

APRIL FOOL ***(see Good Friday)***

LOCATION: SW¼ Sec. 36, T1N, R72W, on the east side of North Boulder Creek, above Boulder Falls. Boulder County.
OWNER: Shiprock Industries, Inc.
PRODUCTION: More than 138,000 units.
WORKINGS: 3 shafts, 3 adits. April Fool shaft is open, and is the main working entrance, over 400′ in depth. Four levels are above the main tunnel, and a 110′ winze, with drifts, is below the tunnel.
ORE OCCURRENCE: Crystalline ferberite in a 1400′ ore-shoot, the longest in the district. This shoot has been mined to a depth of 370 feet, up to 1956.
POTENTIAL: Mine was in production at the time of the 1956 price failure.
LAST OPERATOR: Owner.
MAP SOURCES: Owner. Colorado Tungsten Corp. USGS PP 245, plate 23.

ARROW 1, 2, 3.

LOCATION: NE¼ Sec. 7, T1S, R72W, N. and NW of Western Star shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Less than 500 units.
WORKINGS: Shallow shafts.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: T. J. Henning.
MAP SOURCES: Owner.

BALMORAL

LOCATION: SW¼ Sec. 36, T1N, R72W, 900′ E. of Boulder Falls, Boulder County.
OWNER: Colorado Tungsten Corporation.
PRODUCTION: About 1500 units.
WORKINGS: Inclined shaft, with 3 levels at 16, 39, and 79 feet. Second shaft connected with 39′ level 70′ NE of main shaft. Both caved.
ORE OCCURRENCE: In two veins, the Balmoral and the Smith.
POTENTIAL: 3rd level has a drift on the Smith vein. Might be explored to see if the Smith hanging-wall streak is present.
LAST OPERATOR: Owner.
MAP SOURCES: Owner. GS PP 245, plate 23.

BARKER No. 1

LOCATION: NW¼ Sec. 17, T1S, R72W. 200′ within the portal of the Clark tunnel. Boulder County.
OWNER: J. Clark-H. Barker estate.
PRODUCTION: Probably 2000-3000 units.
WORKINGS: 2 levels; Clark tunnel and winze levels.
ORE OCCURRENCE: Ore taken from stopes 25′ above and 50′ below tunnel level.

POTENTIAL: Unknown.
LAST OPERATOR: Boulder Tungsten Mill, Inc.
MAP SOURCES: Owner. GS PP 245, plate 13.

BARKER No. 2

LOCATION: NW¼ Sec. 17, T1S, R72W. 450′ within the portal of the Clark Tunnel. Boulder County.
OWNER: J. Clark-H. Barker estate.
PRODUCTION: Minor.
WORKINGS: Short drifts on tunnel level, and 30′ above. Winze below tunnel level.
ORE OCCURRENCE: Ore was found in Murphy vein, and between the Murphy and the Hurricane Hill reef.
POTENTIAL: Unknown.
LAST OPERATOR: Boulder Tungsten Mill, Inc.
MAP SOURCES: Owner. GS PP 245, plate 13.

BARKER No. 3

LOCATION: NE¼ Sec. 18, T1S, R72W. Shaft is 1175′ SW of Vasco 6 shaft. Vein is encountered at about 650′ within the Clark tunnel. Boulder County.
OWNER: J. Clark-H. Barker estate.
PRODUCTION: 6000 units or more.
WORKINGS: Mine is in two sections. The upper section has two shafts, with most of the work done on the second level of the old shaft. The first level is an adit, entering from SW of the shaft. There is also another adit on the property, which is caved. The second, or Clark tunnel section, consists of a 110′ drift on the vein, and a 25′ winze.
ORE OCCURRENCE: From stope (in tunnel) 55′ long, 65′ high. 2 veins, of 3 intersecting veins, yielded the ore in the upper workings.
POTENTIAL: Unknown.
LAST OPERATOR: Boulder Tungsten Mills, Inc.
MAP SOURCES: USGS PP 245, page 151; plate 13.

BARKER No. 4

LOCATION: NW¼ Sec. 17, T1S, R72W, 720 feet within the portal of the Clark tunnel. Boulder County.
OWNER: J. Clark-H. Barker estate.
PRODUCTION: Small production.
WORKINGS: Drifts and winze from tunnel level.
ORE OCCURRENCE: 63 tons of 1½% ore from winze and stope above lower drift.
POTENTIAL: Unknown.
LAST OPERATOR: Boulder Tungsten Mill, Inc.
MAP SOURCES: Owner. USGS PP 245, plate 13.

BEDDIG

LOCATION: Sec. 11, T1S, R73W about 1 mile NW of Nederland, and immediately west of the Conger mine. Boulder County.
OWNER: The Colorado Tungsten Corp.

PRODUCTION: About 180,000 units ranking second only to the Conger, in Boulder County production.
WORKINGS: Shaft with seven levels, dipping into and joining with the Conger workings.
ORE OCCURRENCE: Several veins produced breccia ore cemented by ferberite and quartz.
POTENTIAL: An area of float-bearing ground occurs on the slope which forms the south side of Sherwood Gulch.
LAST OPERATOR: Cobb and Weldon.
MAP SOURCES: Vanadium Corp. of America. USGS PP 245, page 106.

BELMONT

LOCATION: Sec. 5, T1S, R71W. Boulder County.
OWNER: Mary R. Kettering.
PRODUCTION: About 50 units.
WORKINGS: Unknown.
ORE OCCURRENCE: Horn type.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: No maps.

BIG SIX

LOCATION: NW¼ NW¼ Sec. 13, T1S, R73W, about ½-mile SE of the new Conger shaft. Boulder County.
OWNER: Richard Tatlow III.
PRODUCTION: Over 1,000 units.
WORKINGS: Three shafts; the Big Six, with levels at 40, 105, and 150 feet; the old and new Mock shafts. The new Mock shaft, in 1953, was deepened to 100 feet, and 91 feet of drifting was completed.
ORE OCCURRENCE: Vein is in schist, and runs east of north.
POTENTIAL: Lowgrade ore drilled on 50′ level, against dike. On floor of bottom of main shaft.
LAST OPERATOR: Lou Mock.
MAP SOURCES: USGS PP 245, page 126.

BISMARK

LOCATION: Sec. 16, T42N, R7W, about 9 miles N of Silverton, on south fork of Cement Creek. San Juan County.
OWNER: San Juan County.
PRODUCTION: Only small production reported.
ORE OCCURRENCE: Hubnerite reported to have been "honey-colored," which may indicate low manganese content.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: No maps.

BLACK BEAUTY

LOCATION: Sec. 5, T1S, R72W. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Less than 200 units.
WORKINGS: One of several named prospects on an agricultural patent.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.

LAST OPERATOR: Unknown.
MAP SOURCES: No maps.

BLACK CRYSTAL

LOCATION: SW¼ Sec. 31, T1N, R71W, Boulder County.
OWNER: L. A. Mock and H. W. Patton.
PRODUCTION: About 200 units.
WORKINGS: Shallow workings near Black Prince.
ORE OCCURRENCE: Horn-type.
POTENTIAL: Unknown.
LAST OPERATOR: L & P Leasing Company.
MAP SOURCES: Unknown.

BLACK DIAMOND

LOCATION: SE¼ Sec. 7, T1S, R72W, about 1100 feet NW of Vasco 6 shaft. Boulder County.
OWNER: Green Vaughn estate.
PRODUCTION: Probably less than 1000 units.
WORKINGS: 30-foot adit.
ORE OCCURRENCE: Narrow stockwork of veins.
POTENTIAL: Unknown.
LAST OPERATOR: Harry Spier. J. M. Smith.
MAP SOURCES: USGS PP 245, page 151.

BLACKHAWK

LOCATION: Sec. 24, T1S, R73W, 900 feet west of the Tungsten shaft, and west of Colo. highway No. 119. Boulder County.
OWNER: George Cowdery, Boulder, Colo.
PRODUCTION: About 14,000 units, in 1907-10, 1915-17, and 1955.
WORKINGS: Several trenches and a caved shallow shaft, 70′ or 80′.
ORE OCCURRENCE: Ore occurs in pegmatite; dies out in surrounding schist.
POTENTIAL: 2 pegmatites still show ore in bottom.
LAST OPERATOR: Roderick and R. Peterson.
MAP SOURCES: None.

BLACKHAWK

LOCATION: Sec. 5, T1S, R72W. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Over 20 units.
WORKINGS: One of several named prospects on an agricultural patent.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: No maps.

BLACK IRON

LOCATION: SW¼ Sec. 19, T1S, R72W, 500′ NW of Tungsten shaft. Boulder County.
OWNER: Richard Murdock.
PRODUCTION: Over 4000 units.
WORKINGS: 60′ shaft and surface trenches.
ORE OCCURRENCE: Float and surface ore.

POTENTIAL: Unknown.
LAST OPERATOR: Judson Thomas, 1942-43.
MAP SOURCES: None.

BLACK JACK

LOCATION: SW¼ Sec. 5, T1S, R72W, 1000′ N of Cross shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: At least 1800 units.
WORKINGS: 500′ or 600′ adit, with 350′ crosscut to Firecracker vein. Shallow shafts and trenches.
ORE OCCURRENCE: Surface ore, which pinched when hard granite was encountered at depth.
POTENTIAL: Unknown.
LAST OPERATOR: Ray Flarty.
MAP SOURCES: Unknown.

BLACK KING

LOCATION: SE¼ Sec. 29, T1S, R72W, 800′ NE of Mammoth shaft. Boulder County.
OWNER: George Cowdery.
PRODUCTION: No production recorded.
WORKINGS: 1800′ tunnel driven to explore several veins.
ORE OCCURRENCE: Unknown.
POTENTIAL: A drift at the end of the tunnel might encounter the ore which was mined in the Tungsten Mountain No. 9, above. An extension of the drift toward the Mammoth might find the Mammoth ore-shoot which was deflected off to the Mammoth side-line by a fault, into the Black King No. 2.
LAST OPERATOR: Tungsten Mountain Mining Co.
MAP SOURCES: USGS PP 245, plate 7.

BLACK METALS

LOCATION: Sec. 22 or 23, T2S, R73W, at head of Silver Creek, near Wideawake, Gilpin County.
OWNER: W. Perkins.
PRODUCTION: Possibly 1000 units.
WORKINGS: Shaft less than 100′ deep.
ORE OCCURRENCE: Some recent ore from dump. Early production was during World War I; shipped to Rollinsville mill.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No map.

BLACK PEARL

LOCATION: SE¼ Sec. 5, T1S, R72W, about 550′ S68°E of Bonanza mine. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Small production, in 1913 and in 1945. Over 100 units.
WORKINGS: Shallow shaft and open cut. Both caved.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: Oscar Fay.
MAP SOURCES: None.

BLACK PRINCE

LOCATION: SW¼ Sec. 31, T1N, R71W. Boulder County.
OWNER: L. A. Mock and H. W. Patton.
PRODUCTION: About 5000 units.
WORKINGS: Four adits driven on a shear zone.
ORE OCCURRENCE: Horn type ore in variously dipping small veins.
POTENTIAL: Unknown.
LAST OPERATORS: M & P Leasing Company.
MAP SOURCES: USGS PP 245, page 188.

BLACK ROSE

LOCATION: SW¼ Sec. 4, T1S, R72W, east of Victor mine, near North Boulder Creek. Boulder County.
OWNER: R. E. Dalley estate.
PRODUCTION: About 3000 units.
WORKINGS: Caved shaft; levels unknown.
ORE OCCURRENCE: Crystalline ore. Vein in granite.
POTENTIAL: Dump screenings show ore. Float, south of mine.
LAST OPERATOR: Alec McClellan.
MAP SOURCES: No maps.

BLACK ROVER

LOCATION: SW¼ Sec. 20, T1S, R72W, about ½-mile SE of Mammoth shaft. Boulder County.
OWNER: George Cowdery.
PRODUCTION: Over 10,000 units, most of which was produced between 1916 and 1931, from the upper shaft workings.
WORKINGS: Upper shaft and lower adit, unconnected.
ORE OCCURRENCE: In an ore-shoot 6′ x 80′.
POTENTIAL: A 1-inch streak of solid ore leaves the workings at about 90 degrees. Will require surface trenching.
LAST OPERATOR: Clyde Clemens.
MAP SOURCES: USGS PP 245, plate 7.

BLACK SQUIRREL

LOCATION: NE¼ Sec. 4, T1S, R72W, near the Rocky Mountain mine. Boulder County.
OWNER: Hays Scruggs. Abandoned.
PRODUCTION: Small.
WORKINGS: One small adit.
ORE OCCURRENCE: In vein striking NE.
POTENTIAL: Unknown.
LAST OPERATOR: Hays Scruggs.
MAP SOURCES: No map.

BLUE BELL

LOCATION: NE¼ Sec. 4, T1S, R72W, W. of Switzerland Park, on south side of North Boulder Creek. Boulder County.
OWNER: Vanadium Corporation of America.
PRODUCTION: Probably over 6000 units.
WORKINGS: 180′ shaft, and stopes.
ORE OCCURRENCE: Concentrate contains heavy iron and zinc.

POTENTIAL: Unknown.
LAST OPERATOR: MacKenzie and Sterling.
MAP SOURCES: Owner.

BLUEBIRD

LOCATION: NE¼ Sec. 34, T1N, R72W, near the top of Primos Hill, on the Sugarloaf road, Boulder County.
OWNER: Ben Skinner.
PRODUCTION: Very small production, most of which was made in 1954-55.
WORKINGS: 40 foot shaft, and several small pits.
ORE OCCURRENCE: Two veins on the claim.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: None.

BLUE JAY

LOCATION: SE¼ Sec. 35, T1N, R72W, above the Eureka mine, and above Boulder Falls on west side of Creek. Boulder County.
OWNER: W. D. Brown.
PRODUCTION: About 100 units. Small production in 1953.
WORKINGS: 3 adits; the upper one caved. Middle adit about 350′ in length; lower adit 631′ in length.
ORE OCCURRENCE: Horn type. Narrow streaks of siliceous, brecciated ferberite.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No map.

BOBCAT

LOCATION: Sec. 12, T1S, R73W, about ½-mile NE of the new Conger shaft. Boulder County.
OWNER: Vanadium Corporation of America.
PRODUCTION: About 1200 units, in 3% to 4% ore, during 1914.
WORKINGS: Shaft at least 140′ deep. 200′ drift on the 40′ level.
ORE OCCURRENCE: Ore occurred at surface, 3′ wide, 40′ long, 40′ deep.
POTENTIAL: Unknown.
LAST OPERATOR: C. H. Smith.
MAP SOURCES: Owner.

BONANZA

LOCATION: SE¼ Sec. 5, T1S, R72W, about ⅓ mile N72°E of the Cross shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Over 15,000 units, a large part in ore averaging 13%.
WORKINGS: 2 shafts, 200′-300′ in depth. South shaft is main entry. Three or four levels.
ORE OCCURRENCE: Ferberite veins in granite.
POTENTIAL: Unknown.
LAST OPERATOR: Bodnar brothers.
MAP SOURCES: Owner.

BOND RANCH

LOCATION: Sec. 10, T17S, R69W, in Eight Mile Creek, Phantom Canyon, 22 miles N of Canyon City. Fremont County.
OWNER: Edward Roberts.
PRODUCTION: Over one ton of 58% ore.
WORKINGS: 1200-foot adit.
ORE OCCURRENCE: Small veins in precambrian rock carry wolframite.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No maps.

BRACE TRACT

LOCATION: SE¼ Sec. 24, T1S, R73W, about ½-mile SW of the Tungsten shaft, Boulder County.
OWNER: John Buchanan.
PRODUCTION: Less than 10,000 units, valued at $100,000.
WORKINGS: 200′ tunnel in granite and pegmatite, connecting with a glory-hole.
ORE OCCURRENCE: Ferberite in the intersection of two veins.
POTENTIAL: Unknown.
LAST OPERATOR: Johnson. A. Rudine, and Stuber.
MAP SOURCES: USGS PP 245, page 97.

BUENO

LOCATION: SE¼ Sec. 24, T2N, R72W, about 1-mile NW of Jamestown, Boulder County.
OWNER: Harry M. Williamson, and Son.
PRODUCTION: 3 or 4 units.
WORKINGS: Gold mine; shaft with many levels. Adits above shaft collar.
ORE OCCURRENCE: Tungsten occurred in one pocket only, on the 3rd level.
POTENTIAL: None.
LAST OPERATOR: Ray Imel.
MAP SOURCES: Owner.

BYRON (LORD)

LOCATION: NW¼ Sec. 35, T1N, R72W, NW of Wild Tiger mine. Boulder County.
OWNER: L. V. Davidson.
PRODUCTION: Less than 1000 units.
WORKINGS: 180′ shaft, with short levels.
ORE OCCURRENCE: Horn type.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: No map.

CAMERON (BIG CAMERON)

LOCATION: SE¼ Sec. 7, T1S, R72W, about 75′ W of Jack-Summit. Boulder County.
OWNER: Cold Spring Tungsten, Inc.

PRODUCTION: Small production from the 104′ level.
WORKINGS: 114′ shaft, 178′ of drifts, most of which was done under DMEA contract.
ORE OCCURRENCE: Nodules and small streaks of ferberite.
POTENTIAL: Unknown.
LAST OPERATOR: Brown, Mosch, and Mosch.
MAP SOURCES: Owner. USGS.

CARLBERG

LOCATION: SW¼ Sec. 5, T1S, R72W, 1400′ N74°W of the Cross shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: More than 2500 units, in ore averaging 16%.
WORKINGS: Shaft at least 100′, with about 550′ of drifts.
ORE OCCURRENCE: In contacts of aplite and granite.
POTENTIAL: Unknown.
LAST OPERATOR: T. J. Henning.
MAP SOURCES: Owner.

CATASTROPHE

LOCATION: SE¼ Sec. 35, T1N, R72W, about ½-mile W of Boulder Falls, Boulder County.
OWNER: Mattie M. Lawrence.
PRODUCTION: About 8,000 units.
WORKINGS: 2 adits, one about 75′ below the other. Raises and crosscuts driven from lower adit.
ORE OCCURRENCE: Ferberite with scheelite.
POTENTIAL: Dump indicates ore content; physical recovery will be difficult.
LAST OPERATOR: Donald Scruggs.
MAP SOURCES: USGS PP 245, page 172.

CHAHUAHUA

LOCATION: SE¼ Sec. 36, T2S, R73W, in Missouri gulch, Gilpin County.
OWNER: Melvin Blake, et al.
PRODUCTION: Less than 100 units.
WORKINGS: 4 adits; lower adit 500′ in length.
ORE OCCURRENCE: Tungsten found only in two middle adits, occurring as a lens in the vein, which is in schist.
POTENTIAL: Unknown.
LAST OPERATOR: Harry S. Blake.
MAP SOURCES: Owner.

CHALLENGER

LOCATION: Sec. 23-24, T8N, R72W. Larimer County.
OWNER: T. H. Sackett, et al.
PRODUCTION: Few tons of 0.57% ore in 1942.
WORKINGS: 2 shallow shafts; several surface pits.
ORE OCCURRENCE: Scheelite in quartz, in quartz-biotite schist.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No map.

CHARLEY

LOCATION: Sec. 13, T1S, R73W, 200′ S of Illinois shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: 67 units.
WORKINGS: Short tunnel; small stopes.
ORE OCCURRENCE: Tungsten with silver locally.
POTENTIAL: Unknown.
LAST OPERATOR: O. P. Pherson.
MAP SOURCES: Owner.

CHATHAM

LOCATION: SW¼ Sec. 6, T1N, R72W, NE of Ward, Boulder County.
OWNER: Edward J. Peterson.
PRODUCTION: 3 tons of 1.12%, in 1956.
WORKINGS: Shaft of unknown depth, perhaps 450′. Joins with Nelson mine on 250′ level. At least two drifts east.
ORE OCCURRENCE: Hubnerite in white quartz.
POTENTIAL: Unknown.
LAST OPERATOR: Chatham Mining Co. (Frank Perry).
MAP SOURCES: None.

CLARK TUNNEL

LOCATION: NW¼ Sec. 17, T1S, R72W, at the village of Tungsten. Boulder County.
OWNER: J. Clark-H. Barker estate.
PRODUCTION: Covered in descriptions of individual mines.
WORKINGS: 2150′ tunnel, runs N77°W, intersecting the following veins: Barker Nos. 1, 2, 3, 4; Vasco 6; Murphy; Five; and Hurricane Hill reef.
ORE OCCURRENCE: See individual mines.
POTENTIAL: See individual mines.
LAST OPERATOR: See individual mines.
MAP SOURCES: See individual mines.

CLIMAX

LOCATION: Sec. 12, T8N, R79W, on Fremont Pass, Lake County.
OWNER: Climax Molybdenum Co. Div., American Metals Climax Corp.
PRODUCTION: Over 300,000 units.
WORKINGS: Developed by adits and block-caving.
ORE OCCURRENCE: Wolframite occurs in veinlets with molybdenite.
POTENTIAL: Tungsten ore constantly occurs as by-product of molybdenum.
LAST OPERATOR: Owner.
MAP SOURCES: Owner.

CLIPPER *(see Good Friday-April Fool)*

CLYDE

LOCATION: NW¼ Sec. 7, T1S, R72W, about 1½ miles NE of Nederland, Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: About 35,000 units. 8000 tons of ore averaged 3½%, before 1929. Some production in 1955.

WORKINGS: 7 levels in 2 overlapping shafts. Bottomed at 253′. Winze from adit, at 211′, extended to 512′.
ORE OCCURRENCE: Horn type ore. Workings are wet; make 500 gpm.
POTENTIAL: 3′ of 1% ore on bottom level west; may be at the endline, which abuts Colorado Tungsten Corp. property.
LAST OPERATOR: Johnson brothers and H. Williams.
MAP SOURCES: Owner.

C. & M.

LOCATION: SE¼ Sec. 7, T1S, R72W, back of Public Service house. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Small production in 1954 from a 10-foot pit.
WORKINGS: 100′ shaft.
ORE OCCURENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: Tom Hetzer.
MAP SOURCES: No map.

COLD SPRING

LOCATION: Sec. 7 & 8, T1S, R72W, about 2 miles NE of Nederland, in Trevarton gulch. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: 101,586 units, in 7.1% ore, by end of 1935. Probably over 200,000 units total.
WORKINGS: 2 shafts, 480′ deep, with 8 levels. In 1951-54, under DMEA, the mine was reopened, and 12,000′ of core-drilling, 1547′ of drifting, 487′ of crosscutting, and 998′ of raising was done. One of the large ore-bodies of the district was discovered during this development.
ORE OCCURRENCE: 4 major and 2 minor shoots on Cold Spring vein; several small shoots on other veins.
POTENTIAL: Requires development on good prospects.
LAST OPERATOR: Owner.
MAP SOURCES: Owner. USGS PP 245, plates 18, 19.

COLD SPRING NO. 2

LOCATION: NE¼ Sec. 7, T1S, R72W, 1500′ WSW of Cold Spring mine, and adjacent to the Forest Home mine. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: At least 2000 units, in 8½% ore.
WORKINGS: Inclined shaft; levels at 41 and 74 feet.
ORE OCCURRENCE: Several intersecting veins, both in Cold Springs and Forest Home.
POTENTIAL: Unknown. Last lessees found no ore.
LAST OPERATOR: Owners, via underground connection, cerca 1938.
MAP SOURCES: Owner. USGS PP 245, plate 16.

COLD SPRING NOS. 3 & 4 *(No. 4 is Pick and Gad)*

LOCATION: NW¼ Sec. 8, T1S, R72W, between Cold Spring main shaft, and No. 2. Boulder County. Old No. 1 shafthouse burned down.

OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Less than 1000 units.
WORKINGS: Connect with part of main Cold Spring workings. No. 4 is on a footwall vein.
ORE OCCURRENCE: Same as main Cold Spring.
POTENTIAL: Same as main Cold Spring.
LAST OPERATOR: Kenneth Horton, et al, on No. 4.
MAP SOURCES: Owner.

COLUMBINE *(unpatented)*

LOCATION: NE¼ Sec. 34, T1N, R72W, near top of Primos Hill. Boulder County.
OWNER: Unknown. Claim is evidently abandoned.
PRODUCTION: Small production in 1954.
WORKINGS: 60′-80′ shaft; one level.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: Unknown.

COMPLEX

LOCATION: Sec. 23, T31N, R4E, near Cumberland Pass, 8 miles N of Pitkin. Gunnison County.
OWNER: U. S. Tungsten Corp.
PRODUCTION: Probably about 500 units.
WORKINGS: 300′ crosscut and 400′ drift constitute the lower workings, which are inaccessible. 200′ inclined shaft above.
ORE OCCURRENCE: Footwall streak of vein, hubnerite in quartz, is up to 18″ in thickness.
POTENTIAL: Stope fills contain some ore. PbAg on HW side of vein.
LAST OPERATOR: Bernard Teets, et al. World War II.
MAP SOURCES: Harold Koster.

CONGER

LOCATION: SE¼ Sec. 11, T1S, R73W, about 1 mile NW of Nederland. Boulder County.
OWNER: Vanadium Corporation of America.
PRODUCTION: Over 400,000 units, making the Conger the largest producing tungsten mine of the state.
WORKINGS: 991′ shaft, with over 5 miles of horizontal workings.
ORE OCCURRENCE: Fissure veins in granite. Most of the ore was above the 6th level.
POTENTIAL: Large amount of dump and sorting-house screenings were yielding $2.00 and $4.00 per ton at the $63.00 per unit price.
LAST OPERATOR: J. M. Smith and Guy Tanner, underground. Cobb and Weldon, surface.
MAP SOURCES: Owner.

CONNIE

LOCATION: Sec. 17, T43N, R7W, about 4000′ SE of the Dunmore mine. Ouray County.
OWNER: George E. Wing.
PRODUCTION: Several tons of sorted hubnerite ore.
WORKINGS: 3 short adits.
ORE OCCURRENCE: A 15-foot vein yielded hubnerite during development of a small lead orebody.
POTENTIAL: Unknown.
LAST OPERATOR: E. E. Eggleston.
MAP SOURCES: No maps.

CONYER

LOCATION: S½ Sec. 29, T42N, R7W, about 5 miles N of Silverton, near the mouth of Dry Gulch. San Juan County.
OWNER: N. E. Walby and Earl Clifford.
PRODUCTION: Several tons of 30% ore during World War I, some production as early as 1900.
WORKINGS: Several adits, pits, and a shaft. One adit, accessible, was extended about 250′ in 1956.
ORE OCCURRENCE: Mineralized fractures in andesite flows. Some contain ferberite.
POTENTIAL: Unknown.
LAST OPERATOR: Louis Schaeffer.
MAP SOURCES: No maps.

COPELAND

LOCATION: Sec. 20, T1S, R71W, in Forsythe gulch. Now under the lake formed by Gross dam. Boulder County.
OWNER: City of Denver. Previously Vanadium Corp. of America.
PRODUCTION: More than 16,000 units, with a small production in 1955.
WORKINGS: 260′ vertical shaft, with levels at 50, 145, and 240 feet, in 1917. Supposedly deepened to 400′ since 1917.
ORE OCCURRENCE: One of the largest orebodies in the district, but the ore is extremely siliceous and horny. Long surface cut about 10′ in width and 30′ deep was mined in the early years.
POTENTIAL: Mill tailings run about 0.5% WO_3.
LAST OPERATOR: C. H. Clark and E. P. Swerdfeger.
MAP SOURCES: Owner.

CORKSCREW

LOCATION: Sec. 12, T1S, R73W, about 900′ W. of Lone Tree shaft, and directly north of Colorado Highway No. 119. Boulder County.
OWNER: V. C. A.
PRODUCTION: Probably less than 10,000 units, previous to 1914.
WORKINGS: Shaft about 200 feet in depth.
ORE OCCURRENCE: Vein in schist. Well crystallized ore.
POTENTIAL: Unknown.
LAST OPERATOR: Scruggs and Wilson.
MAP SOURCES: Owner.

CRACKERJACK

LOCATION: NE¼ Sec. 4, T1S, R72W, on slope S. of N. Boulder Creek, W. of Switzerland Park. Boulder County.
OWNER: Margaret L. Peters.
PRODUCTION: Less than 100 units.
WORKINGS: Shaft and surface trenches.
ORE OCCURRENCE: Ferberite associated with sphalerite.
POTENTIAL: Dump indicates showing of ore.
LAST OPERATOR: Walter Laesch.
MAP SOURCES: No map.

CRACKERJACK

LOCATION: SW¼ Sec. 29, T1N, R71W, about 600′ NE of Dorothy shaft, in Millionaire Gulch. Boulder County.
OWNER: A. T. Barr and Robert C. Barr.
PRODUCTION: At least 500 units.
WORKINGS: 600′ adit cuts three shafts at 430′, 520′, and 555′. Many shallow pits.
ORE OCCURRENCE: "Steel" tungsten in small streaks.
POTENTIAL: Ore showing in winze.
LAST OPERATOR: Gray (initials unknown), about 1944.
MAP SOURCES: George H. Teal.

CRETE

LOCATION: SW¼ Sec. 29, T1N, R71W, 400′ NE of Dorothy shaft. Boulder County.
OWNER: A. T. Barr and R. C. Barr.
PRODUCTION: About 460 units.
WORKINGS: 420′ adit on Crete vein. Surface pits. Joins with Dorothy 2nd and 3rd levels.
ORE OCCURRENCE: Large part of production came from intersection of Crete vein with Peter and Nile veins.
POTENTIAL: Unknown.
LAST OPERATOR: Ralston and Tenhaeff.
MAP SOURCES: George H. Teal.

CROSS

LOCATION: NW¼ Sec. 8, T1S, R72W, 1800′ NE of Cold Spring mine, north side of Trevarton Gulch. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: About 40,000 units.
WORKINGS: Shaft with 4 levels, the lowest at 359 feet. Levels are approximately 800′ long. Mine timbering has been damaged by lessees.
ORE OCCURRENCE: Several veins, including the Pump vein, converge to make the Cross. Hard ore.
POTENTIAL: Stope fill was yielding ore in 1955.
LAST OPERATOR: K. Horton, et al.
MAP SOURCES: Owner. USGS PP 245, plate 20.

CROSS NO. 2

LOCATION: SE¼ Sec. 24, T1S, R73W, 2900′ N87°W of Tungsten shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: 90,000 # of W, including 308 units, between 1907-17, in ore averaging 10.18%.
WORKINGS: 190′ shaft; levels at 50′, 120′ and 180′.
ORE OCCURRENCE: 30′ ore shoot NE of shaft above 120′ level.
POTENTIAL: Unknown.
LAST OPERATOR: Clemens and Rugg, 1917-18.
MAP SOURCES: No map.

CROW NOS. 1, 1½, 1¾

LOCATION: SE¼ Sec. 12, T1S, R73W, at junction of Colo. highway 119 with Hurricane Hill road. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: 2000 units reported.
WORKINGS: Several shallow caved shafts.
ORE OCCURRENCE: Small highgrade ferberite veins in schist.
POTENTIAL: Unknown.
LAST OPERATOR: Cobb and Weldon.
MAP SOURCES: No map.

CROW NOS. 2 AND 37

LOCATION: Sec. 12 T1S, R73W, N. of Mud Lake, and W. of highway 119. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: Probably less than 5000 units.
WORKINGS: Four shafts connected by drifts.
ORE OCCURRENCE: Several intersecting veins in pegmatite, surrounded by schist.
POTENTIAL: Surface ore recovery in 1953 indicates possible stope-fill ore.
LAST OPERATOR: Cobb and Weldon.
MAP SOURCES: USGS PP 245, page 128.

CROW NO. 3

LOCATION: Sec. 12, T1S, R73W, south of Hoosier mine. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: Less than 1000 units.
WORKINGS: Several shafts and cuts.
ORE OCCURRENCE: Ferberite in pegmatitic veins.
POTENTIAL: Unknown.
LAST OPERATOR: Ray Flarty.
MAP SOURCES: None.

CROW NO. 4

LOCATION: Sec. 12, T1S, R73W, on N. side of Sherwood Gulch, about 1½ miles NW of Nederland. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: Probably over 15,000 units.

WORKINGS: 167′ shaft; levels at 38′, 73′, 108′, 133′, 162′. Caved.
ORE OCCURRENCE: Coarsely crystalline ferberite in pegmatites.
POTENTIAL: Unknown.
LAST OPERATOR: Primos Chemical Co., 1918.
MAP SOURCES: VCA. USGS PP 245, page 113.

CROW NOS. 7 AND 8

LOCATION: Sec. 12, T1S, R73W, S. of Hurricane Hill road, ¼-mile E. of Highway 119. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: About 2000 units.
WORKINGS: Various trenches, pits, and shafts.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: None.

CROW NO. 11

LOCATION: Sec. 12, T1S, R73W. Dump abuts E. side of Colo. 119, ¼-mile N. of Hurricane Hill road. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: About 3000 units.
WORKINGS: Caved shaft, drifts at about 40 feet.
ORE OCCURRENCE: Highgrade ferberite veins in schist.
POTENTIAL: Unknown.
LAST OPERATOR: Ray Flarty.
MAP SOURCES: No map.

CROW NO. 12

LOCATION: Sec. 12, T1S, R73W, on upper road to Greenhorn mine, and NW of Mud Lake. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: Less than 1000 units.
WORKINGS: Caved shaft in soft ground. Level at about 75′.
ORE OCCURRENCE: Highgrade soft ore in NE-SW vein.
POTENTIAL: Surface ore recovery in 1954 indicates possible stope-fill ore. Workings caved during mining operations by Roose brothers while on good ore. Recommended that the Greenhorn be extended a short distance, to cut the No. 12 vein.
LAST OPERATORS: Cobb and Weldon.
MAP SOURCES: No map.

CROW NO. 17

LOCATION: Sec. 12, T1S, R73W, 125′ NE of Crow 4. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: Probably less than 100 units.
WORKINGS: 35′ shaft, short level and stope at 18′.
ORE OCCURRENCE: Small pocket in No. 4 vein.
POTENTIAL: Development from No. 4 mine found no ore.
LAST OPERATOR: Unknown.
MAP SOURCES: USGS PP 245, page 113.

CROW NO. 18

LOCATION: Sec. 12, T1S, R73W, ⅛-mile W. of hairpin turn in Colo. 119 at Sherwood Gulch. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: Probably over 17,000 units. One of the more prolific of the small mines of the district.
WORKINGS: Shaft with levels at 85′, 123′, 167′, and 254′. A crosscut goes north, into VCA ground.
ORE OCCURRENCE: Highgrade ferberite in aplite.
POTENTIAL: Known ore possibility lies in VCA ground.
LAST OPERATOR: Jack MacKenzie.
MAP SOURCES: VCA. USGS PP 245, plate 11.

CROW NO. 19

LOCATION: Sec. 12, T1S, R73W, N. of and immediately adjoining Colo. 119 at the hairpin turn at Sherwood Gulch. Boulder County.
OWNER: Vanadium Corporation of America.
PRODUCTION: Small production during World War I.
WORKINGS: 35′ shaft; open cut on surface.
ORE OCCURRENCE: Highgrade ore; vein in schist.
POTENTIAL: Ore said to show in floor.
LAST OPERATOR: James Flood et al.
MAP SOURCES: No map.

CROW NO. 22

LOCATION: Sec. 12, T1S, R73W, W. of Crow 12. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: Small.
WORKINGS: 60′ shaft; 100′ of drifting.
ORE OCCURRENCE: Ore was very light in weight; would not concentrate.
POTENTIAL: Unknown.
LAST OPERATOR: Ray and Russell Flarty.
MAP SOURCES: No map.

CROW NO. 36

LOCATION: Sec. 12, T1S, R73W, across Colo. 119, and gulch, east of Mud Lake. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: Less than 10,000 units, but one of the more prolific producers of the district.
WORKINGS: 50′ shaft; drifts on network of small veins. Shaft area subsiding in 1959.
ORE OCCURRENCE: Small streaks in granite, schist, and aplite. No. 36 made some of the highest grade concentrate of the district, from 70% to 74%, in a clean, coarsely crystalline ferberite.
POTENTIAL: Small ore showings in floors of mine.
LAST OPERATOR: Cobb and Weldon.
MAP SOURCES: H. S. Cobb.

DAISY

LOCATION: Sec. 5, T1S, R72W.
OWNER: Cold Spring Tungsten, Inc.

PRODUCTION: Less than 30 units.
WORKINGS: One of several named prospects on an agricultural patent.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: No maps.

DAWN OF DAY — OHIO

LOCATION: Sec. 20, T42N, R7W, Dry Gulch area, about 8 miles N. of Silverton. San Juan County.
OWNER: Victor Steele.
PRODUCTION: One of the most productive tungsten mines in the district.
WORKINGS: 3 short adits, all caved.
ORE OCCURRENCE: Hubnerite was in a 120′ ore shoot, 8″ wide, of 40% ore.
POTENTIAL: Upper dump and stope fill near one portal recently milled.
LAST OPERATOR: Louis Schaeffer.
MAP SOURCES: Unknown.

DELANO

LOCATION: Sec. 7, T41N, R7W, about 2 mi. NW of Silverton. San Juan County.
OWNER: Henrik Avanzini.
PRODUCTION: One mill shipment yielded 5 tons of 61% concentrate in 1916-17.
WORKINGS: Crosscut about 100′ in length, and 1300′ of drifts.
ORE OCCURRENCE: 2 to 6-inch hubnerite band in a 6′ vein, reportedly developed for 1300 feet, showing several small ore-shoots of up to 30′ in length.
POTENTIAL: Possibility of developing a desirable prospect.
LAST OPERATOR: Dominick French.
MAP SOURCES: Warren C. Prosser.

DENVER

LOCATION: SE¼ Sec. 11, T1S, R73W, about 500′ N. of Illinois shaft, Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: 275 units reported.
WORKINGS: The only underground workings are in a crosscut from the Illinois shaft.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: Wolftongue Mining Co.
MAP SOURCES: No map.

DIAMOND

LOCATION: NE¼ Sec. 8, T1S, R72W, 300′ SW of Philadelphia mine, Dry Lake area. Boulder County.
OWNER: Gold, Silver and Tungsten, Inc., and M. M. Rinn.
PRODUCTION: Small production in 1916.
WORKINGS: 60′ shaft; one level.

ORE OCCURRENCE: Horn type ore.
POTENTIAL: Unknown.
LAST OPERATOR: Doc Hill.
MAP SOURCES: No maps.

DILLON

LOCATION: SE¼ Sec. 7, T1S, R72W, about 1500′ W. of Vasco 6 shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Less than 1000 units, mostly in 1907-09. Small production in 1916, and in 1955.
WORKINGS: 80′ shaft.
ORE OCCURRENCE: Stoped out both sides of shaft.
POTENTIAL: Unknown.
LAST OPERATOR: Tom Hetzer. T. J. Hennings.
MAP SOURCES: Owner.

DOROTHY-KATIE

LOCATION: SW¼ Sec. 29, T1N, R71W, in Millionaire Gulch, S. of Sugarloaf road. Boulder County.
OWNER: A. T. Barr and R. C. Barr.
PRODUCTION: Over 23,000 units.
WORKINGS: Dorothy: inclined shaft; levels at 100′, 184′, and 281′. Katie: inclined shaft; levels at 79′, 136′, 195′, and 248′.
ORE OCCURRENCE: Ore was mainly near Dorothy-Katie intersection.
POTENTIAL: Unknown.
LAST OPERATOR: Boulder Tungsten Mines, Inc.
MAP SOURCES: George H. Teal.

DOUBLE HEADER

LOCATION: NW¼ Sec. 8, T1S, R72W, about 2000′ E. of Cold Spring shaft. Boulder County.
OWNER: Vanadium Corporation of America.
PRODUCTION: Probably about 1000 units.
WORKINGS: Several short adits and shallow shafts. New shaft sunk in 1937.
ORE OCCURRENCE: In group of veins; worked on small scale.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Owner.

DUNMORE

LOCATION: Sec. 17, T43N, R7W, on highway, about 5 miles S. of Ouray. Ouray County.
OWNER: George E. Wing.
PRODUCTION: Small tungsten production, along with gold.
WORKINGS: 2 adits, one 174′ above the other.
ORE OCCURRENCE: Hubnerite, in a vertical, chimney-like ore shoot.
POTENTIAL: A showing of ore is visible in the core of the vein.
LAST OPERATOR: E. E. Eggleston.
MAP SOURCES: No maps.

EARLY SPRING

LOCATION: NE¼ Sec. 8, T1S, R72W, about 400′ S. of the Philadelphia shaft, Dry Lake. Boulder County.
OWNER: Frank Robbins.
PRODUCTION: Probably less than 1000 units.
WORKINGS: Two or three shallow shafts.
ORE OCCURRENCE: Small veins in granite.
POTENTIAL: Unknown.
LAST OPERATOR: Roy Peterson, about 1918.
MAP SOURCES: No map.

EASTVIEW

LOCATION: Sec. 20, T1S, R72W, S. of Magnolia road, about 2 miles E. of Colo. 119. Boulder County.
OWNER: Merle Reynolds.
PRODUCTION: About 10 units.
WORKINGS: Many trenches, cuts, and shallow shafts.
ORE OCCURRENCE: Mostly as float, over an extensive area.
POTENTIAL: Surface areas may yield 1 to 2 pounds of 50% tungsten concentrate per ton, as placer.
LAST OPERATOR: J. M. Pastore.
MAP SOURCES: No map.

EDITH MARY

LOCATION: NE¼ Sec. 7, T1S, R72W, about 500′ SE of Western Star shaft, and 200′ N. of Little Jap. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Few hundred units.
WORKINGS: Shallow shafts and open cuts.
ORE OCCURRENCE: Mine made highgrade ore.
POTENTIAL: Unknown.
LAST OPERATOR: George Todd, underground. Cobb and Weldon, surface.
MAP SOURCES: Owner.

ELSIE AND WINDY TUNNEL

LOCATION: SE¼ Sec. 19, T1S, R72W, about 4 miles SE of Nederland. Boulder County.
OWNER: Guy Tanner et al.
PRODUCTION: About 16,180 units through World War II. Small production in 1955.
WORKINGS: Shaft on Elsie claim, 265′. Tunnel on Windy claim, 100′ below shaft collar.
ORE OCCURRENCE: Single continuous ore shoot on Elsie vein, extending to below tunnel level.
POTENTIAL: Indicated possible ore pitching under creek. Might be core-drilled.
LAST OPERATOR: Eugene Scohy and Overly brothers.
MAP SOURCES: USGS PP 245, plate 7.

EUREKA

LOCATION: SE¼ Sec. 35, T1S, R72W, about 2500′ SW of Boulder Falls, in Middle Boulder Canyon. Boulder County.

OWNER: Eureka Tungsten Company.
PRODUCTION: Probably 30,000 units. Over 3000 units produced in 1956.
WORKINGS: Several tunnels. Main workings are through the 1635-foot Midway tunnel.
ORE OCCURRENCE: Granite and horn quartz cemented by ferberite. Eureka vein is in Boulder Creek granite.
POTENTIAL: In production at the time of the 1956 price failure.
LAST OPERATOR: Eureka Tungsten Co. Elliot Ralston, manager.
MAP SOURCES: Owner. USGS PP 245, page 168.

EVALINE

LOCATION: Sec. 20, T42N, R7W, 8 miles from Silverton, in Dry Gulch. San Juan County.
OWNER: Evaline Mining and Milling Co.
PRODUCTION: Possibly 100 tons of 12% ore through the Yukon mill.
WORKINGS: Tunnel driven from Dry Gulch to intersect the tungsten-vein.
ORE OCCURRENCE: Ore reported to be scattered, but of good concentrating grade.
POTENTIAL: Ore shows in dump. Good prospect for depth.
LAST OPERATOR: Louis Schaeffer.
MAP SOURCES: Unknown.

EVENING POST

LOCATION: SW¼ Sec. 35, T1N, R72W, 3200′ S84°E of Peewink Mtn. Boulder County.
OWNER: Mattie M. Lawrence.
PRODUCTION: Less than 10,000 units from shaft. None from adit.
WORKINGS: 1150′ adit. Shaft with 3 levels.
ORE OCCURRENCE: In a short NE vein in granite.
POTENTIAL: Unknown.
LAST OPERATOR: Forrest.
MAP SOURCES: USGS PP 245, page 165.

EXCHANGE

LOCATION: NE¼ Sec. 34, T1N, R72W, ½-mile N. of Peewink Mtn. Boulder County.
OWNER: Vanadium Corp. of America.
PRODUCTION: About 500 units, in 5% ore.
WORKINGS: Adit, caved.
ORE OCCURRENCE: In aplite, in NNE branch of Quaker City vein system.
POTENTIAL: Unknown.
LAST OPERATOR: James T. Durkan.
MAP SOURCES: Owner.

FAIRCOUNT

LOCATION: Middle of S½ Sec. 36, T1N, R72W, N. side of Boulder Canyon, below junction of north and Middle Boulder creeks. Boulder County.
OWNER: C. L. Stubbs.

PRODUCTION: 3000 units.
WORKINGS: On Denver claim.
ORE OCCURRENCE: Production was made during World War I.
POTENTIAL: Unknown.
LAST OPERATOR: Mr. Widdows, Ft. Collins.
MAP SOURCES: No underground maps.

FIRECRACKER

LOCATION: SW¼ Sec. 5, T1S, R72W, S. of Blackjack shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: About 500 units, in 25.75% ore.
WORKINGS: Old adit; caved shaft of unknown depth; new 35′ shaft.
ORE OCCURRENCE: In vein striking along porphyry dikes in granite.
POTENTIAL: Unknown.
LAST OPERATOR: Ray Flarty.
MAP SOURCES: Owner.

FIRST CHANCE

LOCATION: Sec. 20, T242N, R7W; Dry Gulch area, 8 miles N. of Silverton. San Juan County.
OWNER: Thomas Burgess.
PRODUCTION: Small production in 1953 (½-ton of 10% ore).
WORKINGS: Surface cuts.
ORE OCCURRENCE: Vein in San Juan volcanic series.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No maps.

FITZSIMMONS NO. 1

LOCATION: SE¼ Sec. 19, T1S, R72W, about 850′ SW of Mammoth shaft. Boulder County.
OWNER: W. L. Tanner & Son.
PRODUCTION: About 4000 units.
WORKINGS: 4-level inclined shaft, over 217′ in depth.
ORE OCCURRENCE: Short ore shoot, 217′ deep.
POTENTIAL: Unknown.
LAST OPERATOR: Guy Tanner mined pillars.
MAP SOURCES: USGS PP 245, pages 95, 99.

FITZSIMMONS NO. 2

LOCATION: Same as Fitzsimmons No. 1.
OWNER: Same as Fitzsimmons No. 1.
PRODUCTION: About 4000 units.
WORKINGS: Surface cuts and stopes.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown; was during World War I.
MAP SOURCES: Same as Fitzsimmons 1.

FITZSIMMONS NO. 4

LOCATION: Same as Fitzsimmons 1.
OWNER: Same as Fitzsimmons No. 1.
PRODUCTION: Unknown.
WORKINGS: Several shafts and shallow pits.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown; World War I.
MAP SOURCES: Same as Fitsimmons 1.

FITZSIMMONS NO. 6

LOCATION: Same as Fitzsimmons 1.
OWNER: Same as Fitzsimmons 1.
PRODUCTION: Much of production credited to the Mammoth mine.
WORKINGS: Shallow surface shafts. Underground work was done from the Mammoth.
ORE OCCURRENCE: Smaller ore than that in the Mammoth.
POTENTIAL: Unknown.
LAST OPERATOR: Guy Tanner.
MAP SOURCES: Same as Fitzsimmons 1.

FOREST HOME

LOCATION: NE¼ Sec. 7, T1S, R72W, about 1500′ S67°W of Cold Spring, and on W. side of road to Cold Spring. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Probably over 10,000 units.
WORKINGS: Inclined shaft; 2 levels at 107 and 200 feet. Second level caved prior to 1942. 1st level connects with Cold Spring No. 2. The mine was reopened in 1951 under a DMEA contract, and 135′ of crosscutting, 122′ of drifting, 35′ of raising was done on the 200′ level; 85′ of crosscutting, 135′ of drifting was done on the 107′ level. Ore was found and mined.
ORE OCCURRENCE: Highgrade ore in aplite and gneissic granite.
POTENTIAL: Unknown.
LAST OPERATOR: Tom Stanford.
MAP SOURCES: Owner. USGS PP 245, plate 16.

FRACTION

LOCATION: E½ Sec. 34, and W½ Sec. 35, T1N, R72W. Boulder County.
OWNER: Vanadium Corporation of America.
PRODUCTION: Less than 1000 units. Small production in 1955.
WORKINGS: Adit and winze.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Owner.

GALE

LOCATION: NW¼ Sec. 7, T1S, R72W, 100′ N. of portal of Clyde tunnel. Boulder County.
OWNER: Cold Spring Tungsten, Inc.

PRODUCTION: Over 7000 units.
WORKINGS: 182′ shaft. Under a 1955 DMEA contract, 75′ of shaft, and 314.5′ of drift and crosscut on the lower level was completed.
ORE OCCURRENCE: Vein in fine-grained granite.
POTENTIAL: Unknown.
LAST OPERATOR: Harold Williams.
MAP SOURCES: Owner. USGS PP 245, plate 12.

GALTIE BOY

LOCATION: Sec. 17, T42N, R7W, about 8 miles from Silverton, in Dry Gulch. San Juan County.
OWNER: Green Mountain Development Corp.
PRODUCTION: Unknown.
WORKINGS: Extensive old workings with later adit below. All caved.
ORE OCCURRENCE: 2 ore shoots; 2.4′ x 10′, and 1.7′ x 60′.
POTENTIAL: Spotty ore was on hanging wall.
LAST OPERATOR: Billy Lonergan.
MAP SOURCES: Unknown.

GEM

LOCATION: NE¼ Sec. 7, T1S, R72W, 1100′ N79°W of Cold Spring shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Less than 2000 units.
WORKINGS: 120′ shaft with 2 levels, first level at 90′. An older shaft is buried in the dump 80′ NE of the present Gem shaft.
ORE OCCURRENCE: Very highgrade ore in aplite.
POTENTIAL: Ore produced from dump indicates possible stope-fill ore.
LAST OPERATOR: Todd and Flarty, 1938. Cobb and Weldon, 1952.
MAP SOURCES: Owner.

GERMANIA 1 AND 2

LOCATION: NW¼ Sec. 8, T1S, R72W, E. of Cold Spring, in Cold Spring group of claims. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Less than 1000 units.
WORKINGS: The present (new) Cold Spring shaft is on the Germania.
ORE OCCURRENCE: Stopes east and west of new shaft.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Owner.

GLENDALE

LOCATION: Sec. 32, T1S, R72W, S. of Manchester mine. Gilpin County.
OWNER: Ray Slaughenhaupt and William Goldman.
PRODUCTION: Small production; total unknown.
WORKINGS: 110′ shaft with two levels. Water stands 40′ below collar.
ORE OCCURRENCE: Highgrade ferberite in granite. Vein usually pinched in pegmatite.
POTENTIAL: Requires sinking, and short crosscut to vein.

LAST OPERATOR: William Quiner, 1955.
MAP SOURCES: Owners.

GOLD COIN

LOCATION: SW¼ Sec. 29, T1N, R71W, about 500′ NNE of the Dorothy shaft. Boulder County.
OWNER: Homer Pennock.
PRODUCTION: Included in Dorothy-Katie.
WORKINGS: 2 shafts; several open cuts. Dorothy 2nd and 3rd levels extend under Gold Coin.
ORE OCCURRENCE: Unknown.
POTENTIAL: Small ore shows in bottom of mine.
LAST OPERATOR: Boulder Tungsten Mines, Inc.
MAP SOURCES: George H. Teal.

GOLD LAKE

LOCATION: Sec. 4, T1N, R72W, S. of Gold Lake. Boulder County.
OWNER: George Harvey.
PRODUCTION: Less than 100 units.
WORKINGS: 50′ shaft, very wet from lake seepage. Short drift NE on 30′ level.
ORE OCCURRENCE: Horn type. 3″ of 8%-12%.
POTENTIAL: Small streak in bottom.
LAST OPERATOR: James Morgan.
MAP SOURCES: No map.

GOLD LEAF

LOCATION: Sec. 29, T1N, R71W, in Bummer Gulch. Boulder County.
OWNER: Hal Miller.
PRODUCTION: About 50 units, between 1934 and 1943.
WORKINGS: 125′ tunnel; 60′ shaft, with drifts.
ORE OCCURRENCE: Crystalline and "steel" tungsten, up to 8%, in granite.
POTENTIAL: An intersection to the south is not yet reached.
LAST OPERATOR: W. E. Brewster.
MAP SOURCES: Owner.

GOLD THREAD

LOCATION: Sec. 28, T42N, R7W, 10 miles from Silverton, near the S. fork of Cement Creek. San Juan County.
OWNER: H. C. Sprinkle, Durham, N. C.
PRODUCTION: World War I production reported.
WORKINGS: 300′ adit.
ORE OCCURRENCE: 1″ to 3″ hubnerite in an 18″ vein.
POTENTIAL: Unknown.
LAST OPERATOR: Big Colorado M. & M. Co.
MAP SOURCES: Unknown.

GOLDEN QUEEN

LOCATION: Sec. 6, T1N, R72W, at Ward. Boulder County.
OWNER: Joseph Walters.
PRODUCTION: At least 140 units. Hubnerite and scheelite in sulphides. Estimated several thousand units lost since 1905 in gold ore sales.

WORKINGS: 360′ shaft; levels at 100′, 220′, 300′, 350′. The 200′ level extends west to the endline.
ORE OCCURRENCE: Crystalline hubnerite in quartz, alongside sulphide gold ore shoot.
POTENTIAL: Extensive tungsten-bearing pillars said to be left on 2 levels. 2-oz. Au, with tungsten, extends into Newmarket, across west end line. Said to be 1% ore on 220′ level east.
LAST OPERATOR: Owner.
MAP SOURCES: Owner.

GOOD FRIDAY *(see April Fool)*

GRAND VIEW

LOCATION: SW¼ Sec. 8, T1N, R71W, about 1 mile SW of Sunshine. Boulder County.
OWNER: A. C. Hager.
PRODUCTION: About 2000 units.
WORKINGS: 600′ inclined shaft.
ORE OCCURRENCE: Highly siliceous tungsten ore found and mined at 156′ and 250′ levels.
POTENTIAL: The tungsten ore shoot returned into gold ore.
LAST OPERATOR: Ray Betasso. Bus Tyrer.
MAP SOURCES: Domino Mines, Inc.

GRAPHIC

NOTE: Tungsten production has been incorrectly reported from the Graphic mine. There was, however, tungsten found on a claim NE of the Graphic.
LOCATION: NE¼ Sec. 5, T1S, R71W. One of the mines first reached on the way from Boulder Canyon to Magnolia. Boulder County.
OWNER: Unknown. Probably abandoned.
PRODUCTION: Less than 50 units.
WORKINGS: Short tunnel and shaft.
ORE OCCURRENCE: Very small streak of horn ore.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No map.

GREAT SPHINX

LOCATION: SW¼ Sec. 20, T1N, R71W, S. of Crisman. Boulder County.
OWNER: Edward Bonelli.
PRODUCTION: None recorded.
WORKINGS: Adits and short drifts.
ORE OCCURRENCE: Vein outcrops. Horn type ore.
POTENTIAL: Unknown.
LAST OPERATOR: A. B. Weldon.
MAP SOURCES: No map.

GREENHORN

LOCATION: Sec. 12, T1S, R73W, on S. side of Sherwood Gulch. Boulder County.
OWNER: Colorado Tungsten Corp.

PRODUCTION: About 4000 units, most of which were produced before 1915.
WORKINGS: Crosscut tunnel to several veins. About 690' of drifts and crosscuts. Several shallow shafts. The Greenhorn includes Crow Nos. 5, 9, 15, and 16, and should eventually cut No. 12.
ORE OCCURRENCE: Highgrade ferberite in aplite.
POTENTIAL: See section on Crow No. 12.
LAST OPERATOR: Cobb and Weldon.
MAP SOURCES: USGS PP 245, page 128.

GREEN ROCK

LOCATION: Secs. 26 & 35, T9N, R71W, 2 miles N. of Columbine summer camp. Larimer County.
OWNER: Clifford Woodhouse.
PRODUCTION: About 50 tons of 1% ore in 1942. Some 4% - 5% ore.
WORKINGS: 30' shaft, and 2 short adits.
ORE OCCURRENCE: 6' scheelite vein in quartz-biotite schist.
POTENTIAL: Unknown.
LAST OPERATOR: George H. Teal.
MAP SOURCES: George H. Teal.

GREYBACK

LOCATION: SE¼ Sec. 11, T1S, R73W, about 1400' S. of new Conger shaft. Boulder County.
OWNER: Vanadium Corporation of America.
PRODUCTION: Probably in excess of 4000 units.
WORKINGS: 100' shaft, with drifts west. Adit, which made the production.
ORE OCCURRENCE: Crystalline ore near intersection of 2 veins.
POTENTIAL: Ore has been noted in lower floor, and in lower filled shaft.
LAST OPERATOR: Owner.
MAP SOURCES: Owner. USGS PP 245, page 125.

HALLIE A.

LOCATION: Sec. 25, T1N, R73W, 7½ miles N. of Nederland. Boulder County.
OWNER: Morris Mitts.
PRODUCTION: Less than 500 units.
WORKINGS: 130' lower adit; 200' upper adit; shaft with 160' drift on 100' level; 75' winze.
ORE OCCURRENCE: Horn ore. Shear zone with quartz and minor amounts of ferberite.
POTENTIAL: Mine was abandoned after DMEA completion.
LAST OPERATOR: McBroom.
MAP SOURCES: Owner. USGS.

HELEN

LOCATION: Near middle of N½ Sec. 30, T1N, R71W, S. of Logan mine. Boulder County.
OWNER: John Bosko.
PRODUCTION: About 30 units.
WORKINGS: Shaft and open cuts.

ORE OCCURRENCE: Horn ore.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No map.

HERALD

LOCATION: NW¼ Sec. 35, T1N, R72W, S. of Sugarloaf; Boulder County.
OWNER: Maude Coughlin estate.
PRODUCTION: None.
WORKINGS: Inclined shaft; 3 levels, at 71, 118, and 197 feet.
ORE OCCURRENCE: Telluride gold has been produced. Tungsten as ferberite occurs in the vein.
POTENTIAL: Unknown.
LAST OPERATOR: John W. McChristy, 1952.
MAP SOURCES: USGS PP 245, page 173.

HILDEGARDE

LOCATION: NE¼ Sec. 33, T1N, R72W, about 150′ E. of Oregon shaft. Boulder County.
OWNER: Vanadium Corp. of America.
PRODUCTION: Over 1500 units.
WORKINGS: From 2nd level of Oregon mine. Open cuts.
ORE OCCURRENCE: Ferberite and scheelite; vein in granite.
POTENTIAL: Unknown.
LAST OPERATOR: C. H. Smith.
MAP SOURCES: Owner.

HILLSIDE

LOCATION: SE¼ Sec. 34, T1N, R72W, in Gordon Gulch. Boulder County.
OWNER: Vanadium Corp. of America.
PRODUCTION: Over 1500 units.
WORKINGS: Old tunnel at least 200′ in length. 220′ shaft with levels at 60′, 125′ and 200′. Extensive stoping on lower level.
ORE OCCURRENCE: Up to 10″ vein; ore both crystalline and horn.
POTENTIAL: Ore was evident all the way down the shaft; shows in bottom of shaft. Shaft was quite wet.
LAST OPERATOR: Eugene Scohy and Overly brothers.
MAP SOURCES: John Overly.

HOLY CROSS

Horrible Gash, unpatented.

LOCATION: Sec. 5, T1S, R72W, Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: 32 units recorded.
WORKINGS: Two of several named prospects on an agricultural patent.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: No maps.

HOME RUN

LOCATION: NE¼ Sec. 6, T1S, R72W, N. of Sugarloaf road at Lakewood. Boulder County.
OWNER: Crucible Steel Co. of America.
PRODUCTION: About 100 units during World War I.
WORKINGS: Shallow shafts and surface cuts.
ORE OCCURRENCE: Horn and crystalline ore.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: No maps known.

HUBNERITE

LOCATION: Sec. 32, T15S, R81W, 13 miles by road from Pitkin, on the N. side of Cumberland Pass. Gunnison County.
OWNER: U. S. Tungsten Corp.
PRODUCTION: Estimated 100 units.
WORKINGS: 3 adits. Lower one is a 63′ crosscut, which was reopened in 1953-54 under a DMEA contract. 200′ of additional drifting and crosscutting was done, after which the project was abandoned.
ORE OCCURRENCE: 3 hubnerite-bearing veins. Dump specimens indicate hubnerite-bearing streaks of from 4 to 8 inches in width.
POTENTIAL: Vein was crosscut 40′ from the portal, assaying 2.76% over 2½ feet. No drifting done. An additional 60′ of crosscut cut 8′ of less than 1%, also 6″ of 17%. (Statement of A. L. Pearson, Pitkin.)
LAST OPERATOR: DMEA.
MAP SOURCES: USGS.

HUGO

LOCATION: SW¼ Sec. 5, T1S, R72W, on N. side of N. Boulder Creek, east of Lakewood. Boulder County.
OWNER: Alton Stinson.
PRODUCTION: About 2000 units in 2.25% ore, in 1943-44.
WORKINGS: Shaft with levels at 150 and 220 feet. 260 feet of drift on the 150, and 170 feet on the 220.
ORE OCCURRENCE: One ore-shoot containing fine-grained ferberite, horny ferberite, some scheelite, and black horn quartz.
POTENTIAL: Unknown.
LAST OPERATOR: Boulder Tungsten Mills, Inc.
MAP SOURCES: H. S. Cobb. USGS PP 245, page 155.

HUMMER

LOCATION: NW¼ Sec. 7, T1S, R72W, 250′ NW of Hoosier shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Over 200 units.
WORKINGS: 65′ shaft; about 190′ of drifting.
ORE OCCURRENCE: Good ore was in the shaft, but not in other workings.
POTENTIAL: Unknown.
LAST OPERATOR: Johnson brothers.
MAP SOURCES: USGS PP 245, page 128.

IDA MAE

LOCATION: SE¼ Sec. 11, T51N, R4E, 12 miles by road from Pitkin, and W. of Cumberland Pass. Gunnison County.
OWNER: U. S. Tungsten Corp.
PRODUCTION: 60 tons of 11% ore during World War I. Reported that $69,910.00 has been produced since.
WORKINGS: 60′ shaft; crosscut adit; several surface pits and short adits.
ORE OCCURRENCE: At least seven 1 to 3-foot veins. Most of them are said to have a 2″ to 6″ streak of quartz-hubnerite along one wall.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Owner.

ILLINOIS

LOCATION: SE¼ Sec. 11, T1S, R73W, about .8 mile NW of Nederland. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: About 26,500 units, in ore averaging 2.5%.
WORKINGS: 500′ shaft; levels at 145, 200, 300, 400, and 500 feet. Illinois 4, and Illinois Extension 3, via the Oregon and Beddig mines, join the Conger, but 25′ below Conger 3.
ORE OCCURRENCE: Ferberite veins in granite.
POTENTIAL: Unknown.
LAST OPERATOR: VCA, 1952.
MAP SOURCES: Owner. USGS PP 245, page 102; plates 8, 9.

IOWA

LOCATION: NE¼ Sec. 34, T1N, R72W, E. of Ophir-Miser group, in Gordon Gulch. Boulder County.
OWNER: Vanadium Corp. of America.
PRODUCTION: About 100 units.
WORKINGS: Short adit.
ORE OCCURRENCE: Ferberite and scheelite; vein in granite.
POTENTIAL: Small amount of development by underhand stoping produced fair grade of ore in 1955.
LAST OPERATOR: A. B. Weldon, et al.
MAP SOURCES: No map.

IRENE

LOCATION: NE¼ Sec. 31, T1N, R72W, about 9 miles N. of Nederland, and S. of the Washington Avenue mine. Boulder County.
OWNER: J. E. Spaulding.
PRODUCTION: 5 tons of .89% in 1955.
WORKINGS: 150′ shaft with 2 levels. Adit joins the 70′ level.
ORE OCCURRENCE: Horn ore, running up to 3%.
POTENTIAL: Vein opened on surface by bulldozer.
LAST OPERATOR: Owner.
MAP SOURCES: Owner.

JACK AND SUMMIT

LOCATION: SE¼ Sec. 7, T1S, R72W, at the junction of the Cold Spring Road with the ridge road turning east, at the E. end of Hurricane Hill. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: About 3600 units, in ore averaging 11.77%.
WORKINGS: Inclined shaft, caved; levels at 57, 116, and 175 feet. The 116′ level is the most extensive. Also other old caved shafts.
ORE OCCURRENCE: Veins were in aplite and schist. Made ore only on 175′ level.
POTENTIAL: Dump screenings yielded $5.00 per ton at the $63.00 per unit price, which indicates that stope-fills should be investigated.
LAST OPERATOR: Cobb and Weldon.
MAP SOURCES: Owner, USGS PP 245, page 152.

JASPER QUEEN

LOCATION: Sec. 11, T12S, R72W, 4.6 miles W. of Lake George on U.S. highway No. 24. Park County.
OWNER: Consolidated Tungsten Corp.
PRODUCTION: 3700 lbs of 1.3%; 14 tons of 0.62%, during World War II.
WORKINGS: Shallow shaft, pits, and trenches.
ORE OCCURRENCE: Lenses of thinly-coated scheelite, in lime-silicate beds.
POTENTIAL: Unknown.
LAST OPERATOR: Hayden Mining Co.
MAP SOURCES: Possibly from Hayden Mining Co.

JUNE

LOCATION: Middle of E¼ Sec. 35, T1N, R72W, above Eureka mine. Boulder County.
OWNER: George Todd.
PRODUCTION: About 50 units.
WORKINGS: Shallow shaft.
ORE OCCURRENCE: Horn Type ore. Good showing in 1953.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No Maps.

KATIE *(see Dorothy)*

KEKIONGA

LOCATION: On S line of Sec. 6, T1S, R71W, above Magnolia on the upper Magnolia road, which passes between the dumps. The workings may be clearly seen from many high points miles to the north. Boulder County.
OWNER: Mrs. Wm. Greenewald.
PRODUCTION: About 2000 units.
WORKINGS: Shaft, over 200′. Other shafts and cuts.
ORE OCCURRENCE: Horn ore, often carrying gold values.
POTENTIAL: Last work was done under an RFC loan. Combination gold and tungsten ore was developed; supposedly not mined.
LAST OPERATOR: McDonald.
MAP SOURCES: Owner. USGS.

KICKER

LOCATION: NW¼ Sec. 8, T1S, R72W, 750′ N63°E of Western Star shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Over 7000 units in 18.6% ore. Small amount of work in 1954.
WORKINGS: Inclined shaft; 5 levels, at 33, 68, 108, 153, and 203 feet. The 108 and 203 levels the most extensive. Shaft collar caved, 1955.
ORE OCCURRENCE: Vein is a branch of the Western Star.
POTENTIAL: Unknown, but said to be ore in some of the stope-fills.
LAST OPERATOR: T. J. Hennings.
MAP SOURCES: Owner. USGS PP 245, page 155.

KING

LOCATION: Sec. 28, T41N, R7W, 2 miles S. of Silverton. San Juan County.
OWNER: San Juan County.
PRODUCTION: Small amount of tungsten, along with gray copper.
WORKINGS: Adit and raise with 4 levels. The extension of the Chicago vein.
ORE OCCURRENCE: Copper and tungsten ore.
POTENTIAL: Unknown.
LAST OPERATOR: King Mining Company.
MAP SOURCES: No maps.

LADY LUCK

LOCATION: Sec. 34, T1N, R72W, between the Sugarloaf and Dream Canyon roads; above the Pennsylvania mine. Boulder County.
OWNER: C. H. Smith.
PRODUCTION: Over 1000 units.
WORKINGS: 60′ shaft; levels at 35′ and 60′; 100′ of drift on lower level. Stope 50′ in length.
ORE OCCURRENCE: Ferberite veins in granite.
POTENTIAL: New ore was found in surface cut, 1956.
LAST OPERATOR: Owner.
MAP SOURCES: No map.

LAST CHANCE NO. 1

LOCATION: Secs. 7 & 12, T1S, R72W, about 600′ S. of Hoosier shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc., eastern part; Colorado Tungsten Corp., western part.
PRODUCTION: Probably less than 1000 units.
WORKINGS: Several shallow shafts and pits.
ORE OCCURRENCE: Vein in aplite and pegmatite.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown lessees during World War I.
MAP SOURCES: No maps.

LAST CHANCE NO. 2

LOCATION: NE¼ Sec. 7, T1S, R72W, about 750′ SW of Western Star shaft; Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Over 1000 units.
WORKINGS: Inclined shaft; levels at 96′ and 170′ about 690′ of drift on each level. 1st level caved NE of shaft in 1929.
ORE OCCURRENCE: Wide crystalline lowgrade vein. Ore ran about 6% as sorted in the stopes.
POTENTIAL: Said to be 3 to 4 feet of ore in floor under 125′ stope on 170-level east.
LAST OPERATOR: Ray Flarty.
MAP SOURCES: Owner. USGS PP 245, page 154.

LILY

LOCATION: NW¼ Sec. 7, T1S, R72W, on Colo. 119, 1½ miles NE of Nederland; Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Over 3700 units, most of which were in ore averaging 25.5%.
WORKINGS: Shallow shaft and joining adit, with 4 drifts on veins.
ORE OCCURRENCE: Highgrade ferberite in fine-grained granite and coarse-grained aplite.
POTENTIAL: Screened stope-fills indicated $5.00 per ton value, at the $63.00 per unit price.
LAST OPERATOR: Cobb and Weldon.
MAP SOURCES: Owner. USGS PP245, page 116.

LINCOLN

LOCATION: SE¼ Sec. 30, T1N, R71W, in Bummer Gulch; Boulder County.
OWNER: James McGlaghan.
PRODUCTION: 1250 units.
WORKINGS: Shaft in creek bottom; 60′ tunnel; surface cuts.
ORE OCCURRENCE: Vein in granite. Tungsten was in cross vein.
POTENTIAL: Unknown. Was primarily a gold mine.
LAST OPERATOR: Owner.
MAP SOURCES: No maps.

LITTLE DORA

LOCATION: Sec. 17, T41N, R7W, on the S. edge of Silverton; San Juan County.
OWNER: Mystery Gold Mining Company.
PRODUCTION: Substantial. One shipment, from A level, was comprised of 19 tons of 35% ore.
WORKINGS: Adit, crosscutting tungsten vein and other veins.
ORE OCCURRENCE: Veins in quartz-monzonite stock. Hubnerite.
POTENTIAL: New levels to be developed.
LAST OPERATOR: Owner.
MAP SOURCES: Owner.

LITTLE JACK

LOCATION: Sec. 34, T1N, R72W, E. of Farwell Gulch, in Gordon Gulch; Boulder County.
OWNER: James Durkan.
PRODUCTION: Very small.
WORKINGS: Surface cuts.
ORE OCCURRENCE: Horn type.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No map.

LITTLE JAP

LOCATION: NE¼ Sec. 7, T1S, R72W, about 300′ N. of Tenderfoot shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Over 400 units.
WORKINGS: In a N-S vein. 60′ shaft, caved.
ORE OCCURRENCE: Crystalline ore in granite. Stope N. of shaft.
POTENTIAL: Dump was all $5.00 ore at the $63.00 per unit price. Stopefill may be worth investigating. Said to be lowgrade ore in footwall of stope; also a flat vein in FW at about 30′. A 10′ raise from the bottom near shaft showed iridescent ferberite.
LAST OPERATOR: Cobb and Weldon.
MAP SOURCES: Owner.

LITTLE LESTER

LOCATION: SE¼ Sec. 36, T1N, R72W, 500′ S80°E of Good Friday shaft. Boulder County.
OWNER: G. R. Anderson.
PRODUCTION: About 500 units.
WORKINGS: 130′ adit; 70′ shaft with 1 level about 140′ long, on the Pleasant Dream vein.
ORE OCCURRENCE: Small streak of light, horny ore.
POTENTIAL: Unknown.
LAST OPERATOR: A. B. Pace.
MAP SOURCES: No map.

LITTLE MAJOR

LOCATION: NE¼ Sec. 34, T1N, R72W, about 1000′ NE of mouth of Perkins Gulch. Boulder County.
OWNER: Vanadium Corp. of America.
PRODUCTION: Contributed to the production of the Gordon Gulch group, of 36,000 units by 1907.
WORKINGS: 2 shafts; 2 levels; open stopes, in 1960.
ORE OCCURRENCE: Mainly near junction of Little Major and Miser's Hoard veins, about 160′ SE of Little Major shaft.
POTENTIAL: Stringered zones are visible in stope walls.
LAST OPERATOR: C. L. Mason.
MAP SOURCES: Owner. USGS PP 245, page 160.

LOGAN

LOCATION: SE¼ Sec. 19, T1N, R71W, in Sunbeam Gulch; Boulder County.
OWNER: Logan Metals Company.
PRODUCTION: About 2250 units. Primarily a gold mine.
WORKINGS: 5 adit levels.
ORE OCCURRENCE: Tungsten was found on No. 3, and lower levels.
POTENTIAL: Unknown, in regard to tungsten.
LAST OPERATOR: Seth Armstead.
MAP SOURCES: Owner. USGS PP 245, pages 178, 180; plate 26.

LONE JACK

LOCATION: NW¼ Sec. 7, T1S, R72W, contiguous to Clyde claim. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Less than 100 units.
WORKINGS: 40′ shaft.
ORE OCCURRENCE: Small feeders.
POTENTIAL: Unknown.
LAST OPERATOR: Charles Meyring.
MAP SOURCES: No maps.

LONE PINE

LOCATION: Sec. 11, T1S, R73W, 200′ SW of old Conger shaft. Boulder County.
OWNER: Vanadium Corp. of America.
PRODUCTION: 277.5 units.
WORKINGS: Shaft connecting with Conger Workings.
ORE OCCURRENCE: As streaks in old stope walls.
POTENTIAL: Worked out.
LAST OPERATOR: Vincent DeBell.
MAP SOURCES: No map.

LONESOME POLECAT

LOCATION: Sec. 13, T1S, R73W, S. of ridge road to Conger mine. Boulder County.
OWNER: Richard Tatlow.
PRODUCTION: Less than 100 units.
WORKINGS: 100′ shaft; 60′ drift south.
ORE OCCURRENCE: Pocket of ore at 35′ in shaft. Pinched out.
POTENTIAL: Unknown.
LAST OPERATOR: Lou Mock.
MAP SOURCES: USGS.

LONE TREE

LOCATION: Sec. 12, T1S, R73W, on Colo. 119, N. side of Sherwood Gulch, 1/3 mile E. of hairpin turn. Boulder County.
OWNER: Vanadium Corp. of America.
PRODUCTION: 4000 tons of 10% ore by 1914. Small production since.
WORKINGS: 350′ shaft; levels at 44, 113, 215, 276, and 340 feet.
ORE OCCURRENCE: Highgrade ferberite, in large part from a glory-hole at an intersection of veins.

POTENTIAL: Unknown.
LAST OPERATOR: Wolftongue Mining Company.
MAP SOURCES: Owner. USGS PP 245, page 115.

LONGSHOT NO. 3

LOCATION: SE¼ Sec. 7, T1S, R72W, about 500′ W. of Vasco 6 shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Unknown, but was made in 1916-18.
WORKINGS: Surface cuts.
ORE OCCURRENCE: In schist; some granite and aplite.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: Owner.

LONGSHOT NO. 4

LOCATION: SE¼ Sec. 7, T1S, R72W, about 1800′ WNW of Tungsten village; Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: About 18 tons of 57% concentrate.
WORKINGS: 95′ shaft; 132′ drift, most of which is stoped.
ORE OCCURRENCE: Ore found on surface, extended to the 100′ level.
POTENTIAL: Unknown.
LAST OPERATOR: Smith, Henning, and Rugg.
MAP SOURCES: Owner. Old shaft map on plate 13 of USGS PP 245.

LONG TUNNEL

LOCATION: Sec. 34, T1N, R72W, in N. Boulder Creek, a few hundred feet above the Gordon Gulch confluence. Boulder County.
OWNER: Unknown.
PRODUCTION: Less than 10,000 units.
WORKINGS: Crosscut and drifts on veins. Perhaps 3000′ of workings.
ORE OCCURRENCE: Various grades of ore, in granite.
POTENTIAL: Unknown.
LAST OPERATOR: Dr. Long, during World War I.
MAP SOURCES: J. G. Clark (last known).

LOOKOUT

LOCATION: SW¼ Sec. 36, T1N, R72W, few hundred feet NW of junction of North and Middle Boulder Creeks. Boulder County.
OWNER: Donald Brotzman.
PRODUCTION: Probably over 3000 units.
WORKINGS: 3 crosscut adits, with drifts on the vein. 500′ trench on surface.
ORE OCCURRENCE: Most of the production said to have been from the trench.
POTENTIAL: Unknown.
LAST OPERATOR: Johnson; Orville Heizer.
MAP SOURCES: USGS PP 245, page 170.

LOOKOUT

LOCATION: NE¼ Sec. 22, NW¼ Sec. 23, T8N, R72W, about 1½ miles NW of the Challenger mine. Larimer County.

OWNER: T. H. Sackett, et al.
PRODUCTION: Over 100 tons of 2% ore, in 1952-53.
WORKINGS: 200′ surface cut, 20′ wide and 10′ deep.
ORE OCCURRENCE: Scheelite in tactite.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No map.

LOWER RAMBLER *(see Rambler)*

LUCKIE *(see Venture No. 2)*

LUCKIE NO. 2

LOCATION: SW¼ Sec. 36, T1N, R72W, in Middle Boulder Canyon, just above North Boulder Creek confluence. Boulder County.
OWNER: County of Boulder.
PRODUCTION: Over 72,000 units.
WORKINGS: Lower crosscut portal below highway. 2 main crosscuts, the lower being 970 feet in length. Development was on Luckie 2 and Lookout veins. Workings now inaccessible.
ORE OCCURRENCE: Lookout vein unproductive in Luckie 2 claim.
POTENTIAL: Other veins to be developed.
LAST OPERATOR: Ray and Ernest Betasso.
MAP SOURCES: USGS PP 245, page 170.

MAC GROUP

LOCATION: SE¼ Sec. 31, T1N, R71W, E. of Sugarloaf. Boulder County.
OWNER: Betasso brothers.
PRODUCTION: Less than 500 units.
WORKINGS: 120′ surface cut.
ORE OCCURRENCE: ½″ to 3″ streak.
POTENTIAL: Unknown.
LAST OPERATOR: H. M. Gregory.
MAP SOURCES: No map.

MADELINE

LOCATION: NW¼ Sec. 8, T1S, R72W, about 900′ W. of Cross shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: A few hundred units, in 10% ore.
WORKINGS: 100′ shaft, with about 530 feet of drifts along the Madeline fault.
ORE OCCURRENCE: Vein contains a little horn quartz and ferberite.
POTENTIAL: Unknown.
LAST OPERATOR: Wolf Tongue Mining Co.
MAP SOURCES: Owner.

MAGNOLIA

LOCATION: Sec. 27, T42N, R7W, 10 miles N. of Silverton, on S. fork of Cement Creek. San Juan County.
OWNER: Silver Bay Mines, Inc.
PRODUCTION: Unknown.

WORKINGS: 2500 feet of drifts, 900′ from portal of Occidental crosscut adit. Occidental now caved.
ORE OCCURRENCE: Persistent, narrow hubnerite streak in Magnolia vein.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: Unknown.

MAMMOTH

LOCATION: SE¼ Sec. 19, T1S, R72W, on S. slope of Tungsten Mtn. Boulder County.
OWNER: W. L. Tanner and Son.
PRODUCTION: Over 45,000 units.
WORKINGS: Two 300′ inclined shafts; five levels.
ORE OCCURRENCE: In Mammoth vein, striking N20°E. Also in Fitzsimmons 6, on 3rd and 4th levels.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Owner. USGS PP 245, page 95.

MANCHESTER AND NUGGET

LOCATION: Sec. 32, T1S, R72W, E. of Rollinsville, N. of S. Boulder Creek; Gilpin County.
OWNER: Stroehle estate.
PRODUCTION: Manchester, about 5000 units. Nugget, substantial, but total unknown.
WORKINGS: 325′ shaft, very crooked, with 4 levels, 2 of which open into the valley as adits. Drifts on east-west vein.
ORE OCCURRENCE: Crystalline ore. Vein in granite and schist.
POTENTIAL: Hard-sortable ore appears in dump, indicating possible stope-fill ore. Shaft requires sinking. Ore said to be showing in one drift.
LAST OPERATOR: John Phillips.
MAP SOURCES: Owner.

MANYON

LOCATION: Sec. 4, T1N, R72W, in Spring Gulch, N. of Lefthand Canyon. Boulder County.
OWNER: Manyon and Spence.
PRODUCTION: About 10 units.
WORKINGS: Adit and drift on vein. Old shaft at portal.
ORE OCCURRENCE: Very light, horny ore.
POTENTIAL: Ore is evident in the vein within the mine workings.
LAST OPERATOR: Slide Mine, Inc.
MAP SOURCES: Slide Mine, Inc. Denver Public Library.

MARCH

LOCATION: SW¼ Sec. 19, T1S, R72W, 75′ SE of Tungsten shaft. Boulder County.
OWNER: George Cowdery.
PRODUCTION: Included in production from Sunday and Tungsten mines.

WORKINGS: 2 shallow shafts. Most of workings were from adjoining mines.
ORE OCCURRENCE: Vein in biotite schist.
POTENTIAL: Unknown.
LAST OPERATOR: George Cowdery.
MAP SOURCES: Included in records of the Tungsten mine.

MARCH WIND — RED BIRD

LOCATION: NW¼ & SE¼ Sec. 36, T1N, R72W, adjacent to Good Friday. Boulder County.
OWNER: Shiprock Industries, Inc.
PRODUCTION: Small production from dumps in 1954-55.
WORKINGS: Surface pits. Good Friday tunnel enters end of March Wind. Red Bird is extension of April Fool.
ORE OCCURRENCE: Unknown. Gold vein.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: No maps.

MARY NELSON

LOCATION: Sec. 19, T1S, R72W, 1200′ S76°E of Tungsten shaft. Boulder County.
OWNER: W. Tanner.
PRODUCTION: Small.
WORKINGS: 100′ shaft with two levels.
ORE OCCURRENCE: Small ore shoots.
POTENTIAL: Unknown.
LAST OPERATOR: Tanner and Clark, about 1916.
MAP SOURCES: No map.

MASON RANCH

LOCATION: Sec. 9, T6N, R70W, about 2 miles N. of Masonville; Larimer County.
OWNER: J. W. Livingstone.
PRODUCTION: Small tungsten production.
WORKINGS: 122′ inclined shaft, caved. 960′ adit, 150′ below the shaft collar. 200′ of drifting reported.
ORE OCCURRENCE: Originally a gold prospect. Flakes of scheelite in a 6″ to 48″ vein.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: No maps.

McKENZIE TUNNEL

LOCATION: SE¼ Sec. 13, T1S, R73W, SE edge of Nederland. Boulder County.
OWNER: Don McKenzie.
PRODUCTION: Probably less than 1000 units.
WORKINGS: 500′ tunnel; 400 feet of drifts, 1940.
ORE OCCURRENCE: Seams of ferberite in vein, with horn quartz.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Owner. USGS PP 245, page 127.

MINNESOTA

LOCATION: Sec. 20, T42N, R7W, between Dawn of Day-Ohio, and Galtie Boy Mines. San Juan County.
OWNER: F. L. Ross and E. M. Bacon.
PRODUCTION: Early production substantial. Small production from dumps in 1954.
WORKINGS: Short adit, caved, with stope to surface.
ORE OCCURRENCE: Vein contains base metals and hubnerite.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Owner.

MINNESOTA

LOCATION: SE¼ Sec. 24, T1S, R73W, 1400′ N50°W of Tungsten shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Small production in 1917-18 from shallow ore.
WORKINGS: 100′ shaft, caved, with 2 levels.
ORE OCCURRENCE: Vein in schist. Splits off Rambler sideline.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown, but was in 1930's.
MAP SOURCES: No maps.

MINNIE

LOCATION: NW¼ Sec. 32, T1N, R71W, S. of Ohio mine; Boulder County.
OWNER: L. A. Cole.
PRODUCTION: Small production in 1955.
WORKINGS: Short adits and surface pits.
ORE OCCURRENCE: Very hard, horny ore.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No map.

MINNIE FOY

LOCATION: SW¼ Sec. 11, T1S, R73W, 675′ S80°W of Illinois shaft. Boulder County.
OWNER: D. H. Petzke.
PRODUCTION: Probably less than 100 units.
WORKINGS: 125′ shaft; 2 levels.
ORE OCCURRENCE: On Illinois vein system.
POTENTIAL: Unknown.
LAST OPERATOR: Gresser; 1942.
MAP SOURCES: No map.

MISER'S HOARD

LOCATION: NE¼ Sec. 34, T1N, R72W, about 1000′ NE of mouth of Perkins Gulch; Boulder County.
OWNER: Vanadium Corporation of America.
PRODUCTION: Included in production from Gordon Gulch group; 36,000 units.
WORKINGS: Connected adit and shaft. About 1000 feet of workings, connecting with Ophir, Pride, and Little Major mines.

ORE OCCURRENCE: Mostly from intersection of Miser's Hoard and Little Major veins.
POTENTIAL: Early production may indicate presence of stope-fill ore.
LAST OPERATOR: C. L. Mason.
MAP SOURCES: Owner. USGS PP 245, page 160.

MISHAP

LOCATION: Sec. 29, T1N, R71W, above Marion mill in Bummer Gulch. Boulder County.
OWNER: Hal Miller.
PRODUCTION: Probably less than 100 units.
WORKINGS: 325′ adit and drifts.
ORE OCCURRENCE: Crystalline and steel tungsten. One shipment ran 38.93%.
POTENTIAL: Ore showed in open cut. Intersection to south not yet reached.
LAST OPERATOR: Unknown.
MAP SOURCES: Owner.

MISSING LINK

LOCATION: SE¼ Sec. 24, T1S, R73W, 100′ SW of Lower Rambler shaft. Boulder County.
OWNER: George Cowdery.
PRODUCTION: 100 to 150 tons of 5% ore, chiefly in 1915-16.
WORKINGS: 110′ shaft.
ORE OCCURRENCE: Horn quartz cemented with ferberite, in vein up to 7′ in width, striking N20°E.
POTENTIAL: Unknown.
LAST OPERATOR: Joseph M. Smith; crosscut from Lower Rambler.
MAP SOURCES: J. M. Smith.

MISSING LINK

LOCATION: NE¼ Sec. 7, NW¼ Sec. 8, T1S, R72W, crossing E. end of Tenderfoot claim; Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Over 100 units.
WORKINGS: Probably connect with Tenderfoot workings.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Owner.

MOLYBDENITE EXTENSION

LOCATION: NW¼ Sec. 14, T51N, R4E, about 1400′ SW of the Ida Mae shaft; Gunnison County.
OWNER: U. S. Tungsten Corp.
PRODUCTION: 10 tons of 20% concentrate from 100 tons of ore reported.
WORKINGS: 20′ shaft; surface trench; shallow pits. 200′ tunnel.
ORE OCCURRENCE: 4″ to 12″ streak of hubnerite ore in a 2′ to 4′ vein.

POTENTIAL: Good ore showing in surface dozer cuts.
LAST OPERATOR: Owner.
MAP SOURCES: No map.

MONTANA

LOCATION: Sec. 28, T43N, R8W, at the head of Marshall Creek. San Miguel County.
OWNER: Idarado Mining Company.
PRODUCTION: Small production saved from base-metal mining during World War II.
WORKINGS: Extensive workings; adits and drifts.
ORE OCCURRENCE: Core of hubnerite in sulphide vein.
POTENTIAL: Mined out.
LAST OPERATOR: Owner.
MAP SOURCES: Owner.

MUD LAKE

LOCATION: NE¼ Sec. 12, T1S, R73W, about 1 mile N. of Nederland. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: About 36 tons of 1% ore.
WORKINGS: 25′ shaft in lake bottom. Makes a great deal of water.
ORE OCCURRENCE: Crystalline ferberite vein in granite and schist.
POTENTIAL: Vein reported as 6″ wide in shaft bottom.
LAST OPERATOR: Scruggs and Wilson.
MAP: No maps.

NABOB

LOCATION: NE¼ Sec. 12, T1S, R73W, 275′ E. of Lone Tree shaft. Boulder County.
OWNER: Vanadium Corp. of America.
PRODUCTION: 150 tons of 7%-8% ore in 1914. Production since 1914 probably credited to Conger mine.
WORKINGS: 75′ shaft; 133′ drift.
ORE OCCURRENCE: 6 to 18 inches of brecciated granite and horn quartz cemented with ferberite.
POTENTIAL: Unknown.
LAST OPERATOR: John White.
MAP SOURCES: Owner.

NANCY HENDERSON

LOCATION: NE Cor. Sec. 7, T1S, R72W, 1425′ W. of Cold Spring shaft. Boulder County.
OWNER: Ernest Bonelli.
PRODUCTION: May be about 5000 units.
WORKINGS: 108′ shaft; levels at 43, 78, and 98 feet. Other caved shafts.
ORE OCCURRENCE: Most of the ore came from the 43′ level, in a stope 170′ long, going to the surface in several places.
POTENTIAL: Unknown.
LAST OPERATOR: Ed Henderson.
MAP SOURCES: USGS PP 245, page 153.

NATALIE

LOCATION: Sec. 27, T42N, R7W, 10 miles from Silverton, on S. fork of Cement Creek. San Juan County.
OWNER: Silver Bay Mines, Inc.
PRODUCTION: Small.
WORKINGS: Reached through Occidental tunnel, about 5000′ from portal.
ORE OCCURRENCE: Vein in pyroxene andesite. Shows spots of hubnerite on surface.
POTENTIAL: Vein said to contain considerable hubnerite.
LAST OPERATOR: Unknown.
MAP SOURCES: Unknown.

NAVY

LOCATION: Sec. 3, T8S, R78W, at lower Blue Lake. Summit County.
OWNER: R. Parker and M. Sheldon.
PRODUCTION: Some 9% ore.
WORKINGS: 5 adits, up to 160′ in length. Surface cuts.
ORE OCCURRENCE: 3 to 30-inch vein containing hubnerite and scheelite. Averages 2% in a 200′ surface cut, 3″ to 30″ in width.
POTENTIAL: Unknown.
LAST OPERATOR: H. Williams and Jim Witcher, under DMEA contract.
MAP SOURCES: USGS.

NEW YORK

LOCATION: NW¼ Sec. 8, T1S, R72W, 60′ NW from Philadelphia shaft, which is 800′ N57°E from Western Star shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: About 2800 units in 11.9% ore, up to 1929. Small production in 1953, making total about 3600 units.
WORKINGS: Philadelphia vein splits off of New York (Western Star) vein. One-level shafts with levels extending 50′ NE, and 65′ SW.
ORE OCCURRENCE: Hard ore.
POTENTIAL: Almost all of dump made $4.00 per ton screenings. Stope fills assayed 0.40%.
LAST OPERATOR: Cobb and Weldon. Bodnar brothers.
MAP SOURCES: Owner. USGS PP 245, page 155.

NIAGARA

LOCATION: SE¼ Sec. 11, T1S, R73W, 800′ S60°E of the Illinois shaft. Boulder County.
OWNER: Patterson estate.
PRODUCTION: Probably less than 1000 units.
WORKINGS: 125′ shaft; levels at 75′ and 125′.
ORE OCCURRENCE: Unrecorded.
POTENTIAL: Unknown.
LAST OPERATOR: Wolf Tongue Mining Co. 1943.
MAP SOURCES: Possibly Cold Spring Tungsten, Inc.

1905

LOCATION: SE¼ Sec. 7, T1S, R72W, 825′ S25°W of Vasco No. 1 shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: 250 units, in 12.9% ore; small production in 1953-54. Total over 400 units.
WORKINGS: Caved shaft probably not over 150 feet in depth.
ORE OCCURRENCE: Vein in aplite and granite on HW side of Hurricane reef.
POTENTIAL: Unknown.
LAST OPERATOR: Jack Clark.
MAP SOURCES: Unknown.

NO NAME

LOCATION: Sec. 5, T1S, R72W.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Less than 100 units.
WORKINGS: One of several named prospects on an agricultural patent.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: No maps.

NUGGET *(see Manchester)*

OCCIDENT

LOCATION: NE¼ Sec. 15, T51N, R4E, Gunnison County.
OWNER: U. S. Tungsten Corp.
PRODUCTION: None.
WORKINGS: 300′ crosscut.
ORE OCCURRENCE: Hubnerite in lead-silver vein.
POTENTIAL: 12″ of 4% ore reported in workings.
LAST OPERATOR: Tatman and Wylie, 1880.
MAP SOURCES: USGS.

OHIO

LOCATION: NE¼ Sec. 32, T1N, R71W, about 3000′ S76°E of Dorothy shaft; Boulder County. Probably the easternmost productive tungsten mine of the district.
OWNER: Vanadium Corp. of America.
PRODUCTION: Almost 10,000 units.
WORKINGS: Glory hole; extensive underground stopes; lower tunnel with shaft connecting with glory hole. Many surface cuts and shafts.
ORE OCCURRENCE: Ore in pegmatites and aplites. Scheelite was important constituent of Ohio ore, along with ferberite. Majority of material removed from upper workings was ore.
POTENTIAL: Small showings still evident at various places in the mine.
LAST OPERATOR: Cobb and Weldon.
MAP SOURCES: Owner. H. S. Cobb, USGS PP 245, page 194.

OHIO *(see Dawn of Day)*

OLIVER

LOCATION: Sec. 20, T19S, R73W, about 13 miles by road from Texas Creek, and on Copper Creek. Fremont County.
OWNER: Mr. Oliver, Canyon City.
PRODUCTION: 4 tons of 2% ore in 1942.
WORKINGS: Several shallow pits.
ORE OCCURRENCE: Scheelite lenses in hornblende.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No map.

ONLY CHANCE

LOCATION: NE¼ Sec. 7, T1S, R72W, adjoining Last Chance No. 2. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Over 150 units.
WORKINGS: Shaft possibly 200′ in depth.
ORE OCCURRENCE: Ferberite in granite.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown, but during World War I.
MAP SOURCES: No maps.

OPHIR

LOCATION: NE¼ Sec. 34, T1N, R72W, adjacent to Miser's Hoard. Boulder County.
OWNER: Vanadium Corp. of America.
PRODUCTION: Less than 10,000 units.
WORKINGS: Shaft; levels at 100 and 210 feet, connecting with adjoining mines of Gordon Gulch group. 40′ open cut NE at shaft collar.
ORE OCCURRENCE: On 3 main intersections; bottomed at about 100′.
POTENTIAL: Dump screenings indicate value of $4.00 per ton at the $63.00 price. Stringered zones show on stope walls.
LAST OPERATOR: E. Webb.
MAP SOURCES: Owner. USGS PP 245, page 160.

ORANGE BLOSSOM

LOCATION: NW¼ Sec 8, T1S. R72W, 475′ S68°E of Cold Spring shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: About 3800 units.
WORKINGS: 195′ inclined shaft; 5 levels. Cold Spring 7th connects via raise with Orange Blossom shaft.
ORE OCCURRENCE: Horn ore in hard gneissic biotite granite.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Owner. USGS PP 245, plate 18.

OREGON

LOCATION: SE¼ Sec. 11, T1S. R73W, 800′ S28°W of new Conger shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.

PRODUCTION: Estimated 10,000 units until 1914, at $5.00 per unit.
WORKINGS: Shaft connects with Conger second level.
ORE OCCURRENCE: Part of the Conger vein. Hard ore.
POTENTIAL: Unknown.
LAST OPERATOR: Allebaugh and Sisson, about 1935.
MAP SOURCES: Owner. USGS PP 245, plate 9.

OREGON

LOCATION: Sec. 33, T1N, R72W, about ½-mile NW of Peewink Mtn. Boulder County.
OWNER: Vanadium Corp. of America.
PRODUCTION: About 40,000 units.
WORKINGS: Inclined shaft; levels at 84, 139, 260, 337, 433, and 463 feet. Adit to first level.
ORE OCCURRENCE: Hard ore in Oregon, Quaker City, and Hildegarde veins.
POTENTIAL: Unknown.
LAST OPERATOR: George Jump.
MAP SOURCES: Owner. USGS PP 245, plate 21.

PANSY BLOSSOM

LOCATION: NW¼ Sec. 8, T1S, R72W, 500′ S of Cold Spring shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: About 1400 units in 5.44% ore.
WORKINGS: 100′ shaft; drifts 400′ SW and 100′ NE.
ORE OCCURRENCE: Horn ore, in Orange Blossom vein.
POTENTIAL: Unknown.
LAST OPERATOR: Wolf Tongue Mining Co.
MAP SOURCES: Owner.

PARKER

LOCATION: SE¼ Sec. 36, T1N, R72W, E of Good Friday-April Fool. Boulder County.
OWNER: Joseph Rafter.
PRODUCTION: About 200 units.
WORKINGS: 140′ adit; 15′ winze. Caved.
ORE OCCURRENCE: Stope 35′ long.
POTENTIAL: Ore shows in trench ahead of tunnel.
LAST OPERATOR: Al Blanchard.
MAP SOURCES: No underground map.

PAYMASTER — WHEELMAN TUNNEL

LOCATION: SE¼ Sec. 31, T1N, R71W, on Colo. 119, W. of Red Signe mine. Boulder County.
OWNER: Paymaster Mine Trust.
PRODUCTION: About 250 units. Small production in 1955.
WORKINGS: Wheelman adit is close to highway; about 500′ in length, striking north. Paymaster is about 75′ higher, 260′ in length, on an easterly vein.
ORE OCCURRENCE: In Paymaster adit, as a very light, horny ore.
POTENTIAL: Unknown.

LAST OPERATOR: E. A. Baumgartner.
MAP SOURCES: USGS PP 245, page 192.

PEEWINK

LOCATION: S½ Sec. 34, T1N, R72W, S side of Gordon Gulch, and S of the Oregon mine, on Peewink mountain. Boulder County.
OWNER: Partly located by Al Rogers and Eastman, as the Lady Luck Extension. Otherwise unknown.
PRODUCTION: Probably as much as 5000 units.
WORKINGS: Upper: Glory hole and open cuts on stockwork. Lower: 500′ adit on two veins.
ORE OCCURRENCE: Adit vein in granite with aplite and pegmatite. Glory hole produced from veinlets in fractures.
POTENTIAL: Unknown.
LAST OPERATOR: Gold, Silver, and Tungsten, Inc.; 1937.
MAP SOURCES: USGS PP 245, page 163.

PENNSYLVANIA

LOCATION: NE¼ Sec. 34, T1N, R72W, between the Sugarloaf and Dream Canyon roads, and on Primos hill. Boulder County.
OWNER: John Jordan, et al.
PRODUCTION: May be about 10,000 units.
WORKINGS: 100′ inclined shaft; levels at 32, 64, and 100 feet. Adit connects with 2nd level. Workings are mainly east of shaft.
ORE OCCURRENCE: In 2 ore-shoots; one near shaft, the other 50′-60′ farther east. 6″ of highgrade in ore-shoots 3′ wide. Contained scheelite as well as ferberite.
POTENTIAL: Unknown.
LAST OPERATOR: Earl Craig and Sons.
MAP SOURCES: Owner. USGS PP 245, page 164.

PENNSYLVANIA

LOCATION: NW¼ Sec. 31, T1N, R71W, SE of Sugarloaf village. Boulder County.
OWNER: Joseph Rafter.
PRODUCTION: About 50 units.
WORKINGS: 100′ shaft; 275′ of drift on 80′ level.
ORE OCCURRENCE: Ferberite as filling in minor fractures; as cement in breccia.
POTENTIAL: Operating at time of 1956 price failure.
LAST OPERATOR: Prime. Betasso, and Hetzer.
MAP SOURCES: USGS.

PHILADELPHIA *(see New York)*

PHILADELPHIA *(Dry Lake)*

LOCATION: NE¼ Sec. 8, T1S, R72W, about 1000′ E of Bonanza shaft. Boulder County.
OWNER: W. D. Townsend.
PRODUCTION: About 3000 units.
WORKINGS: 210′ shaft; levels at 50, 135, and 200 feet.
ORE OCCURRENCE: Ore made in cross veins between two east-west veins.

POTENTIAL: Unknown.
LAST OPERATOR: W. G. Kent until 1942. Doc Hill later.
MAP SOURCES: USGS PP 245, page 156.

PHILLIP

LOCATION: NW¼ Sec. 7, T1S, R72W, adjoining Hoosier mine on west.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Less than 3000 units.
WORKINGS: Connect with the Hoosier mine.
ORE OCCURRENCE: Highgrade crystalline ferberite.
POTENTIAL: Unknown.
LAST OPERATOR: Johnson Bros. and Prime.
MAP SOURCES: Johnson Bros. Cold Spring Tungsten, Inc. USGS PP 245, page 122.

PHILLIP EXTENSION

LOCATION: SE¼ Sec. 12, T1S, R73W, 1 mile NE of Nederland; W. of Hoosier. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: About 12,000 units since 1938.
WORKINGS: 200′ shaft; levels at 90, 150, and 200 feet.
ORE OCCURRENCE: Veins in aplite.
POTENTIAL: Main vein worked out to 200′. Prospects exist on other veins.
LAST OPERATOR: Johnson Bros, and Prime.
MAP SOURCES: USGS PP 245, page 120.

PINE SHADE

LOCATION: NE¼ Sec. 15, T1S, R73W, on Nederland-Cardinal road. Boulder County.
OWNER: Nannie E. Duval.
PRODUCTION: Less than 100 units.
WORKINGS: 150′ adit connects with Alton tunnel.
ORE OCCURRENCE: Spots of ore; surface showing.
POTENTIAL: Unknown.
LAST OPERATOR: Smith and Rugg.
MAP SOURCES: No map.

PIONEER *(see Brace Tract)*

PLEASANT DREAM

LOCATION: SW¼ Sec. 36, T1N, R72W, adjacent to April Fool-Good Friday. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: Less than 1000 units.
WORKINGS: Open into April Fool workings in lower levels.
ORE OCCURRENCE: Near junction with April Fool vein.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: USGS PP 245, page 176.

POOPOUT

LOCATION: SE¼ Sec. 34, T1N, R72W, about ⅛ mile N of Gordon Gulch-North Boulder junction. Boulder County.
OWNER: J. L. Starnes.
PRODUCTION: Unrecorded, but very small.
WORKINGS: 108′ shaft; 200′ drift on bottom level.
ORE OCCURRENCE: Unknown.
POTENTIAL: DMEA certificate of discovery was issued, but property was abandoned.
LAST OPERATOR: Owner.
MAP SOURCES: Owner. USGS.

PRINCESS EULALIA

LOCATION: SW¼ Sec. 29, T1N, R71W, 410′ N48°E of Katie shaft. Boulder County.
OWNER: Homer Pennock.
PRODUCTION: Less than 10,000 units.
WORKINGS: 300′ adit on Eulalia vein. 140′ shaft on Katie vein; levels at 80 and 130′.
ORE OCCURRENCE: Two veins in granite, cut by dikes of aplite and pegmatite.
POTENTIAL: Winze was being sunk on ore, when work was drowned out.
LAST OPERATOR: Sid West.
MAP SOURCES: George Teal. USGS PP 245, plate 24.

PROSPECT TUNNEL

LOCATION: NW¼ Sec. 7, T1S, R72W, S side of Sherwood Gulch. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Over 3000 units.
WORKINGS: 2170′ tunnel; 1000′ of drifts.
ORE OCCURRENCE: Vein in pegmatite. above tunnel level.
POTENTIAL: Original goal of Nancy Henderson, Forest Home, etc., not yet reached.
LAST OPERATOR: Reynolds Tungsten Corp.
MAP SOURCES: Owner.

PROTECTION *(placer)*

LOCATION: SE¼ Sec. 34, T1N, R72W, near Gordon Gulch-North Boulder junction. Boulder County.
OWNER: Gold Uranium Mining Company.
PRODUCTION: Less than 1000 units.
Workings: None.
ORE OCCURRENCE: Possibly as float.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: No map.

PUEBLO BELLE

LOCATION: SE¼ Sec. 31, T1N, R71W, near mouth of Black Tiger Gulch. Boulder County.
OWNER: Shattuck Chemical Company.
PRODUCTION: $49,000 from open cuts, 1915-17. At least 5000 units, mostly 1939-44.
WORKINGS: 360′ inclined shaft; levels at 100, 200, 280, and 360 feet. 400′ surface cut.
ORE OCCURRENCE: Horn-type ferberite.
POTENTIAL: Unknown. Small production was made in 1953-54.
LAST OPERATOR: Owner.
MAP SOURCES: Owner. USGS PP 245, page 190.

QUAKER CITY

LOCATION: NW¼ Sec. 34, T1N, R72W, N side of Gordon Gulch road, above Perkins Gulch. Boulder County.
OWNER: Vanadium Corp. of America.
PRODUCTION: About 15,000 units.
WORKINGS: Shaft; levels at 139 and 260 feet.
ORE OCCURRENCE: In vein zone averaging about 20 feet in width.
POTENTIAL: Said to be volume of minus 1% ore.
LAST OPERATOR: C. H. Smith and W. G. Cowdery.
MAP SOURCES: Owner.

QUAY

LOCATION: SE¼ Sec. 11, T1S, R73W, about 1 mile NW of Nederland. West of Conger and Beddig mines. The westernmost productive mine of the district. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: About 30,000 units.
WORKINGS: 2 shafts, joined by 6 levels. Most extensive work was on the 265′, or third level.
ORE OCCURRENCE: From 2 parallel veins. Scheelite with ferberite.
POTENTIAL: $2.00 per ton screenings, at the $63 per unit price, left in dump.
LAST OPERATOR: W. M. MacKenzie.
MAP SOURCES: USGS PP 245, page 103.

QUEEN *(see Golden Queen)*

RAINY DAY

LOCATION: Sec. 8, T1S R72W, 400′-500′ W of Madeline. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Less than 100 units.
WORKINGS: At least 100′ of shaft.
ORE OCCURRENCE: No production.
POTENTIAL: Unknown.
LAST OPERATOR: Wolf Tongue Mining Co.
MAP SOURCES: Owner.

RAKE OFF

LOCATION: NE Cor. Sec. 12, T1S, R73W, about 1½ miles NE of Nederland, on Colo. 119. Boulder, County.
OWNER: Vanadium Corp. of America.
PRODUCTION: More than 10,000 units.
WORKINGS: 284′ shaft; levels at 133, 250, and 284 feet.
ORE OCCURRENCE: Large ore-body was mined above first level.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Owner. USGS PP 245, page 116.

RAMBLER — LOWER RAMBLER

LOCATION: SW¼ Sec. 24, T1S, R73W, 1500′ to 1800′ westerly from Tungsten shaft. Boulder County.
OWNER: George Cowdery.
PRODUCTION: Close to 20,000 units.
WORKINGS: Rambler workings consist of an inclined shaft with levels at 30, 42, and 75 feet. Vein strikes N57°E; dips 65° NW to a depth of 50′, where it flattens to 45°. Lower Rambler main shaft is 200′ deep. New level at 187′ has 537′ of drifting and crosscutting done under a DMEA contract.
ORE OCCURRENCE: Rambler ore was good to 50′ depth. Lower Rambler has small feeder veins that make ore locally.
POTENTIAL: Unknown.
LAST OPERATOR: Joseph M. Smith.
MAP SOURCES: USGS PP 245, pages 96, 98.

RANGE VIEW

LOCATION: Sec. 34, T1N, R72W, on south side of Gordon Gulch, across from Oregon and Quaker City mines. Boulder County.
OWNER: Glen Coughlin.
PRODUCTION: Reported $92,000 worth of ore, 1915-18 and 1942-43.
WORKINGS: 130′ crosscut; drifts on two veins.
ORE OCCURRENCE: Both north and south veins, in granite, have been productive.
POTENTIAL: DMEA contract extended workings in 1952-53.
LAST OPERATOR: Owner.
MAP SOURCES: USGS.

RED BIRD *(see March Wind)*

RED PINE

LOCATION: NW¼ Sec. 7, T1S, R72W, in gulch above Clyde tunnel. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Perhaps 140 units.
WORKINGS: Shallow shaft; 40′ drift.
ORE OCCURRENCE: In aplite.
POTENTIAL: Unknown.
LAST OPERATOR: Ray Flarty.
MAP SOURCES: None Known.

RED SIGNE

LOCATION: Sec. 31, T1N, R71W; one of the first mines to be observed along the Boulder Canyon highway. Boulder County.
OWNER: A. T. Barr.
PRODUCTION: About 6000 units.
WORKINGS: 3 adits; 3 shafts; 3 winzes.
ORE OCCURRENCE: A 2-product mine. Crystallized and horn tungsten was mined in the western, lower section of the workings; gold, both free and in tellurides, in the eastern, upper section.
POTENTIAL: 40′ x 15″ of 3% to 4% shows in the bottom, under the creek. Workings are very wet from creek seepage.
LAST OPERATOR: Sid West. RFC loan in 1943.
MAP SOURCES: George Teal. USGS PP 245, page 193.

REEVES

LOCATION: SE¼ Sec. 8, T1S, R72W, below the village of Tungsten. Boulder County.
OWNER: Sugro.
PRODUCTION: Less than 1000 units.
WORKINGS: 90′ shaft; 70′ drift east, 20′ west.
ORE OCCURRENCE: Stoped to surface east.
POTENTIAL: Ore said to show in floor.
LAST OPERATOR: T. and M. Williams.
MAP SOURCES: No maps.

RICHARD

LOCATION: Sec. 12, T1S, R73W, adjoining Crow 4 on NE. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: Estimated 500 units.
WORKINGS: 70′ shaft, stoped both sides.
ORE OCCURRENCE: Flat vein in footwall of Crow 4. Crystalline ferberite.
POTENTIAL: Dump screenings were yielding $5.00 per ton at the $63.00 per unit price.
LAST OPERATOR: Cobb and Weldon.
MAP SOURCES: No maps.

ROCKY MOUNTAIN

LOCATION: NE¼ Sec. 4, T1S, R72W, about 4500′, SW of Peewink Mtn. Boulder County.
OWNER: E. J. Radke.
PRODUCTION: About 3500 units.
WORKINGS: Stopes along veins intersected by 2 crosscut adits. Caved shaft.
ORE OCCURRENCE: Veins in granite.
POTENTIAL: Unknown.
LAST OPERATOR: Fansteel Corp., 1938.
MAP SOURCES: Owner, or Fansteel Corp. USGS PP 245, page 162.

ROBINS

LOCATION: Sec. 6, T1N, R72W, E of Ward. Boulder, Colorado.
OWNER: B. F. Points.
PRODUCTION: None recorded.
WORKINGS: 100′ shaft.
ORE OCCURRENCE: Crystalline hubnerite in quartz at the 30′ level, beside sulphide gold ore shoots.
POTENTIAL: Ore shows in end of caved shaft.
LAST OPERATOR: Unknown.
MAP SOURCES: No maps.

RODERICK

LOCATION: SE¼ Sec. 24, T1S, R73W, 175′ N of the Brace glory-hole. Boulder County.
OWNER: John Buchanan.
PRODUCTION: About 500 units of 1½-2% ore in 1942-43.
WORKINGS: 50′ shaft; 100′ of drifts.
ORE OCCURRENCE: Highgrade ferberite in granite and pegmatite.
POTENTIAL: Unknown.
LAST OPERATOR: Roderick and Putnam.
MAP SOURCES: No maps.

ROGERS NO. 1

LOCATION: NW¼ Sec. 3, T1S, R72W, about 1500′ SSW of Switzerland Park. Boulder County.
OWNER: Platt Rogers Estate.
PRODUCTION: About 37,000 units, in ore of over 10% grade.
WORKINGS: 2 adits on Rogers 1 vein. Upper is 330′ long, 135′ above the lower, which is 600′ long.
ORE OCCURRENCE: All production came from above the upper level.
POTENTIAL: Unknown.
LAST OPERATOR: Slide Mines, Inc.
MAP SOURCES: USGS PP 245, plate 22. Slide Mine, Inc., maps to be placed in Denver Public Library Technical Division.

ROGERS NO. 2

LOCATION: SW¼ Sec. 4, T1S, R72W, 3750′ N of Castle Rock. Boulder County.
OWNER: Platt Rogers Estate.
PRODUCTION: At least 5000 units.
WORKINGS: Inclined shaft; levels at 75 and 118 feet. 110′ of workings on the 75, and 200′ on the 118.
ORE OCCURRENCE: Main stope was NE of the shaft.
POTENTIAL: Unknown.
LAST OPERATOR: J. A. Smith, 1943.
MAP SOURCES: USGS PP 245, page 165.

ROGERS NO. 3

LOCATION: SW¼ Sec. 3, T1S, R72W. 1900′ S12°E of Rogers 1. Boulder County.
OWNER: Platt Rogers Estate.

PRODUCTION: 1528 units until 1926. Statements indicate total of 30,000 units, but this probably includes production from other of the Rogers mines.
WORKINGS: Numerous small tunnels, open cuts, and shafts.
ORE OCCURRENCE: From extensions of Rogers 4 and 5 veins.
POTENTIAL: Unknown.
LAST OPERATOR: Slide Mines, Inc.
MAP SOURCES: Denver Public Library.

ROGERS NO. 4

LOCATION: SW¼ Sec. 3, T1S, R72W, 2300′ S of upper Rogers 1. Boulder County.
OWNER: Platt Rogers Estate.
PRODUCTION: Over 1200 units.
WORKINGS: 2 adits, intersecting the vein. About 450′ of drift on each level.
ORE OCCURRENCE: Sorted horn type ore ran about 8%.
POTENTIAL: Unknown.
LAST OPERATOR: Slide Mines, Inc., 1942.
MAP SOURCES: Denver Public Library.

ROGERS NO. 5

LOCATION: SW¼ Sec. 3, T1S, R72W, 300′ NW of lower tunnel of Rogers No. 4. Boulder County.
OWNER: Platt Rogers Estate.
PRODUCTION: Probably few hundred units.
WORKINGS: 80′ shaft, with 225′ drift. 125′ adit, with stopes along N. side.
ORE OCCURRENCE: Lowgrade, horn-type ferberite.
POTENTIAL: Unknown.
LAST OPERATOR: Slide Mines, Inc., 1943-44.
MAP SOURCES: USGS PP 245, page 166. Denver Public Library.

ROGERS NO. 6

LOCATION: SE¼ Sec. 4, T1S, R72W, Boulder County.
OWNER: Platt Rogers Estate.
PRODUCTION: About 200 units.
WORKINGS: Unknown.
ORE OCCURRENCE: Horn-type ore.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: Unknown.

ROGERS NO. 7

LOCATION: NW¼ Sec. 3, T1S, R72W, 175′ S30°E of upper tunnel of Rogers 13. Boulder County.
OWNER: Platt Rogers Estate.
PRODUCTION: Given as 1000 units.
WORKINGS: Adit, drifts, and crosscut, comprising about 300′ of workings.
ORE OCCURRENCE: Horn-type ore.
POTENTIAL: Unknown.

LAST OPERATOR: Unknown.
MAP SOURCES: USGS PP 245, page 166.

ROGERS NO. 8

LOCATION: Sec. 3, T1S, R72W, Boulder County.
OWNER: Platt Rogers Estate.
PRODUCTION: About 37 units.
WORKINGS: 10′ tunnel.
ORE OCCURRENCE: From small pocket.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: None.

ROGERS NO. 9

LOCATION: NE¼ Sec. 3, T1S, R72W, about 3700′ S58°E of Peewink Mt. Boulder County.
OWNER: Platt Rogers Estate.
PRODUCTION: 612 units, in 8% ore.
WORKINGS: Several adits and open cuts, all caved.
ORE OCCURRENCE: Veins in granite.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Unknown.

ROGERS NO. 10

LOCATION: Sec. 3, T1S, R72W, Boulder County.
OWNER: Platt Rogers Estate.
PRODUCTION: About 55 units.
WORKINGS: 15′ shaft.
ORE OCCURRENCE: Small pocket.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Unknown.

ROGERS NO. 11

LOCATION: NW¼ Sec. 3, T1S, R72W, about 1500′ SSW of Switzerland Park. Boulder County.
OWNER: Platt Rogers Estate.
PRODUCTION: About 3000 units, in below 2% ore, in 1942.
WORKINGS: 140′ crosscut adit, 500′ of drift. Short winze level 50′ below west drift.
ORE OCCURRENCE: Black horn and ferberite in brecciated light gray horn quartz.
POTENTIAL: Unknown.
LAST OPERATOR: Slide Mine, Inc.
MAP SOURCES: USGS PP 245, plate 22. Denver Public Library.

ROGERS NO. 12

LOCATION: SW¼ Sec. 4, T1S, R72W, 400′ NE of Rogers 2 shaft. Boulder County.
OWNER: Platt Rogers Estate.
PRODUCTION: 727 units, in 20.8% ore, before 1919.
WORKINGS: Several shallow shafts and trenches.

ORE OCCURRENCE: At intersections of Rogers 2 vein with small branch veins.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Unknown.

ROGERS NO. 13

LOCATION: NE¼ Sec. 4, T1S, R72W, 3650′ S30°W of Peewink Mt. Boulder County.
OWNER: Platt Rogers Estate.
PRODUCTION: Over 1800 units, in 10.6% ore.
WORKINGS: 2 parallel adits, 200′ and 300′ long.
ORE OCCURRENCE: Mostly in extensive surface trenches.
POTENTIAL: Unknown.
LAST OPERATOR: A. H. Scruggs.
MAP SOURCES: USGS PP 245, page 167.

ROOSEVELT

LOCATION: NE¼ Sec. 36, T1N, R71W, SE of Sugarloaf village. Boulder County.
OWNER: Joseph Rafter.
PRODUCTION: At least 4200 units.
WORKINGS: 350′ adit; connects with Annie L. adit through a winze. 150′ shaft, with 3 levels. Caved adit below Roosevelt tunnel.
ORE OCCURRENCE: In vein following 3 aplite dikes through granite. Crystalline and horn ore.
POTENTIAL: Unknown.
LAST OPERATOR: Tracy and Paulzine.
MAP SOURCES: No maps.

ROSE

LOCATION: Sec. 10, T42N, R7W, at the head of Cement Creek, on Hurricane Peak, 11 miles N of Silverton. San Juan County.
OWNER: Laurette Giroux.
PRODUCTION: Small production reported.
WORKINGS: Few short workings.
ORE OCCURRENCE: Hubnerite in sulphide quartz.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No maps.

ROUND MOUNTAIN GROUP

LOCATION: Secs. 3 and 10, T12S, R72W, about 6 miles NW of Lake George, 1 mile N of Highway No. 24. Park County.
OWNER: D. W. Denny.
PRODUCTION: 14 tons of 0.63%, during World War II.
WORKINGS: Pits, trenches, and shallow shafts, up to 27 feet in depth.
ORE OCCURRENCE: Scheelite in lime-silicate beds, following the schist bedding.
POTENTIAL: Unknown.
LAST OPERATOR: Sandusky, 1951.
MAP SOURCES: No maps.

RUBY

LOCATION: Sec. 5, T41N, R6W, 9 miles ENE of Silverton, in Maggie Gulch; San Juan County.
OWNER: Angelo Dalla.
PRODUCTION: About 14 tons of 10% ore in 1942. Small production in 1953.
WORKINGS: 270′ adit.
ORE OCCURRENCE: Hubnerite in a strong vein through rhyolite.
POTENTIAL: Said to be 4 or 5 feet of disseminated hubnerite.
LAST OPERATOR: Harrison and Bird.
MAP SOURCES: No maps.

RUDY NO. 2

LOCATION: Sec. 34, T1N, R72W, in Dry Lake area. Boulder County.
OWNER: Elmer Rudine.
PRODUCTION: About 15 units.
WORKINGS: Shallow shaft and open cuts.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No maps.

ST. ELMO

LOCATION: SW¼ Sec. 7, T1S, R72W, 200′ SE of Hoosier shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Very small.
WORKINGS: 200′ shaft; 2 levels, inaccessible.
ORE OCCURRENCE: Above the 150′ level. In aplite: pinched out in schist in bottom.
POTENTIAL: Ore was not found in bottom.
LAST OPERATOR: Elmer Hetzer.
MAP SOURCES: No maps.

SILVER BELL

LOCATION: Sec. 33, T42N, R9W, W of Ophir. San Miguel County.
OWNER: Silver Bell Mines Co.
PRODUCTION: 60 tons in 1940.
WORKINGS: 6 adits; veins opened for as much as 2000 feet.
ORE OCCURRENCE: Wolframite found in Butler and Ida veins.
POTENTIAL: Mill was discontinued in 1953.
LAST OPERATOR: Owner.
MAP SOURCES: Owner.

SILVER KING

LOCATION: NE¼ Sec. 7, T1S, R72W, N. of Western Star shaft. Boulder County.
OWNER: Albert Perkins.
PRODUCTION: About 2 units.
WORKINGS: Surface cuts.
ORE OCCURRENCE: Stringers and float.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No maps.

SILVER LEDGE

LOCATION: Sec. 27, T42N, R7W, 10 miles N. of Silverton. San Juan County.
OWNER: McCausland and Ruhder.
PRODUCTION: Has produced some hubnerite ore. Primarily a gold mine.
WORKINGS: 300 feet within the portal of the Occidental tunnel. Also the Silver Ledge adit. Both caved. 2000 feet of drifting reported.
ORE OCCURRENCE: Vein contains a persistent but narrow hubnerite zone.
POTENTIAL: Unknown.
LAST OPERATOR: Barnes (?), Silverton.
MAP SOURCES: No maps.

SILVER QUEEN

LOCATION: SW¼ Sec. 9, T1S, R72W, 1 mile E. of Tungsten village, and on N. side of Highway No. 119. Boulder County.
OWNER: Victor P. Helburg.
PRODUCTION: Less than 10,000 units.
WORKINGS: Shaft; adit 160′ in length, with 295′ drift on vein.
ORE OCCURRENCE: Shaft workings (now caved) produced the tungsten ore.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: USGA PP 245, page 157.

SISSON *(see Sunset)*

SMITH

LOCATION: SW¼ Sec. 36, T1N, R72W, on S. side of Good Friday mine. Boulder County.
OWNER: Colorado Tungsten Corp.
PRODUCTION: About 10,000 units.
WORKINGS: 50′ shaft. Level stoped to surface on main vein.
ORE OCCURRENCE: "Steel" tungsten in east-west vein.
POTENTIAL: Ore streak recently discovered in hanging wall of main stope. Balmoral 3rd level has drifts on Smith vein. HW streak might be checked in these workings.
LAST OPERATOR: Clyde Jump.
MAP SOURCES: USGS PP 245, page 176. H. S. Cobb.

SPENCER TUNNEL

LOCATION: NE¼ Sec. 7, T1S, R72W, 950′ S76°W from Star shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Less than 100 units recorded.
WORKINGS: 80′ open cut; 360′ adit, with a 70′ raise to surface. A drift south from the face of the adit was driven in 1944.
ORE OCCURRENCE: In granite with aplite and pegmatite.
POTENTIAL: Unknown.
LAST OPERATOR: Wolftongue Mining Co.
MAP SOURCES: USGS PP 245, page 155. Owner.

SPIDERLEG

LOCATION: NE¼ Sec. 11, T1S, R73W, 1475′ NE of Conger shaft. Boulder County.
OWNER: Vanadium Corp. of America.
PRODUCTION: Probably over 5000 units.
WORKINGS: Shaft; about 1300′ of drifting and stoping on the 200′ level.
ORE OCURRENCE: Most of the ore was found near the surface. Otherwise productive zones were where veins crossed pegmatite.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Owner. USGS PP 245, page 127.

STEEL PLATE

LOCATION: NE¼ Sec. 7, T1S, R72W, 400′-500′ S. of Cold Spring. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Over 100 units.
WORKINGS: 45′ shaft.
ORE OCCURRENCE: Horn-type ore.
POTENTIAL: Unknown.
LAST OPERATOR: Ford and Flarty.
MAP SOURCES: No maps.

STOCKTON

LOCATION: Sec. 10, T49N, R9E, 3 miles SW of Salida, on N. side of Arkansas river. Chaffee County.
OWNER: E. G. Gobatti.
PRODUCTION: About 2 tons of ore, value $110.00, during World War I.
WORKINGS: Shaft with 3 short levels. 2 adits, 500′-600′ in length.
ORE OCCURRENCE: Pegmatitic Stockton vein contains scheelite.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Owner.

SUMMIT *(see Jack)*

SUNBEAM

LOCATION: SE¼ Sec. 19, T1N, R71W, below Logan mine. Boulder County.
OWNER: Fred J. Holmes.
PRODUCTION: About 200 units.
WORKINGS: 30′ stope above adit. Winze stope below adit on same shoot.
ORE OCCURRENCE: About 30′ x 30′ ore shoot in granite.
POTENTIAL: No further development indicated for tungsten.
LAST OPERATOR: John Romarine.
MAP SOURCES: No maps.

SUNDAY

LOCATION: SW¼ Sec. 19, T1S, R72W, 400′ SE of Tungsten shaft. Boulder County.
OWNER: George Cowdery.
PRODUCTION: Estimated 6260 units.
WORKINGS: 200′ shaft; levels at 100′, 150′, and 200′.
ORE OCCURRENCE: All ore found above 150′ level. One large, disseminated orebody mined.
POTENTIAL: Unknown.
LAST OPERATOR: Tom Walsh, 1942.
MAP SOURCES: Owner. USGS PP 245, page 93; plate 6.

SUNNYSIDE

LOCATION: Sec. 26, T1N, R72W. Boulder County.
OWNER: Bessie I. and C. V. Skinner.
PRODUCTION: Few units.
WORKINGS: Unknown.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Unknown.

SUNSET-SISSON

LOCATION: SE¼ Sec. 11, T1S, R73W, 180′ S of Anna C. shaft. Boulder County.
OWNER: Nannie L. Duval.
PRODUCTION: Less than 1000 units.
WORKINGS: 140′ shaft; crosscut to Anna C. vein. Stoped.
ORE OCCURRENCE: Ferberite-bearing vein in granite.
POTENTIAL: Unknown.
LAST OPERATOR: W. M. MacKenzie.
MAP SOURCES: No maps.

SUNSHINE

LOCATION: Sec. 20, T42N. R7W. 8 miles from Silverton, in Dry Gulch. adjacent to the Ohio. San Juan County.
OWNER: Charles Bacon.
PRODUCTION: Small.
WORKINGS: Short tunnel.
ORE OCCURRENCE: Narrow band of hubnerite in the vein.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No map.

SWEET HOME

LOCATION: Sec. 33, T8S, R78W, 5 miles NW of Alma. Park County.
OWNER: E. C. Spray.
PRODUCTION: ½-ton of 10% ore.
WORKINGS: Several adits; 200′ winze; over 5000′ of drifts.
ORE OCCURRENCE: One 12″ vein contained a 10′ ore-shoot assaying 2%.
POTENTIAL: Unknown.

LAST OPERATOR: Guy O. Lear, for owner.
MAP SOURCES: Owner.

TENDERFOOT

LOCATION: NE¼ Sec. 7, T1S, R72W, about 900′ NW of Cold Spring shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: About 3800 units. 2243 units in ore averaging 13.2%.
WORKINGS: 2 inclined shafts; one level at 105′, with about 900′ of drifts and crosscuts.
ORE OCCURRENCE: In several intersecting veins.
POTENTIAL: Unknown.
LAST OPERATOR: Rugg and Conklin.
MAP SOURCES: Owner. USGS PP 245, page 153.

TENNESSEE

LOCATION: Sec. 24, T1S, R73W, NW of Tungsten shaft. Boulder County.
OWNER: Joseph M. Smith.
PRODUCTION: 2750 units.
WORKINGS: 95′ shaft. 100′ of drift SE on 90′ level.
ORE OCCURRENCE: Stoped to surface.
POTENTIAL: Small ore in sump of shaft.
LAST OPERATOR: Rodgers and Crook, 1950.
MAP SOURCES: No maps.

TOM MOORE

LOCATION: Sec. 17, T42N, R6W, 10 miles NE of Silverton, in Burns Gulch; San Juan County.
OWNER: U. S. Manganese Co.
PRODUCTION: Some tungsten produced along with base metals.
WORKINGS: 5 adits, the lowest of which is 1500 feet in length.
ORE OCCURRENCE: Hubnerite mined only in the face of one adit. Shows in outcrop across stream.
POTENTIAL: Small showings.
LAST OPERATOR: Great Divide M. & M. Co.
MAP SOURCES: Owner.

TOWNLOT

LOCATION: NE¼ Sec. 13, T1S, R73W, at N edge of Nederland. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: About 2300 units.
WORKINGS: Shaft not over 150′ deep, with small stopes and drifts.
ORE OCCURRENCE: Ferberite in aplite, surrounded by schist.
POTENTIAL: Unknown.
LAST OPERATOR: Rudine and Williams.
MAP SOURCES: Owner.

TUNGSTEN

LOCATION: SW¼ Sec. 19, T1S, R72W, beside Colo. 119, 1½ miles SE of Nederland. Boulder County.
OWNER: George Cowdery.
PRODUCTION: Probably exceeds 70,000 units.

WORKINGS: Shaft with levels at 80, 120, 180, 220, 300, and 370 feet. 384′ of drifts and crosscuts driven in 1951-52 under a DMEA contract.
ORE OCCURRENCE: High grade ferberite in 2 veins, the Tungsten and the March. In schist with aplite and pegmatite.
POTENTIAL: Continuous producer. Many possibilities.
LAST OPERATOR: Owner.
MAP SOURCES: USGS PP 245, page 91; plate 6.

TUNGSTEN

LOCATION: Sec. 30, T42N, R7W, 6 miles from Silverton, in Minnesota Gulch. San Juan County.
OWNER: San Juan County.
PRODUCTION: Small.
WORKINGS: Open cuts.
ORE OCCURRENCE: Hubnerite showings.
POTENTIAL: Unknown.
LAST OPERATOR: Clifford and Walby.
MAP SOURCES: No maps.

TUNGSTEN MOUNTAIN NOS. 6 AND 9

LOCATION: SE¼ Sec. 19, T1S, R72W, E of Tungsten shaft. Boulder County.
OWNER: George Cowdery.
PRODUCTION: 1000 units or more from No. 9.
WORKINGS: 100′ tunnel and stopes.
ORE OCCURRENCE: Ore at intersection of large vein with small veins.
POTENTIAL: Short crosscut and 230′ raise required to join from Black King tunnel.
LAST OPERATOR: Norton, in upper workings.
MAP SOURCES: No maps.

TUNGSTEN KING

LOCATION: Sec. 5, T1S, R71W. Boulder County.
OWNER: Nellie B. Robb.
PRODUCTION: About 50 units.
WORKINGS: Unknown. Probably on agricultural patent.
ORE OCCURRENCE: Unknown.
POTENTIAL: Unknown.
LAST OPERATOR: May have been owner, 1955.
MAP SOURCES: No maps.

UTICA

LOCATION: Sec. 7, T1N, R72W, at Ward. Boulder County.
OWNER: Joseph K. Davidson.
PRODUCTION: None recorded.
WORKINGS: 900′ shaft with many levels.
ORE OCCURRENCE: Hubnerite in gold sulphide vein.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: Owner.

VACANT SPOT

LOCATION: SE¼ Sec. 11, T1S, R73W. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Less than 100 units.
WORKINGS: If any, from the Oregon workings.
ORE OCCURRENCE: Production probably from float.
POTENTIAL: Unknown.
LAST OPERATOR: Unknown.
MAP SOURCES: Owner.

VASCO NO. 1

LOCATION: 2900′ S of NE Corner Sec. 7, T1S, R72W, in SE corner of junction of Trevarton Gulch road with Ridge road. Boulder County,
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: About 30,000 units in ore averaging 14%.
WORKINGS: 220′ shaft; levels at 46, 95, 142, and 220 feet. Workings were in good condition in 1955. Under a DMEA contract in 1953-54, drifts were extended, and a footwall vein explored.
ORE OCCURRENCE: From strong main vein, and from branch vein in FW of shaft.
POTENTIAL: Unknown.
LAST OPERATOR: P. H. Bennett.
MAP SOURCES: P. H. Bennett. USGS PP 245, page 140. H. S. Cobb.

VASCO NO. 2

LOCATION: SW½ Sec. 8, T1S, R72W, inside of the turn, and below the highway, at the village of Tungsten. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Records show only 3800 units.
WORKINGS: Shaft with levels at 87 and 188 feet. Workings connect with Vascos 8 and 5.
ORE OCCURRENCE: Strong, wide veins in granite.
POTENTIAL: Unknown.
LAST OPERATOR: H. M. Gregory.
MAP SOURCES: Owner. USGS PP 245, page 135: plate 13.

VASCO NO. 3

LOCATION: SW¼ Sec. 8, T1S, R72W, 1150′ NE of Vasco 2. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Large production pre-1915. 4749 units, 1915-45. Small 1955 production.
WORKINGS: Inaccessible. Upper and lower adits, and stope to surface.
ORE OCCURRENCE: Evidently stoped between upper and lower adits.
POTENTIAL: Should be investigated for stope-fill.
LAST OPERATOR: J. G. Clark.
MAP SOURCES: Owner. USGS PP 245, plate 13.

VASCO NO. 4

LOCATION: SW¼ Sec. 8, T1S. R72W, 740′ N16°W of Vasco 2. Boulder County.
OWNER: Cold Spring Tungsten, Inc.

PRODUCTION: 3000 units from 1915 to 1945.
WORKINGS: Shaft and 2 adits. Lower adit was main entry, and connects by a 20′ winze with 5th level of Vasco 10. Shaft levels at 50, 125, 147, 195, and 220 feet.
ORE OCCURRENCE: Best ore was taken from upper workings.
POTENTIAL: Unknown.
LAST OPERATOR: Boulder Tungsten Mills, Inc.
MAP SOURCES: Owner. USGS PP 245, plates 13, 14.

VASCO NO. 5

LOCATION: SW¼ Sec. 8, T1S, R72W, near center of village of Tungsten. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Possibly as much as 25,000 units.
WORKINGS: Upper and lower adits; underground shaft. Lower adit connects with Vasco 3. 25′ level of shaft connects via raise with 1st level of Vasco 2. Workings are flooded.
ORE OCCURRENCE: Strong vein was largely quartz and ferberite cementing granite breccia.
POTENTIAL: Unknown. Possible stope-fill ore.
LAST OPERATOR: Bob Plummer.
MAP SOURCES: Owner. USGS PP 245, plate 13.

VASCO NO. 6

LOCATION: SW corner of Sec. 8, T1S, R72W, about 1000′ W of Tungsten village. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: May be as much as 60,000 units.
WORKINGS: Inclined shaft with 8 levels; 102′ (Stevens tunnel), 178′, 227′, 280′, 362′, 410′, 455′, 515′, 605′.
ORE OCCURRENCE: Upper orebody was between 2nd level and surface; Lower orebody between 8th and 3rd levels. One of the larger mines of the district.
POTENTIAL: Unknown.
LAST OPERATOR: Boulder Tungsten Mills, Inc.
MAP SOURCES: Owner. USGS PP 245, page 131; plate 13.

VASCO NO. 7

LOCATION: SW¼ Sec. 8, T1S, R72W, about 1700′ NW of Tungsten village. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Probably at least 16,000 units.
WORKINGS: 336′ shaft; levels at 30, 120, 218, 282, and 335 feet, plus a 109′ winze. Workings are flooded below the 30′ level.
ORE OCCURRENCE: In main vein, and in a footwall split.
POTENTIAL: DMEA development contract in 1953 yielded only small production.
LAST OPERATOR: P. H. Bennett.
MAP SOURCES: Owner. USGS PP 245, plate 15.

VASCO NO. 8

LOCATION: NW¼ Sec. 17, T1S, R72W, 80′ S22°W of Vasco 2. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: 1564 units recorded.
WORKINGS: Adit; winze with levels at 22, 68, and 125 feet.
ORE OCCURRENCE: One ore shoot in vein which intersects Vasco 2 vein.
POTENTIAL: Unknown.
LAST OPERATOR: J. G. Clark.
MAP SOURCES: Owner. USGS PP 245, plate 13.

VASCO NO. 10

LOCATION: SW¼ Sec. 8, T1S, R72W, about 1400′ N of Tungsten. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: About 20,000 units to 1945.
WORKINGS: Inclined shaft; levels at 30, 66, 114, 158, 206, 256 and 323 feet. The 206 and 256 levels connect with Vasco 4.
ORE OCCURRENCE: Upper levels made best production, averaging 3.74% ore.
POTENTIAL: DMEA contract in 1955 resulted in only small production.
LAST OPERATOR: Boulder Tungsten Mills, Inc.
MAP SOURCES: Owner. USGS PP 245, plate 14.

VENTURE NO. 2 — LUCKIE

LOCATION: Sec. 5, T48N, R8E, near Poncha Pass. Chaffee County.
OWNER: John Butala.
PRODUCTION: Very small production in 1955.
WORKINGS: 30′ shaft.
ORE OCCURRENCE: 1″ streak with scheelite.
POTENTIAL: Unknown.
LAST OPERATOR: Mining Ventures, Inc.
MAP SOURCES: No maps.

VICTOR

LOCATION: NE¼ Sec. 8, T1S, R72W, E of Bonanza 2. Boulder County.
OWNER: Milton V. Christman.
PRODUCTION: Over 300 units.
WORKINGS: 125′ shaft, two levels; winze and sub-level.
ORE OCCURRENCE: Small pockets of coarsely crystalline soft ore.
POTENTIAL: Unknown.
LAST OPERATOR: Oscar Fay and associates.
MAP SOURCES: Unknown.

VICTORY

LOCATION: Sec. 3. T12S, R72W, 7 miles NW of Lake George; 2 miles by road N of US 24, and N of the Round Mountain group of claims. Park County.
OWNER: Rocky Mountain Tungsten Corp.

PRODUCTION: Small scheelite production in 1955.
WORKINGS: 40′ shaft; shallow pits.
ORE OCCURRENCE: Scheelite in tactites following schistosity.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No maps.

WALKER RANCH

LOCATION: Sec. 28, T1S, R71W, about 4 miles from Boulder, via Flagstaff mountain highway. Boulder County.
OWNER: Dr. O. I. and Bertha N. Taylor.
PRODUCTION: About 150 units.
WORKINGS: Shaft about 80′ in depth, with short drifts.
ORE OCCURRENCE: Horn type ore.
POTENTIAL: Said to be 5″ of 20% ore in shaft bottom. Property is on margin of district.
LAST OPERATOR: S. Clyde, 1942.
MAP SOURCES: No maps.

WESTERN STAR

LOCATION: NE¼ Sec. 7, T1S, R72W, about 1500′ NW of Cold Spring shaft. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Possibly over 12,000 units.
WORKINGS: Vertical shaft; levels at 75, 122, 200, and 300 feet. Old inclined shaft to first level.
ORE OCCURRENCE: The Star was opened as a silver prospect. The tungsten vein had been exposed in the shaft before the mineral was identified. Ore in the Star vein ended at its intersection with the Madeline fault, just below the 122′ level.
POTENTIAL: Re-openings in 1942 and 1953 resulted in small production, but no new ore shoots were discovered.
LAST OPERATOR: Owner.
MAP SOURCES: Owner. USGS PP 245, plate 17.

WHEELMAN TUNNEL *(see Paymaster)*

WILD TIGER

LOCATION: NE¼ Sec. 35, NW¼ Sec. 36, T1N, R72W, 3500′ S15°W of village of Sugarloaf. Boulder County.
OWNER: Robert Cochran.
PRODUCTION: Less than 1000 units.
WORKINGS: 2 shafts and one main adit.
ORE OCCURRENCE: 60′ shaft produced the tungsten ore. Adit was on low grade gold ore.
POTENTIAL: Unknown.
LAST OPERATOR: A. B. Pace.
MAP SOURCES: USGS PP 245, page 175.

WILLIAMS, H. & M.

LOCATION: Sec. 33, T7S, R73W, on Quandary Peak, about 13 miles by road south and west of Breckenridge. Summit County.
OWNER: Harold and Milo Williams.

PRODUCTION: Several shipments from outcrops and float.
WORKINGS: Shallow surface workings.
ORE OCCURRENCE: Hubnerite and scheelite in small veins.
POTENTIAL: Small ore showing.
LAST OPERATOR: Owners.
MAP SOURCES: No maps.

WILLIAMS, THOMAS

LOCATION: 3 claims in Sec. 4, T8S, R78W, near upper Blue Lake. Summit County.
OWNER: Thomas Williams.
PRODUCTION: Small production of 5% ore.
WORKINGS: 60′ adit; small pits.
ORE OCCURRENCE: 2 lenses, 10 to 15 feet in length, containing hubnerite, scheelite, and other minerals.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No maps.

WINDY TUNNEL *(see Elsie)*

WISCONSIN

LOCATION: Sec. 8, T1S, R73W, at Dry Lake. Boulder County.
OWNER: Edward Bonelli.
PRODUCTION: Less than 1000 units.
WORKINGS: Surface cuts.
ORE OCCURRENCE: Small ore found with bulldozer.
POTENTIAL: Unknown.
LAST OPERATOR: Owner.
MAP SOURCES: No map.

WORLD

LOCATION: NW¼ Sec. 8, T1S, R72W, between Cold Spring and Cross mines. Boulder County.
OWNER: Cold Spring Tungsten, Inc.
PRODUCTION: Reported $50,000 from above the 40′ level of World shaft.
WORKINGS: 2 shafts, the World and the Brandt, connected by crosscut from World 80′ to Brandt 107′.
ORE OCCURRENCE: Several veins in altered granite produced ore locally.
POTENTIAL: DMEA contract in 1953 resulted in small production.
LAST OPERATOR: P. H. Bennett.
MAP SOURCES: Owner. USGS.

YUKON TUNNEL

LOCATION: Sec. 32, T42N, R7W, 4 miles N of Silverton, on E side of Cement Creek. San Juan County.
OWNER: Ariadne Corp.
PRODUCTION: Small production of concentrate in Gold Hub mill in 1936.
WORKINGS: Yukon tunnel crosscuts Uncle Sam vein; now caved.

ORE OCCURRENCE: Hubnerite and scheelite in a shoot 6″ to 18″ wide, and about 100′ long.
POTENTIAL: Hubnerite float reported from surface above the adit.
LAST OPERATOR: John Cooper.
MAP SOURCES: Owner. H. L. Tedrow.

FRONT RANGE TACTITES

There are numerous occurrences of scheelite in tactites following the bedding planes in the schists and gneisses in the Front Range of the Colorado Rocky Mountains. Many of these have been located as claims, and abandoned; many others have never been claimed. These lens-shaped occurrences vary in size from those that would yield a few hundred pounds of ore, to larger ones that might produce as much as 200 tons. The vein rock is usually very hard, and is often surrounded by rock equally hard, so that it is difficult to make a clean mine product. Clean vein material with strong showings of scheelite, will assay from 0.20% to over 1%, with occasional samples running as high as 3% WO_3.

These occurrences have the typical appearance of tactites, with local quartz, iron-oxide filled vugs, and garnet, epidote and calcite accompanying the small amounts of scheelite. They are quite widespread, and have been recognized in Larimer County; in Gilpin County, southeast of Blackhawk; in Grand County, east-northeast of Tabernash; in Chaffee County, east of Salida; in Park County, in the Tarryall district; and in Fremont County, south of the Arkansas river. At least two such occurrences have been noted across the state line, in Wyoming.

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Provide the following information on continuation sheets. Cite the letter and title before each section of the narrative. Assign page numbers according to the instructions for continuation sheet in *How to Complete the Multiple Property Documentation Form* (National Register Bulletin 16B). Fill in page numbers for each section in the space below.

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National Register of Historic Places
Multiple Property Documentation Form

This form is used for documenting multiple property groups relating to one or several historic contexts. See instructions in *How to Complete the Multiple Property Documentation Form* (National Register Bulletin 10-900-a). Use a typewriter, word processor, or computer to complete all items.

_X_ New Submission __ Amended Submission

SECTION A: NAME OF MULTIPLE PROPERTY LISTING

Historic Mining Resources of San Juan County, Colorado

SECTION B: ASSOCIATED HISTORIC CONTEXTS

(name each associated historic context, identifying theme, geographical area, and chronological period)

The Gold Rush, 1860-1861
Return to the San Juans, 1870-1874
Settlement and Establishment of Industry, 1875-1881
The Early 1880s Boom, 1882-1885
The Value of Silver is Restored, 1890-1893
The Silver Crash, 1894-1897
The Great Mining Revival, 1898-1910
World War I Revival, 1915-1921
Great Depression Era Revival, 1933-1939
Post World War II Recovery, 1946-1954

SECTION C: FORM PREPARED BY

name/title Eric Twitty, historian, M.A.
organization Mountain States Historical (303) 499-4334 date September 27, 2010
street & number 1011 Glenwood Drive telephone (303) 499-4334
city or town Lafayette state CO zip code 80026

SECTION D: CERTIFICATION

As the designated authority under the National Historic Preservation Act of 1966, I hereby certify that this documentation form meets the National Register documentation standards and sets forth requirements for listing of related properties consistent with the National Register criteria. This submission meets the procedural and professional requirements set forth in CFR Part 60 and the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation.
(see continuation sheet for additional comments [ ])

State Historic Preservation Officer
Signature and title of certifying official — date

Office of Archaeology and Historic Preservation, Colorado Historical Society
State or Federal agency and bureau

NPS Form 10-900-b
(Revised March 1992)

OMB No.1024-0018

United States Department of the Interior
National Park Service

Historic Mining Resources of San Juan County, Colorado

National Register of Historic Places Multiple Property Documentation Form

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_X_ New Submission __ Amended Submission

I hereby certify that this multiple property documentation form has been approved as a basis for evaluating related properties for listing in the National Register.

_____

Signature of the Keeper date of action

Section E 1: History of Mining in San Juan County

INTRODUCTION

In terms of mining history, San Juan County is among the most important regions in the Rocky Mountain states. The county hosted a local mining industry that was significant for its longevity, productivity, role in key industry events, and association with important people. For example, in 1860, the Animas River drainage was the scene of the first popular gold rush in southwestern Colorado. This initial event led to the exploration and popularization of the San Juan Mountains. During the late 1870s, hardrock mining took hold and became important enough to convince the Denver & Rio Grande Railroad to grade a narrow-gauge line to the San Juans and then up to Silverton. The railroad is still in service today as one of Colorado's premiere tourist attractions, designated a National Historic Landmark in July 1961. Following the Silver Crash of 1893, the owners of the two largest mines in the county instituted the practice of producing and milling low-grade ore in unprecedented volumes to offset the meager returns per ton of material. When these two individuals demonstrated that the strategy was effective, the rest of Colorado's hardrock mining industry followed and pulled the state out of the mid-1890s depression.

An outstanding assemblage of historic resources represents the county's fascinating and important hardrock mining industry. Following abandonment, many of the prospects, mines, and mills succumbed to the pressures of mineral exploration, scavenging, recreational use, and especially natural decay, leaving a number of resources in various states of preservation. While some of the important mines and towns are well-known, forgotten resources are being rediscovered through historic preservation efforts, environmental cleanup, and greater attention to local and Federal public lands.

To foster the understanding and preservation of important sites, the Bureau of Land Management (BLM) commissioned a Multiple Property Documentation Form focused on the county's rich mining heritage. Little other context work has been completed as of 2009 regarding the county's mining history. Several popular publications and a series of resource inventory reports constitute the only broad-scale body of historical analysis. Between the late 1990s and early 2000s, the BLM funded a sweeping inventory of the county's principal mine and settlement sites. The BLM divided the county into study units, identified the principal sites within each unit, and contracted with archaeological consultants to inventory the selected resources. The consultants then produced reports of findings.[1]

While these projects established an important baseline, they were not designed to provide specific guidance regarding the identification, interpretation, and evaluation of the county's

[1] Steve Baker, *Cement Creek West Study Unit-AML Historic Site Survey* (Montrose, CO: Centuries Research, 1998); Ross S. Curtis, *Recording of Historic Mining Properties in the Galena Mountain Study Unit, San Juan County, Colorado* (Durango, CO: Durango Archaeological Consultants, 2001); Eric Twitty, *Mining Cement Creek: A Selective Inventory of Historic Mine Sites on the East Side of the Cement Creek Drainage, San Juan County, Colorado* (Boulder: Mountain States Historical, 2000); Eric Twitty, *The Silverton Mining District k: A Selective Inventory of Principal Historic Sites, San Juan County, Colorado* (Boulder: Mountain States Historical, 2002).

mining resources. The 2010 *Historic Mining Resources of San Juan County, Colorado Multiple Property Documentation Form* commissioned by the BLM attempts to fill this need. The document contains an abundance of information that has been formatted for an understanding of the common types of mining-related resources that may be encountered today.

The *Historic Mining Resources of San Juan County, Colorado* is a subcontext of the larger statewide Multiple Property Documentation Form *The Mining Industry in Colorado*.[2] Jay Fell and Eric Twitty wrote the document in 2005, and the Colorado Historical Society published a revision in 2008. *The Mining Industry in Colorado* provides a broad overview of mining throughout Colorado between 1858 and 2001, general descriptions of its common resource types, and their general registration requirements. A subcontext with greater detail and specificity to San Juan County is necessary to better support regional nominations. The county's history is complex, and the resources varied in type specialized to the region's environment.

Section E.1 of the subcontext describes San Juan County's geography, mining districts, and history in greater detail than the statewide context, and in chronological order. The statewide context, in contrast, follows a geographic approach. The subsection on history is new material and covers the events, trends, people, organizations, and Periods of Significance specific to the county. The subsection is crucial for placing present historic resources in time and place, and identifying relevant Areas of Significance for nomination. Section E.2 reviews the technology, methods, and equipment commonly employed for prospecting, mining, and milling in the county. This information is important to promote a better understanding of the county's mining history and to help interpret mining resources in the field. Section E.2 directly reproduces a parallel section in the statewide context, with author permission, and adapted to the county-specific industry. Material not directly relevant to San Juan County, such as coal mining, has been omitted.

Section F of the subcontext describes the property types common to the mining industry in San Juan County as well as their registration requirements. The section was also directly repeated from the statewide context for consistency, and because terminology and many resource types are universal throughout the greater Rocky Mountains. Section F was, however, adapted to San Juan County where needed. Some resource types are described in more detail while those not found in the county, such as dredge placers, were omitted. Editorial improvements were made as well, and embedded illustrations removed to comply with revision to National Park Service policy.

THE PHYSICAL ENVIRONMENT OF SAN JUAN COUNTY

San Juan County lies in southwestern Colorado, and it encompasses approximately 753 square miles within the central San Juan Mountains. Cycles of geological uplift, subsidence, and glaciation contributed to particularly difficult terrain dominated by high alpine peaks and deep

[2] Jay Fell and Eric Twitty, *The Mining Industry in Colorado Multiple Property Documentation Form* (Denver: On file with the Colorado State Historic Preservation Office, Colorado Historical Society, 2008).

valleys. The peaks range in elevation from around 11,000 to 14,000 feet, and separate several distinct drainages.

The Animas River carved the county's principal valley from between towering landforms. Following a cultural geographic pattern common to the greater Rocky Mountains, nearly all the county's principal towns grew in the valley. The river begins at the confluence of three alpine creeks in the county's northern extent. The appropriately named town of Animas Forks lay at the confluence, and from here, the river trends southerly for around three miles to the townsite of Eureka. The valley widens, curves southwest around two miles to Howardsville, and continues three more miles to the town of Silverton, the county seat. From there, the valley constricts again and resumes a southward course out of the mountains toward Durango.

Numerous streams descend into the Animas River valley from both sides, draining basins between the principal peaks. On the north side, the principal streams are, west to east, Mineral Creek, Cement Creek, Eureka Gulch, California Gulch, and the North Fork of the Animas.

Mineral Creek ascends northwest from Silverton for several miles and then branches at a point historically known as Burro Bridge. The South Fork continues west into a cluster of peaks and basins forming a divide with the Telluride area in the western San Juans. Ice Lake Basin, near the headwaters, was noteworthy because it was center to the Ice Lake Mining District and a cluster of mines developed during the 1880s. The basin is above treeline, features an alpine environment, and, historically, was remote and difficult to access, which confounded mining.

The main fork of Mineral Creek ascends due north from Burro Bridge for around four miles and ends at Red Mountain Pass. Here, the tributary Mill Creek extends west into a group of peaks. The historic settlement of Chattanooga grew at the confluence, and it was center to a small collection of mines. When the Red Mountain Mining District boomed on the north side of the pass (Ouray County) during the mid-1880s, Mineral Creek became a principal route and Chattanooga served as a gateway.

Cement Creek, another principal drainage, ascends north from Silverton and is flanked on both sides by high peaks. The valley trends north for around six miles, curves northeast, and ends at the townsite of Gladstone, which was established at a confluence. Near Gladstone, Prospect Gulch ascends steeply northwest into the Red Mountain peaks, which rise to elevations of more than 12,000 feet. At Gladstone, the South Fork of Cement Creek branches south, the main fork ascends north, and both end in alpine basins. While Cement Creek was heavily prospected during the late 1870s, twenty years passed before the drainage saw mining of significance. Most of the substantial operations were relatively close to Gladstone, and a few were in Prospect Gulch. The Gold King, one of the county's most productive mines, was on the east edge of Gladstone.

Eureka Gulch enters the Animas valley at the townsite of Eureka, and it passes northwest between peaks to Lake Emma and Sunnyside Basin. The gulch saw some of the county's earliest activity, and Sunnyside Basin hosted the Sunnyside Mine, which was one of the most important mines both in the county and state.

California Gulch and the North Fork of the Animas are the last two principal drainages on the north side of the Animas River. They and Cinnamon Creek join at the townsite of Animas Forks, and this confluence serves as the Animas River's headwaters. California Gulch ascends gently west, the North Fork ascends north, and Cinnamon Creek extends east. High peaks rising

to elevations of 12,500 to 13,200 feet surround the confluence, and the confluence itself is a lofty 11,000 feet.

The south side of the Animas River valley features almost as many tributary drainages as the north side. From west to east, the tributaries include Arrastra Gulch, Cunningham Gulch, Maggie Gulch, Minnie Gulch, and Burns Gulch. Arrastra Gulch, scene of the first hardrock mine in the San Juans, is relatively short and ascends steeply south to an abrupt headwall bracketed by high peaks. Beyond lies Silver Lake Basin, which hosted several of the county's most advanced mines.

Cunningham Gulch is one of the deepest of the tributaries and featured several of the earliest and longest-lived mines. The drainage extends southeast from Howardsville for one mile and curves southwest. At the curve, Stony Gulch veers southeast, and while it is a minor tributary to Cunningham, the gulch is noteworthy because it was historically one of the main entry points into the region. Cunningham Gulch continues south for around two miles and branches into several alpine creeks. King Solomon Mountain and North Star Peak form the gulch's west side, and Green Mountain serves as the east side.

Maggie and Minnie gulches open into the Animas valley relatively close together. Over the course of two miles, Maggie Gulch curves from southeast to south and ends in a glaciated basin. Minnie Gulch is almost as long and follows a similar course. Burns Gulch, which featured several productive mines, lies between Eureka and Animas Forks and follows a short and southeastern ascent into numerous peaks.

The far northern reach of the county, mostly above treeline, is the only portion that drains northwest away from the Animas River. Mineral Creek carries snowmelt from the area north of Animas Forks westerly into Ouray County and the Uncompahgre River. Poughkeepsie Gulch, north of Cement Creek, flows from alpine basins into Mineral Creek. Both drainages were, for a brief time early in the county's history, important centers of prospecting.

The climate in the San Juan Mountains presented the mining industry with conditions that some observed were second in difficulty only to Alaska. The editors of the *Silverton Standard* summed the general weather pattern in a simple sentence: "Snow-banks whiten these upper elevations from January to August, and from August to January. The clouds weep about all the year round."[3] What the editors forgot to mention were the high winds.

The summers were the most important season for activity, and while they tended to be hospitable, they were remarkably short and cool. Summer begins in June when temperatures in the 60s and 70s, Fahrenheit, melt the thick snowpack from lower elevations and improve transportation. June is usually clear and bright, but by July, a regional phenomenon known as the monsoon shrouds the mountains in clammy and rainy weather until September, when reliable warmth and sun return. With occasional snows, the middle of summer in the San Juans could be mistaken for mild winter in more temperate climates. The fall begins in October, and while it tends to be dry, the weather has an element of unpredictability. At the least, the temperatures during both day and night are cooler, and cold snaps, snow, and prolonged warm weather are all possible through November. Winter sets in during November and lasts through April. Powerful

[3] *Silverton Standard* (7/27/95): 1.

Pacific storms blowing in from the west deposit up to several feet of snow at a time and send temperatures plummeting well below zero degrees. Cold air masses that follow the storms force the temperatures down as low as -40 degrees, although readings in the 30s and 40s are more typical. Because the cold air tends to sink, the mountain canyons, where most of the settlements were located, channeled streams of frigid air, while the areas on the slopes where the mines lay tended to be much warmer. Despite such conditions, mining thrived in the San Juans by the 1880s and all-year residence became common. Nevertheless, both the geographic and climatic factors contribute to a distinct sense of physical isolation.

SAN JUAN COUNTY'S MINING DISTRICTS

In general, prospectors across the West organized mining districts as a primitive form of frontier government to regulate claim activity and some behaviors of miners. The boundaries of a mining district were usually drawn around concentrations of mineral claims. When prospecting and mining spilled outside of an established district, the boundaries were usually amended to incorporate the additional activity. An elected board set regulations that defined the types of claims, claim sizes, requirements to maintain title, rights for infrastructure and engineering projects, and discovery rights for placer and hardrock deposits. The board also kept records, defined laws that governed behavior and enforced law and order. With the rise of effective county governments throughout Colorado, the majority of these responsibilities fell to a clerk and recorder, while the sheriff administered law enforcement. Mining districts, however, continued to be recognized.

Roughly between 1870 and 1880, prospectors in San Juan County established seven formal mining districts: Animas, Bear Creek, Eureka, Ice Lake, Mineral Creek, Mineral Point, and Poughkeepsie. The press, industry experts, and local interests often attributed new centers of activity to the nearest district and substituted popular names for original designations. As a result, some of the county's districts are known by several names, and their exact boundaries remain nebulous.

Las Animas Mining District

The Las Animas Mining District enjoys the status of first district in the county and probably the greater San Juan Mountains. Prospectors organized the entity, often known simply as the Animas district, on June 15, 1871, to govern claim activity throughout the Animas River drainage.[4] The original district proved unwieldy in size, and when prospectors arrived in significant numbers in 1873, they began carving other districts out of the Las Animas. The Eureka district was the first and took in the territory north of the Animas River and east of Cunningham Gulch. Mineral Creek was the second and assumed the Mineral Creek drainage and mountains west of the Animas River. This left the large cluster of towering peaks southwest of Silverton as the Las Animas district, and they included Kendall Mountain, Kendall Peak,

[4] Allen Nossaman, *Many More Mountains: Volume 1: Silverton's Routes* (Denver: Sundance Publications, 1989) 103.

Hazelton Mountain, Round Mountain, King Solomon Mountain, and North Star Peak. Silver Lake Basin lay near the center. In terms of final boundaries, the Animas River defined the district's west and north edges, Cunningham Gulch was the east side, and Whitehead Peak marked the south line. Silverton anchored the district's northwest corner and Howardsville the northeast corner.

Eureka Mining District

Ruben J. McNutt and George W. Howard, two of the county's pioneers, were the driving force behind the Eureka Mining District. They formalized the district in 1873 and, while the original boundaries are unclear, they designated the region north of the Animas River, east of Cunningham Gulch, and west of the Continental Divide. The boundaries became defined in 1874 or 1875 when prospectors created the Mineral Creek district to the west, and the Mineral Point district to the north. Ultimately, the Eureka district assumed a complex shape. Silverton lay at the southwest corner, and from here, the west boundary passed northwest through the series of peaks that culminated as the Red Mountains. In particular, the west boundary passed through, south to north, Anvil Mountain, Ohio Peak, McMillan Peak, and Red Mountain No.3.

The district's north boundary was inconsistent. It started at Red Mountain No.3, followed the ridge east to Red Mountain No.1, and wrapped around the head of Cement Creek to Hurricane Peak. The north boundary then followed the ridge northeast to Tuttle Mountain, east to Houghton Mountain, and crossed over the North Fork of the Animas to Cinnamon Pass. In essence, the entire north boundary followed the separation between south-flowing and north-flowing drainages.

The east boundary followed a similar principal. That boundary was drawn along the Continental Divide from Cinnamon Pass south to Stony Pass. The Divide also served as the separation between San Juan and Hinsdale counties.

The south boundary was almost as complex as the north. Specifically, the boundary extended from Stony Pass west to Cunningham Gulch and then followed the gulch northward to Howardsville. Thus, the mountains on the west side of the gulch remained within the Animas district while those on the east side belonged to the Eureka district. The south boundary then followed the Animas River west to Silverton.

Cement Creek Subdistrict

It remains uncertain whether the Cement Creek Mining District was formally organized, but archival sources, including mining journals and mine inspectors', reports allude to the existence of a district by that name. The Cement Creek district was limited to the Cement Creek drainage and can be considered a subdistrict within the Eureka.

Mineral Creek Mining District

When prospectors fanned out into the western portion of the county in 1874 and 1875, they found enough mineral deposits to justify a mining district. The prospectors organized the Mineral Creek Mining District, and because the discoveries were widely scattered among the peaks and drainages, the district boundaries remained poorly defined. In general, we can assume that the district included the Mineral Creek drainage west of the Animas and Eureka districts. Most of the activity in the district occurred along the forks of Mineral Creek.

Ice Lake Mining District

During the late 1870s, prospectors found a concentration of mineralized veins in Ice Lake Basin, near the head of the South Fork of Mineral Creek, at the county's west edge. Because the collection was a distinct entity, they organized the Ice Lake Mining District, which was limited to the basin and head of the creek. Ground largely devoid of mineralization between Ice Lake Basin and the mines on Mineral Creek helped the district maintain recognition as distinct.

Mineral Point Mining District

The county's northern extent featured a second Mineral Creek, and it was center to another early district. When Albert W. Burrows and Charles H. McIntyre prospected the area and staked a number of claims in 1873, they almost certainly organized a district at the same time. The original name probably contained the term Mineral but excluded Point because the name Mineral Point did not come into being until 1875 when the Postal Service recognized the settlement of Mineral City as Mineral Point. Afterward, the mining industry adopted the name Mineral Point, and the district was one of the most remote, highest, and difficult to work in.

The district straddled southeast Ouray and northeast San Juan County and encompassed the Mineral Creek drainage. The northeast edge followed the Continental Divide between Wood and Engineer mountains, and extended west from Engineer Mountain across several unnamed peaks. The west edge went almost due south to Tuttle Mountain and respected the divide between the Mineral Creek and Poughkeepsie drainages. The district's south boundary was the same as the Eureka district's north boundary. In particular, the south edge connected the crests of Tuttle and Houghton mountains, and leapt over the North Fork of the Animas River to Cinnamon Pass. The east edge then followed the Continental Divide from the pass north to Wood Mountain, closing the loop.

Poughkeepsie Mining District

The Poughkeepsie Mining District encompassed the Poughkeepsie Gulch area, which was also the headwaters of the Uncompahgre River, in the county's northern portion. From another perspective, the district occupied a pocket of territory west of the Mineral Point and north of the Eureka districts. McNutt and Howard may have formulated a version of the district as early as 1873, when they staked the Poughkeepsie and other claims. The original boundaries are uncertain, but the district became well-defined by 1875. The Poughkeepsie district's east

boundary was the same as the Mineral Point district's west edge. In particular, the boundary formed a line from Tuttle Mountain north over Mineral Creek to the crest of an unnamed peak. Originally, the west boundary may have extended as far as Ironton Park and Red Mountain Creek, but this was pushed eastward with the creation of the Red Mountain Mining District in the early 1880s. As a result, the Poughkeepsie district's western edge followed the crest of Brown Mountain, which was also the boundary between San Juan and Ouray counties. The district's southern edge respected the divide between the Cement Creek and Poughkeepsie drainages and extended from the south end of Brown Mountain through Poughkeepsie Pass to Hurricane Peak.

Bear Creek Mining District

The Bear Creek Mining District was one of the last designated in San Juan County. Prospectors discovered gold on Bear Creek in 1893, prompting a small rush the following year. The district centered on Bear Creek, which flows northeast into the headwaters of the Rio Grande River. Deep in the mountains southeast of Cunningham Gulch, the district was so remote that mining companies found Creede in Mineral County to be easier to reach and relied on it as the nearest point of commerce instead of Silverton. The district extended west over the Continental Divide and included the headwaters of Elk Creek.

THE HISTORY OF MINING IN SAN JUAN COUNTY

Each subheading in Section E itemized below refers to a discrete Period of Significance in San Juan County mining history as defined by historical events, trends, and patterns:

The Gold Rush, 1860-1861
Return to the San Juans, 1870-1874
Settlement and Establishment of Industry, 1875-1881
The Early 1880s Boom, 1882-1885
The Value of Silver is Restored, 1890-1893
The Silver Crash, 1894-1897
The Great Mining Revival, 1898-1910
World War I Revival, 1915-1921
Great Depression Era Revival, 1933-1939
Post World War II Recovery, 1946-1954

The Gold Rush, 1860 – 1861

Mining in San Juan County began not in the San Juan Mountains, but far to the northeast in California Gulch near present-day Leadville. A prospector named Charles Baker postulated that the gulch lay within a huge mineral belt extending from Boulder County southwest to points deep in the mountains. Baker came to Colorado with the Pikes Peak Gold Rush in 1859 or 1860,

examined placer mining centers on the Front Range and in Park County, and finding the most profitable ground already claimed, joined the excitement in California Gulch. Arriving late, he found the same conditions there and, in need of income, joined a crew of miners working for S.B. Kellogg & Company. In his travels, Baker observed that from Boulder County to California Gulch, the placer fields conformed to a northeast-southwest pattern, which supported the mineral belt idea.

Baker discussed the concept with Kellogg and convinced him that more gold probably lay to the southwest. Kellogg agreed to fund an expedition, which Baker led into uncharted territory during the summer of 1860. Leaving the Arkansas River valley, the Baker party crossed over the Continental Divide and descended west along the Gunnison River panning for gold. Repeated failures to find even traces put the mineral belt hypothesis in doubt, although had the party gone south along Cochetopa Creek or north in the Elk Mountains, they would have been successful. Baker instead continued southwesterly toward the San Juan Mountains and followed the Lake Fork of the Gunnison River. When the party arrived at Lake San Cristobal, Baker found gold, but the small deposits were unprofitable and some members turned back. The gold, however, was enough to tantalize Baker and six or seven others into further exploration, and they crossed west over Cinnamon Pass into the Animas River valley. Thus Baker and partners became the first Euro-Americans clearly known to penetrate the deep San Juan Mountains.[5]

When the party reached the Animas River, it followed the constricted, rocky gorge until the valley broadened into an area where tributary drainages converged from nearly all directions. Here, the members pitched camp and prepared for a systematic search for gold. The party allotted specific tributary drainages to its members, who would later compare findings in camp. W.H. Cunningham assumed the first deep gulch near camp that extended south, a prospector named Mason took the only gulch to the west, Baker wandered the Animas valley, and others fanned out to the north.

In the latter portion of summer, Baker and partners grew excited when they discovered what they thought were bonanza placers at the mouths of Cunningham and Mason gulches (later renamed Arrastra Gulch), and near the later townsite of Eureka, presumably named after this initial placer strike. During August, men converged on the discoveries and pursued deeper deposits. Had they taken the time, however, to track the horizontal extent of the gold-bearing gravel, the prospectors may have proceeded less enthusiastically.

Regardless, they processed the shallow gravel with pans and sluices through September, realizing that the season's end drew near. In need of supplies, and seeking to popularize the find, Baker traveled out from the San Juans. In October, he followed the Animas River south to the New Mexican trading outpost of Abiquiu. After relaying his story, Baker turned east and trekked to settlements on the Rio Grande River, where he not only acquired goods, but found a ready audience. After heavily promoting the placer discoveries, Baker assembled a party of around 150 prospectors and other individuals willing to try their luck in what he referred to as Baker's Park.[6]

[5] Nossaman, 1989: 36-37.
[6] Nossaman, 1989: 39.

By mid-October, the original party welcomed Baker and his 150-member entourage. Baker apparently neglected to inform the new prospectors that their window for exploring the high country was short and that they would have to descend before deep snows stranded them. This became painfully obvious as the temperatures fell and the weather turned increasingly unpredictable. Still, the participants of the small rush had just enough time to examine the placer fields, stake claims, and break ground. In response to new competition and out of certainty that the following year would see a major rush, the Baker party claimed their camp and surrounding land as Baker's Park. When winter set in, the entire assemblage of prospectors decided the season was over and descended south out of the mountains.[7]

When they approached the lower elevations, the prospectors broke into several groups. Wanting more than just the Animas River gold, Baker and several others wrapped west around the San Juans to the Dolores River for additional prospecting. Some of the 150 returned to the San Luis Valley and Abiquiu, while Baker's original party and others established a small settlement on the Animas River. The group named their collection of dank and crude cabins Animas City and felt some security in its strategic location (another town by the same name was founded during the mid-1870s down river). The immediate area offered water, shelter, timber for cabins, and game, and the settlement was as close as possible to the gold discoveries. Reasons for insecurity also abounded, however. Because Animas City was completely isolated, residents had to be completely self-sufficient. Of greater import, the settlement was within territory traditionally used by the Ute Indians, and the presence of the prospectors fueled tribal fears of encroachment. Ultimately, these fears would prove well-founded.[8]

As various parties left the San Juans in late fall, they conveyed information that contributed substance to the rumors initially spread by Baker. The reports of gold in the mysterious San Juans spread like wildfire. The Pikes Peak Gold Rush was souring, mountain discoveries were at their zenith, older gold fields were claimed and moreover showed signs of exhaustion, while optimistic wealth seekers continued to arrive. Colorado was ready for another significant gold discovery.

As individuals repeated Baker's stories, the richness and extent of the gold deposits were wildly elaborated. Even the voices of rational and experienced prospectors who personally journeyed to Baker's Park were unable to counter the exaggerations. The highly seasoned Richard Sopris and partners left Animas City by December and returned to the Front Range to report that Baker's discoveries were a bust. Another prospector went so far as to write a series of letters to *Rocky Mountain News* in January 1861 arguing against Baker's finds. The dissent did little to dissuade the unsuccessful, optimistic, and adventurous from journeying to the San Juans as early as October 1860.[9]

S.B. Kellogg was among those that mobilized almost immediately. He felt that Baker's discovery would incite a significant rush and wanted to be among the first to stake profitable ground. He quickly returned East for his family, brought them to Colorado, and organized a party

[7] Ibid.
[8] Ibid.
[9] Nossaman, 1989: 40, 51.

of 150 to 200 individuals. Some of Colorado's most notable pioneers were among the group, and their interest fostered a sense of confidence that Baker's Park would be the next bonanza. Abe Lee, the discoverer of California Gulch, Henry Allen, a founder of Auraria, and Thomas Pollock, one of Denver's first settlers and business operators, all joined Kellogg. In an attempt to establish a foothold in advance of the big rush, Kellogg's party hastily left in the uncertain weather of December with relatively few provisions.

Meanwhile, the idle residents at Animas City grew impatient as they waited for the weather to change. Eager to be first at the diggings, Baker and partners built sleds, hauled supplies 30 miles up to the park, erected cabins, and readied for the season. Much to their surprise, Kellogg's massive party arrived at Animas City in early April along with other, smaller groups of prospectors. Kellogg then joined Baker on what they hoped would be the last trudge up to the placer fields. Despite snow, they tramped to the discovery site and began panning gravel in the icy water.[10]

After Baker had been absent for some days, some Animas City residents assumed that conditions had dramatically improved. A large contingent ascended into the park, and they were undoubtedly disappointed when they saw a thick snowpack covering much of the ground not exposed to direct sun. Further, the weather turned and snow began falling. And yet, the prospectors respected the frontier etiquette of permitting the discoverer, Baker in this case, to stake his claims first before defining their own. As the conditions worsened, the prospectors grew panicky at the thought of being snowbound and implored Baker and partners to take action. Aware of the potential uprising, Baker, his partners and members of Kellogg's party reluctantly staked claims, despite the snow, over the areas that Baker remembered being the best. The group staked 20 claims ascending Cunningham Gulch from its confluence with the Animas River, a like set of claims in Mason Gulch, and another 20 on the Animas at what the group named Eureka. In the context of haste and uncertainty, the Baker party staked the first claims recorded in the San Juan Mountains. As soon as this was finished, the extraneous prospectors then staked their locations adjoining the Baker and Kellogg assemblages, and all retreated back down to Animas City and safety.[11]

Finally, in May, scouts reported that the passes were negotiable, and within several days, Animas City emptied. When the swarm of prospectors arrived in Baker's Park, some paused to build cabins around Baker's supposed townsite while others continued on to the diggings. There, eager prospectors looked over the groups of claims staked in April, added their own, and built cabins and crude shelters nearby. Through May and into June, more prospectors continued to arrive, constituting the first mineral rush to the San Juan Mountains. Silverton historian Allen Nossaman claims that more than 1,000 individuals were interested in Baker's Park in 1861 but not all came. In total, the rush probably drew between 500 and 700 prospectors who invested considerable emotional capital and time in the difficult journey.[12]

[10] Ibid:53.
[11] Nossaman, 1989: 56.
[12] Ibid:60.

Within several weeks, the Animas River ran muddy as those prospectors fortunate enough to possess claims began to process gravel for gold. As a brilliant June progressed, however, doubt about the richness of Baker's Park slowly grew. The meager returns from backbreaking labor demonstrated that the gravel deposits in the lower reaches of Cunningham and Mason gulches and at Eureka were the only ones that contained appreciable amounts of gold and that all the rest offered nothing. Further, the profitable deposits had been claimed by the Baker party and the other prospectors who braved the April snows, leaving little for hundreds of others. Some despaired, many grew angry, and the disenfranchised prospectors looked for someone to blame for their failure. They seized upon Baker, who countered that he had been accurate and that exaggerations of his factual reports were at fault. Regardless, some prospectors attempted to foment rebellion and sought punishment of and even threatened to hang Baker. Most, however, conceded defeat and left the San Juans in June and early July, popularizing the event as the San Juan Humbug.[13]

After most of the rush participants departed, Baker, Kellogg, and party members continued to recover gold but realized that they were not going to be wealthy. The party quickly exhausted its claims in Mason and Cunningham gulches then contracted around Eureka, and after a number of weeks, quit and packed their tools. With little to show after a year of hardship, Baker and partners left the San Juans and brought to an end a gold rush in a land that would later yield millions of dollars in silver.

When Baker arrived at Fort Garland, he found that the Civil War had begun, and feeling the call of duty, hastened to his native state of Virginia to enlist in the Confederacy. After the war's end, Baker returned to Colorado to resume prospecting and was drawn to the upper Arkansas River valley in 1867 by gold discoveries at Granite. Probably still interested in his gold belt hypothesis, he and a small party began exploring the Western Slope and followed the Colorado River into Utah. There, Baker, who managed to survive the deadly Civil War, was killed in tribal conflict with the Ute.[14]

Return to the San Juans, 1870 – 1874

The failure of the San Juan Humbug etched an indelible prejudice against the mountains during the 1860s and 1870s, even though the region was in reality a mineralogical treasure trove. Experienced prospectors, however, remained cognizant of this potential. Unknown to each other, two parties made plans during the late 1860s to search the San Juans not for additional placer deposits, but for hardrock silver and gold ore.

One party consisted of Adnah French, John C. Dunn, Rodney McKinnon, and Solomon Shoup, who prospected together in west-central Arizona. Born in Brandon, Vermont, French

[13] Robert L. Brown, *An Empire of Silver* (Denver: Sundance Publications, 1984) 19; Nossaman, 1989: 64; J.G. Pangborn, *The New Rocky Mountain Tourist Arkansas Valley and San Juan Guide* (Chicago: Knight & Leonard, 1878) 41; Robert E. Sloan, and Carl A. Skowronski, *The Rainbow Route: An Illustrated History of the Silverton Railroad, the Silverton Northern Railroad, and the Silverton, Gladstone, & Northerly Railroad* (Denver: Sundance Ltd, 1975) 14.

[14] Brown, 1984: 19; Nossaman, 1989: 74; Pangborn, 1878: 41; Sloan and Skowronski, 1975: 14; Muriel Sibel Wolle, *Stampede to Timberline: The Ghost Towns and Mining Camps of Colorado* (University of Ohio Press, 1991 [1949]; Swallow Press) 340.

joined the famed Lawrence Party in 1858, one of the three original groups to find placer gold in Colorado and launch the Pikes Peak Gold Rush. As such, French was one of the founders of St. Charles City at the Cherry Creek diggings, and went on to help found Denver. Two years later, French hoped to repeat his good fortune and joined the Baker Party, where he became intimately familiar with Baker's Park. Dunn was born in New Brunswick in 1838, moved to Maine, and then to Lawrence, Kansas at the age of sixteen. Seeking adventure, he traveled over the Santa Fe Trail to wild New Mexico in 1862 and worked at the Apache-Navajo Indian Agency. Dunn also served as an agent between 1864 and 1866. During his time in New Mexico, Dunn heard of the failed rush to Baker's Park and suspected that the gold came from a parent source.[15]

Corydon E. Cooley, Henry W. Dodd, and Dempsey Reese constituted the second party, also in Arizona. Like French, Reese had direct experience as a prospector. Born in Henry County, Indiana, in 1835 Reese joined the Pikes Peak rush in 1860. Finding no gold, he worked for outfitters and helped Charles Baker begin his journey into the San Juans. When the Pikes Peak rush went bust, Reese left Colorado and joined a party to prospect in Oregon. Wealthy in experience but not gold, he returned to the East via Idaho, British Columbia, and Montana. Restless, Reese came west on another whirlwind prospecting tour of Utah; California; Nevada; and Sonora, Mexico, winding up in Arizona in 1868.[16]

Whether the two groups met or simultaneously came up with a common idea is unknown, but both parties idealized the potential for hardrock ore in the San Juans and joined forces. In 1869, the merged party began its journey across the Southwest and quickly confronted problems. Water was difficult to find, and Apache raids and threats struck fear into most of the party, who had increased beyond the original eight. Within a short time, all but the original eight turned back. With Dunn's experience as an Indian agent, the party successfully negotiated passage across the desert and finally reached abandoned Animas City by October. An early snowstorm blocked their ascent into Baker's Park, but the group was unwilling to hunker down in the abandoned collection of cabins, some of which the Utes had destroyed, and went southwest to the safety of Fort Lowell in New Mexico.[17]

Once there, the party decided to split and winter in various points in the region. A few stayed at Santa Fe, several went on to Tierra Amarilla, and Reese and others took up residence at San Juan Pueblo. There, Reese met Miles T. Johnson, an old Pikes Peak friend. During the winter, Cooley arrived at San Juan Pueblo with several of the prospectors who turned back, and all waited for the spring thaw.[18]

When April 1870 arrived, the party amassed at Tierra Amarilla and left for the San Juans. They reoccupied the intact cabins at Animas City and waited for the snowpack on the passes to thaw. During the idle time, Dunn and some of the other members grew impatient, and they left for a venture around the west base of the San Juans to the Dolores River drainage, which was

[15] Roger Henn, *Lies, Legends & Lore of the San Juans* (Montrose: Western Reflections, 1999) 14; Nossaman, 1989: 43, 81.
[16] Nossaman, 1989: 82.
[17] Brown, 1984: 21; Nossaman, 1989: 81-82; Pangborn, 1878: 42; Sloan and Skowronski, 1975: 15.
[18] Brown, 1984: 20; Nossaman, 1989: 84.

free of snow. French, Reese, Johnson, and a few others, however, were still fixated on Baker's Park and awaited passage.[19]

Later in the month, French was able to wait no longer and broke tracks over the passes and into Baker's Park. These adventurous prospectors were the first Euro-Americans in the area since the rush of nine years before and must have thought that the realization of riches was only a matter of time. They had the river valley to themselves, and furthermore sought hardrock ore, which the Baker party had not considered. French and partners at once returned to the scene of the original gold discoveries in Cunningham and Mason gulches and probably occupied one of the original cabins built in 1861. Possibly working as a group, the prospectors tried the stream gravels again for gold but eagerly began examining the sides of the gulches for the parent veins.

While French, Reese, and Johnson would have considered silver ore, they were interested primarily in gold. In 1870, gold was valued at $20.70 per ounce and could be easily separated in the field with fine crushing and amalgamation with mercury. Silver, by contrast, was valued at $1.33 per ounce and usually required in-depth processing including roasting, leaching, and smelting. In addition, the exact process was dictated by the proportion of silver and other metals, which could only be determined through assay.

With this in mind, the trio began their search for ore in Cunningham Gulch, followed the drainage to its end, and veered southwest up a tributary they named Mountaineer Creek. Near an unusual geological formation on the north side, one of the prospectors found a vein that carried metals. Close examination suggested that the metal was silver, and the party claimed the formation as the Mountaineer (later part of the Highland Mary Mine). French, Reese, and Johnson thus found the first hardrock lode and staked the earliest hardrock claim in the Animas drainage. On the way down and north out of the gulch, the party examined the steep walls and found another vein of similar character on the east side and staked it as the Manderfield, the second lode and claim (later the Green Mountain Mine).[20]

Afterward, French, Reese, and Johnson focused on Mason Gulch, which had featured the richest placer deposits in the past. At first, the prospectors examined mineralized veins in the gulch's outcrops and cliffs, and one of them ascended a ridge on the west side and encountered a third silver vein. The group staked the region's third discovery as the Mammoth (later part of the Aspen Mine) and then resumed the search for gold.[21]

Rather than try to find the source of the placer gold by happenstance, the party resorted to a systematic strategy practiced by experienced hardrock prospectors. In particular, they sampled the gravel in the gulch for traces of placer gold, not to recover the material, but instead to find the point where the gold particles were being introduced into the drainage. Through digging and panning, they slowly progressed upward until the gold disappeared. This marked the point where the gold was eroding into the stream from its parent source, and the prospectors turned to soil samples taken from the gulch sides. Recovering gold well above the stream channel, the prospectors neared the source and began closely examining the gulch sides for any sign of a

[19] Nossaman, 1989: 86; Sloan and Skowronski, 1975: 15.
[20] Nossaman, 1989: 89.
[21] Ibid: 89.

mineral formation, vein, or fault. Possibly after encountering fragmented vein material lying on the ground, the party found that the gold came from a minor drainage on the gulch's east side, and after inspecting the bedrock outcrops, one of the prospectors finally found gold ore. Excited and optimistic, the party staked the find as the Little Giant but was reluctant to declare absolute success until the vein's content had been proven. The claim was the fourth in the region and the only gold vein yet found.[22]

By drilling and blasting, the prospectors drove a discovery cut into the vein and found, that the ore continued deep into the rock. The size of the discovery workings remains unknown, but it seems highly likely that the prospectors collected sacks of ore for assay. During the last month of summer 1870, French, Reese, and Johnson reluctantly packed their camp. Even though they were undoubtedly excited, the three prospectors understood that hard work was ahead if they were to make the claims legal and profit from their finds.

French, Reese, and Johnson wintered in Santa Fe, where they met the Dunn party. Dunn reported gold and silver discoveries near what became Rico. Based on French's recounts, Dunn planned his own visit to Baker's Park in 1871. While in Santa Fe, French also encountered William J. Mulholland, one of the 1869 Arizona prospectors who turned back in fear of Apache attacks. Mulholland was born in Ireland in 1837 and immigrated to Canada in 1847 to seek a better life. He went south in 1859, working as a carpenter before reaching Colorado in 1865, where he tried his luck at Buckskin Joe in Park County. When the boom there collapsed, he engaged in construction in Huerfano County before joining the rush to Elizabethtown, New Mexico. In 1869, Mulholland went to Arizona to prospect, where he encountered French and Reese. After abandoning French's expedition, Mulholland finally reached Santa Fe, where he accepted a position as carpenter for the government and worked with Thomas Blair.[23]

Blair was a western roustabout and skilled carpenter. He was born in Pond Mills, Ontario, probably during the 1830s and may have served as a mercenary in the Civil War. Restless after the war ended, Blair sought adventure in the West, working as a carpenter and prospecting along the way. In 1870, he found employment at Santa Fe as a government carpenter and worked with Mulholland.[24]

After meeting Mulholland and Blair, French realized that the two carpenters possessed the skills needed to develop the Little Giant. In particular, they had tools, knowledge of mechanics, the ability to build from scratch, and most importantly, adventurous spirits. The only resources that lacked were adequate capital for supplies, specific mining equipment, and materials. To interest the carpenters and several investors, French, Reese, and Johnson divided the Little Giant into six shares and offered one each to themselves, Blair, Mulholland, and merchant James H. Cook for $500 and a grubstake. French realized that $500 was not enough

[22] Nossaman, 1989: 89; Frederick Leslie Ransome, *USGS Bulletin No. 182: A Report on the Economic Geology of the Silverton Quadrangle, Colorado* (Washington, D.C.: U.S. Geological Survey, Government Printing Office, 1901) 19; *"The San Juan Mines" EMJ* (2/11/73); Sloan and Skowronski, 1975: 15.

[23] Nossaman, 1989: 93.

[24] Ibid: 94.

and approached William A. Pile, New Mexico governor, and Joshua S. Fuller, Santa Fe merchant, to offer them a deed to half of the Little Giant for a greater sum.[25]

In May 1871 French, Reese, Johnson, Mulholland, Blair, and Cook left Santa Fe to develop the Little Giant. They departed in secrecy and followed the Rio Grande River to its westerly headwaters. Certain that the party had not been followed, the six wealth-seekers pitched camp on the grassy floor of Cunningham Gulch, relocated the Mountaineer claim, and conducted additional prospecting. Afterward, the party made the short climb into Mason Gulch and immediately went to work.[26]

While French, Reese, and Cook began blasting ore from the vein, Blair and Mulholland most likely erected several cabins. Because the ore could not be economically shipped to one of the handful of mills in New Mexico or Colorado's Front Range, the party came prepared to build their own facility, based on the traditional Spanish arrastra. This simple apparatus consisted of a circular stone floor hemmed in by low sidewalls with a capstan at center and a beam that rotated around the capstan. A draft animal walked a track around the arrastra and pulled the beam, which dragged stones around the floor. As the stones ground the ore, an attendant added water and mercury, which amalgamated with the gold as it was freed.

The arrastra that Mulholland and Blair built, however, was more sophisticated to treat a larger tonnage of ore in less time. The Little Giant facility featured four drag beams linked to a side-shot waterwheel with a leather belt. The arrastra floor was relatively large at 15 feet in diameter, the sidewalls consisted of vertical planks, and the waterwheel was 18 feet in diameter. To take advantage of waterpower, Mulholland and Blair sited the arrastra on the floor of what came to be known as Arrastra Gulch. A dam and flume provided the water, which flowed through a ditch.[27]

When the apparatus was finished, the party gathered for the trial run and eagerly awaited the results. After the ore had been ground, they drained out standing water, shoveled off the sandy tailings, and grew excited over the dark gray amalgam lining the stone floor. They scraped the material into a leather bag, squeezed out the liquid mercury, and heated the pasty mass in a retort to drive off and condense the remaining mercury for reuse. When the retort's cover was cautiously removed, all marveled at the golden results of their year-long planning. They produced the first pure gold, or any metal for that matter, in the San Juans.

Isolation was ordinarily perceived as an impediment to mining, and yet, the French party treasured the fact that they had the Animas River drainage and its potential riches to themselves. Thus, they were pained when they saw another party of prospectors arrive in May, followed by two more in June. George Howard led the first party, and he too had direct experience with the San Juan Humbug. Howard spent the winter of 1871 in Elizabethtown, New Mexico, where he learned of the gold discoveries at what became Summitville. He assembled a party at Loma, on the Rio Grande River, and traveled into the mountains where they were turned back by snow. When the party reappeared in Loma, Howard learned of the French party's quiet escape and set

[25] Ibid: 94.
[26] Nossaman, 1989: 95, 97.
[27] Ibid: 102-3.

out after them only several days behind. Imitating French, the Howard party arrived in Cunningham Gulch, pitched camp, and prospected the area. Howard ascended the east flank of King Solomon Mountain, found a silver vein, and staked it as the Weminuche claim. Afterward, Howard joined the French group in Arrastra Gulch and staked several more claims.[28]

John Dunn brought the second party into Baker's Park. Disenchanted with the Dolores drainage and remembering French's excitement over Baker's Park, Dunn formed his group and came to the Animas drainage. The party consisted of George U. Ingersoll, David P. Quinn, Andrew Richardson, and Edwin Wilkinson. Ingersoll was born in Maine during 1847 and began life on the frontier as a reporter in the railroad town of Cheyenne in 1867. The following year, Ingersoll prospected south through Colorado and into New Mexico, and turned back north to Gilpin County, where he worked as a miner until 1871. There, he honed his knowledge of prospecting and mining gold. Rumors of strikes around the San Juans, particularly Summitville, drew him back south to Del Norte, where he joined Dunn's party.[29]

Like the two parties before him, Dunn and compatriots gravitated to the head of Cunningham Gulch, where they may have encountered French's Mountaineer claim. Nearby, they found another silver vein and claimed it as the Highland Mary. In Arrastra Gulch, the prospectors found a gold vein, named it the Sampson (which should not be confused with the Sampson Mine on Cement Creek), and began development. In imitation of the Little Giant operation, Dunn and partners built their own arrastra, probably relying on traditional animal power. Unlike the Little Giant arrastra, however, Dunn's facility was unsuccessful and became the first in a long series of mill failures that plagued the region for three decades.[30]

Ruben J. McNutt, Jim Pringle, George Rolbin, and Jack Munroe constituted the third prospecting party to arrive in the summer of 1871. McNutt had as much experience with the western frontier as anyone in Baker's Park. He was born on a farm in Albany, New York, in 1841, went west to California on the tail end of the Gold Rush in 1859 to find the placer fields mostly exhausted. To earn income, he worked as a miner at Placerville before joining the Fifth California Infantry in 1861 to participate in its Civil War march to New Mexico. After the war ended, McNutt remained on the plains as a scout amidst perennial conflict between settler and tribal interests before returning to New York. Unhappy, McNutt came to Colorado in 1870 and ended up at Loma, New Mexico, where he learned of the strikes in the San Juans.[31]

Pringle was another seasoned frontier prospector. He was born in Roxburghshire, Scotland, in 1838 and immigrated to the United States as a young man. Pringle spent a year in New York, followed by a brief sojourn in western Canada, and tried his luck in the California gold fields. When he arrived in 1857, Pringle found that organized companies dominated the available placer deposits, and, in need of income, shoveled gravel for one of those companies until he saved enough money to move on. Hoping to strike it rich at distant, inland placer strikes, he joined the rushes to Boise Basin and Montana in 1865. Still unsuccessful, he went to White

[28] Ibid: 98.
[29] Henn, 1999: 14; Nossaman, 1993: 39, 100, 121.
[30] Henn, 1999: 13-14; Nossaman, 1989: 100-101.
[31] Nossaman, 1989: 102; *Portrait and Biographical Record of the State of Colorado* (Chicago: Chapman Publishing Co., 1899): 1026.

Pine, Nevada, during its 1869 silver rush then prospected his way south through Utah to Arizona. When Pringle assessed his situation, he realized that Colorado was the only place of mineralogical significance he had yet to visit, so he traversed the dangerous southwest to the San Luis Valley in 1871. Impressed with the region's potential, he made a semipermanent home in Cañon City and spent the warm months prospecting. On his way to Cañon City, however, Pringle joined McNutt and partners.[32]

During June, the three parties of prospectors acknowledged that there was enough activity, to justify the organization of a mining district. Because the French party was the first in Baker's Park, the rest of the prospectors gave them seniority in terms of administration and appointed Miles T. Johnson as recorder. On June 15, 1871, they congregated around Johnson's tent and created the Las Animas Mining District around the main portion of the Animas River drainage. Initially, the district included the peaks and tributaries flanking the Animas River from the Continental Divide on the east, over to the west end of Baker's Park. As noted above, this original geographic entity was divided into smaller mining districts during the following ten years. Ultimately, the cluster of peaks and basins bounded on the east by Cunningham Gulch, on the north by the Animas River, and on the south by Whitehead Peak constituted the district's core.[33]

With a mining district formally designated, an estimated forty to fifty prospectors kept Johnson busy recording claims. Thomas Blair was among the prospectors who submitted information and, curious about the Mammoth Lode, he ascended Arrastra Gulch's west rim and found a more robust, parallel formation. Blair claimed the vein as the Aspen, which sparked only minor interest at the time because gold commanded the attention. This would change. The Aspen, like the other veins recorded by Johnson, featured silver and industrial metals, and none offered gold like the Little Giant. However, that mine was the only truly productive operation in the San Juans during 1871.

When the working season came to a close, the prospectors made preparations to leave. They had demonstrated that the mountains abounded with mineral veins, and in an attempt to regulate claim activity, created the first mining district. The prospectors also established a camp in Arrastra Gulch, which would serve as a base of operations for years to come. Of greatest significance, the first profitable mine and mill were brought into production, proving that mining could be successful.[34]

1872 was also significant for mining in the San Juan Mountains due to three factors. First, prospectors realized that Baker's Park was vast and untapped, and therefore offered high potential. Thus, when the French, Dunn, and McNutt parties returned in the late spring, other groups followed and increased the total number of individuals up to around 150. Second, these new prospectors were interested in silver as well as gold. The net result was that the p prospectors spread out, found silver veins of considerable richness, and began actual development of them. Third, the overall increase in activity, proof of ore, and success of the

[32] *History of the Arkansas Valley* (Chicago: O.L. Baskin, 1881) 755; *Portrait and Biographical Record*, 1899: 1102.
[33] Nossaman, 1989: 103.
[34] Nossaman, 1989: 104. Dollar conversions are derived from consumer price indexes on eh.net.

Little Giant Mine began to draw the interest of alert investors. Because the San Juans were remote, though, another rush was long in coming.

During 1872, Arrastra Gulch, Cunningham Gulch, and the Animas River valley continued to host most of the activity. The French party enlarged the camp in Arrastra Gulch, other individuals built cabins in nearby drainages, and George Howard pioneered the mouth of Cunningham Gulch. With silver now of interest, individuals began developing the Mountain Boy, Green Mountain, and other veins on the east side of Cunningham Gulch. With the Sampson gold mine not producing, the Dunn party joined the search for silver, targeting veins near Howard's discovery on King Solomon Mountain. Dunn ascended Cunningham Gulch's precipitous west wall into a glaciated hanging valley. The basin was crowded on all sides by North Star Peak, another peak to the south, and a connecting arête, or knife-edged ridge, between. In what became known as Dives Basin, Dunn, Ingersoll, Richardson, Quinn, and several others established a camp and fanned out across the ragged bedrock walls. Within days, the party located the Shenandoah vein, traced it northwest across the valley, and staked the extension with a series of claims that included the Dives and Shenandoah No.3. Satisfied, Dunn and partners returned to Arrastra Gulch. In imitation, Miles Johnson made the ascent and staked his namesake claim on the peak, and Henry B. Adsit, John Goodwin, and members of the Dunn party located additional properties.[35]

Prospecting partners Theophile Benjovsky and Martin Van Buren Wason were among the new arrivals in 1872, and they joined the small rush up to North Star Peak. Benjovski was born in Poland in 1854. Possibly in response to the Moose silver discovery of 1871 and Fairplay's reputation for placer gold, he decided to try prospecting the Mosquito Mountains. Discouraged, Benjovski tried his fortune at Summitville. During 1871, Benjovsky staked and sold a few claims there and formed a partnership with Wason.[36]

Wason could match almost anyone in terms of mining and prospecting experience. Born in New Hampshire or Vermont in 1823, he became a sailor, traveling to Japan, China, and India. He weathered Cape Horn several times and joined the California Gold Rush, during which he learned the basics of prospecting, placer mining, and the dark side of the mining frontier. Wason also spent much time in Central and South America where he served as a captain on a pearl boat, ranched in Argentina, and mined gold in Central and South America. He returned to California in 1870, acquired a small herd of horses, and drove them east into Colorado. Impressed by the Rio Grande River valley and its proximity to markets, he established a ranch. When gold was discovered at Summitville, Wason joined the small rush in 1871 where he met Benjovsky. The partners staked several unsuccessful claims, but with whetted appetites, continued on the following year to North Star Peak.[37]

In Dives Basin, the partners enjoyed a streak of good fortune. They identified one of the best silver veins, claimed it as the North Star, then followed it northwest with the North Star

[35] Nossaman, 1989: 124, 220.

[36] Allen Nossaman, *Many More Mountains: Volume 2: Ruts into Silverton* (Denver: Sundance Publications, 1993) 145-6.

[37] Nolie Mumey, *Creede: The History of a Colorado Silver Mining Town* (Denver: Artcraft Press, 1949) 81-2; Nossaman, 1989: 122; Nossaman, 1993: 99.

Extension claim. They also identified a spur south of the Shenandoah vein and staked the Spotted Pup claim. In so doing, Wason and Benjovsky had unwittingly laid claim to the best veins in Dives Basin.

Inevitably, reports of silver, word of the North Star excitement, and the success of the Little Giant Mine reached eastern investors who specialized in remote and unproven mining ventures. Emery Hamilton reasoned that, because the San Juans had just been opened, he could have his choice of prospects, but only if he personally spent time on the scene. Thus, in 1871, he left New York for Loma, New Mexico, a major departure point for prospectors. Because the Little Giant Mine was already a seemingly rich producer, it clearly offered great potential. When the French party came to town for supplies, Hamilton offered them immediate payment of $1,000 to each party member, the equivalent of $15,000 today, and another $4,500 to each by September 1, 1872.[38]

Hamilton's desire for a quick return, however, clouded his judgment, and he made a major financial error that proved costly. Instead of paying the outstanding debts to the French party, Hamilton used his capital to purchase a stamp mill. The plan was to replace the arrastra with the mechanized mill, process higher volumes of ore, and recover more gold in less time. Shipping the pieces from the East over the Santa Fe Trail and into the Rio Grande valley was relatively easy, but Hamilton was unable to secure a freighter willing to complete the last difficult leg to Arrastra Gulch. An entire working season passed, when Hamilton finally interested Martin Van Buren Wason in the project. While in Santa Fe, Wason learned of the mill, and since he was going back to his ranch on the upper Rio Grande, made a costly proposition to Hamilton to haul the pieces onward. Hamilton agreed, Wason purchased ten heavy wagons, and with Hamilton, freighted the first substantial cargo into the Animas drainage. Unfortunately for Hamilton, the trip consumed two months, placing him in the mining district at the end of September, too late for construction.[39]

Subsequently, Hamilton neglected to make the September payment to the French party, and they rightfully repossessed the Little Giant with other buyers waiting in the wings. In Hamilton's absence, French sold the mine to Samuel S. Wallihan, Sterling P. Rounds, and George W. Bishop of Wisconsin, and Dan Castillo of New Mexico. The four investors then organized the Little Giant Gold & Silver Mining Company, also known as the Chicago Company.[40]

Horrified, Hamilton attempted to pry his way into the new organization. When company officials arrived in Loma with supplies, he met with them and used the disassembled mill as a bargaining tool. Hamilton offered to trade the equipment for company stock and asserted that he would also pay Cook's share of the mine, which had not been transferred. After clashing with

[38] Nossaman, 1989: 109; Sloan and Skowronski, 1975: 15.

[39] Nossaman, 1989: 122; Nossaman, 1993: 99; Sloan and Skowronski, 1975: 15.

[40] Nossaman, 1989: 126; Ransome, 1901: 167; *"The San Juan Mines"* *EMJ* (2/11/73).

Wallihan, the rest of the owners consented and Hamilton was once again a force behind the Little Giant. Flush from the sale of the mine, the French party returned to the Las Animas district.[41]

The new owners of the Little Giant invested considerable capital to make their mine as well-equipped as any other of similar size in Colorado. The company appointed Mulholland as superintendent. In July 1873 he had a crew assemble the mill machinery on the valley floor. A Dodge crusher pulverized crude ore into small cobbles, a battery of stamps reduced the material to sand and gravel, and a ball mill pulverized the lot into slurry. With increased surface area, the particles flowed over amalgamating tables coated with mercury to leach out the gold. As was the case with the earlier arrastra, workers recovered the amalgam and drove off the mercury in a retort. The mine and mill were separated by around 500 vertical feet, which presented the logistical problem of transporting the ore efficiently. Ordinarily, burros would have packed the material down in canvas sacks, but the company instead built a single-rope reversible tramway. A bucket on a pulley rode a fixed-track cable spanning between the mine and station, where a worker winched the bucket up and lowered it down via a brake. Compared with the tramways built three decades later, the Little Giant system was simple and limited, but it was the earliest in western Colorado.[42]

Despite progress at the Little Giant, localized excitement over silver discoveries, and some claim development, there was little actual production in the San Juans. The vast distance to nodes of commerce and communication and the lack of treatment facilities rendered all but the richest ore uneconomical to produce. In addition, politics between the U.S. government and the Ute Indians, who depended on the natural resources of the region, exacerbated the isolation and threatened the fledgling mining industry.

Simply put, the prospectors were squeezed between the Utes, who did not want them in the San Juans, and the U.S. government, which recently outlawed activity there. During the 1860s, the Utes learned to mistrust newcomers due to interactions of intolerance and violence, and several times attempted to regain portions of their traditional territory. Aware that settlement and mining were inevitable in the territory, the government and the Utes agreed to the Hunt Treaty in 1868. Accordingly, the Utes would relinquish the central portion of the territory and remove to the west and southwest; in exchange, the government outlawed permanent settlement there. However, officials perceived the Utes as a single entity when, in fact, they belonged to at least seven bands. Secondly, for the sake of political convenience, the government recognized Ouray as spokesman for all Utes, when he actually held limited power. Lastly, the government ignored the fact that the lust for gold and silver overpowered respect for the law.[43]

As a result, settlement in the San Juans followed the problematic pattern wherein non-native settlers usurped native American lands. Prospectors infiltrated the mountains, the Utes responded, settlers felt threatened, and tensions rose. In hopes of preventing violence, the government passed an order during the spring of 1873 outlawing prospecting in the San Juans. Because unenforceable and against popular sentiment, the government attempted again to treat

[41] Nossaman, 1989: 127.

[42] Nossaman, 1989: 134; Nossaman, 1998: 311; Ransome, 1901: 19; *Rocky Mountain News* (7/20/73):4; Sloan and Skowronski, 1975: 15.

[43] Brown, 1984: 23; Nossaman, 1989: 79; E.F. Tucker, *Otto Mears and the San Juans* (Montrose: Western Reflections, 2003): 51.

with the Utes. With Otto Mears as mediator, the government met with Ouray and devised the Brunot Treaty in 1873. Mears and Ouray both understood that settlers would inevitably come, and that the Utes must leverage some agreement at least favorable to tribal interests. The Utes ultimately ceded the San Juans in exchange for annual interest on a $500,000 trust and a promise that the lands surrounding the peaks would remain theirs.[44]

The treaty revolutionized mining in the San Juans because they were now unquestioningly open. With the prospect of violence mitigated, prospectors were free to wander the San Juans, and businessmen and merchants felt that permanent lines of trade could be established with the growing, if still seasonal, population. Political stability instilled confidence among investors. Under these circumstances, the central San Juans saw more prospecting and, finally, ore production in addition to the Little Giant. Extreme isolation and difficult conditions were now the principal impediments to the blossoming of a mining industry.

In 1873, Arrastra and Cunningham gulches were still the hub of activity, largely because they had been proven to offer ore. What the Little Giant Mine featured in actual production, adjacent properties had in promotion. The Little Giant Extension, just developed but as yet unproven, was one example, for which capitalists offered an astounding $450,000 (around $7 million today). Prospectors continued to make rich discoveries in the gulches. When Thomas Blair developed silver ore at his Aspen Lode, prospectors hastened up to the ridge west of Arrastra Gulch and searched for similar veins. Robert McGregor found a parallel chute in what was becoming a complex series of narrow ore bodies and named the claim after himself. Several days later, Thomas P. Higgins and Z.H. Lawman, both of whom arrived in 1873, staked the nearby Susquehanna and began a tunnel downslope and east.[45]

As most of the prospectors who arrived in 1873 congregated around Arrastra and Cunningham gulches, some pioneer individuals turned their attention to other drainages where competition was lesser. Reuben J. McNutt and George Howard trekked into the high peaks on the north side of the Animas River, which were relatively unexplored. During the summer, they made several discoveries, which confirmed their suspicions that the peaks on the north side of the river held as much promise as those on the south side. At what became Lake Emma, at the head of Eureka Gulch, they found a particularly rich gold and silver vein and claimed it as the Sunnyside. The partners then crossed north over barren ridges and found another silver formation they named the Poughkeepsie. Aware that other prospectors would begin searching the area, McNutt and Howard organized the Eureka Mining District so their claims would be officially recognized. At the time, the Eureka district took in nearly the entire region on the north side of the Animas.[46]

Even though the northern peaks were largely unexplored in 1873, McNutt and Howard were not completely alone. Albert Burrows and Charles H. McIntyre established a camp in open

[44] Brown, 1984: 23; Nossaman, 1989: 144-145; Tucker, 2003: 51, 55.

[45] Nossaman, 1989: 179; *"The San Juan Mines" EMJ* 10/28/73.

[46] Nossaman, 1989: 139; Nossaman, 1993: 206; *"The San Juan Mines" EMJ* 12/2/73; Laurel Michele Wickersheim and Rawlene LeBaron, *Mine Owners and Mines of the Colorado Gold Rush* (Westminster, MD: Heritage Books, 2005) : 418, 429.

country at the headwaters of the Animas River. En route to the San Juans in 1872 or 1873, Burrow met McIntyre, who came from the Dakotas. With a party in tow, the partners followed Baker's old route up the Lake Fork of the Gunnison River and began their search in what became known as Burrows Park. The party then crossed west over the Continental Divide and were immediately impressed by the plentitude of mineralized veins at the headwaters of the Animas. Wasting no time, the party claimed a number of veins, including the Big Giant, Bill Young, Bonanza, Boston, Burrows, and Red Cloud. Exactly where the camp was located is uncertain, but it lay proximal to the Mineral Creek in the county's northeast reaches.[47]

While Burrows, McIntyre, McNutt, and other prospectors wandered the peaks, entrepreneurs familiar with the needs of mining prepared to profit from the region. Henry F. Tower and Wesley A. Stevens understood that every mining industry required lumber, so they established the first sawmill in the Animas drainage at Mineral Creek ascending north from Silverton. Their lumber was consumed almost as quickly as they could mill it.[48]

Reese, Blair, and William Kearnes claimed large tracts of land for ranching or platting a townsite. Adnah French was conspicuously absent from the group's plans. A true prospector, French realized a dream with the discovery of the Little Giant. Flush from its sale, French spent his money on luxurious living and died of alcohol poisoning during the summer. Reese filed an eighty acre homestead claim on the broad, open floor of Baker's Park, where a settlement was most likely to grow. Blair and Kearnes filed adjoining 160 acre homestead claims.[49]

Just as the Animas River drainage gained momentum in its transition from prospecting to mining, snow brought the working season of 1873 to an end. The year saw key elements for future growth. Mears and the U.S. government successfully negotiated the San Juans away from the Utes and formally opened the mountains for development. The resultant security encouraged a wave of prospecting, bold investment in minor claim development, and machinery for ore and lumber. By setting up their sawmill, Tower and Stevens began providing one of the most important commodities needed for the growth of industry. In addition, these lumbermen, and Martin Van Buren Wason, hauled in the first machinery and, in so doing, set a precedent. Mining would come to depend on machinery. The last significant factor was the actual production of silver ore from the Aspen and other claims, and gold bullion from the Little Giant. When these materials arrived in Del Norte and other commercial centers, they contributed to an ever growing interest in the San Juans.

In the spring of 1874, entrepreneurs put in place the final pieces necessary for a mining industry to blossom. Approaching the season with foresight, Donald Brown, aware of a nascent townsite in Baker's Park, recognized that the region's population was too small to support two competing locations. In an attempt to get ahead of Reese, Brown risked winter storms to cross over the range from Del Norte and locate the townsite claim of Bullion City at the mouth of Cunningham Gulch. Brown, Horton D. Chase, Theodore F. Braun, and others formed a townsite

[47] Brown, 1984: 96; Henn, 1999: 45; Nossaman, 1993: 176.
[48] Nossaman, 1989: 147.
[49] Nossaman, 1989:127, 152; Nossaman, 1993: 11.

company and filed the necessary papers. The location was well-chosen, because it offered water, open land, building materials, and lay at one of the most important crossroads in the entire drainage. The trail up Cunningham Gulch and over Stony Pass was the principal artery to points east, and another trail that ascended the Animas River to Cinnamon Pass was the second gateway. A third trail descended southwest into Baker's Park. Given such a strategic location, Bullion City was poised to receive most of the traffic flowing into the deep San Juans.[50]

Meanwhile, after planning a townsite with Blair and Kearnes, Reese spent the winter in Chicago and Cedar Rapids, promoting the mineral wealth of the San Juans and soliciting investment. Reese found a ready audience in George Greene, one of the founders of Cedar Rapids, a justice on the Iowa Supreme Court, and president of the Union Bank of Cedar Rapids. Reese boosted the handful of nascent mines and dozen proven ore bodies under development. Greene, who previously published a mining periodical, was experienced enough to see through fraudulent promotion. He nevertheless gathered from Reese that even though the region was not yet thoroughly explored, it was already an outstanding opportunity. Further, Greene understood that real profit could be made by treating the ore that others produced instead of investing in specific mines, and so he committed to financing a smelter. Reese returned to Colorado victorious with a key element for the mining district and a major anchor business for his townsite.[51]

When the working season of 1874 opened, Cunningham and Arrastra gulches remained the centers of activity. Some of the known veins now yielded ore, others were being developed, and prospectors found yet more. In Cunningham Gulch, Reese, Blair, and Mulholland prospected the high, barren, east side and found a startlingly rich silver vein that they staked as the Green Mountain. Over the course of several months, they drove a tunnel and produced enough ore to render the operation one of the region's most important. Dunn, Quinn, and Richardson returned to their Highland Mary claim on the west side of the gulch's head to conduct development work. King Solomon Mountain, between Cunningham and Arrastra gulches, also drew interest. W.S. Stratton was among those at work on the Cunningham side, where he staked the Silver Cross and Black Crook claims. Later in the 1890s, Stratton discovered the Independence Lode near Cripple Creek, and realized millions of dollars.[52]

In Arrastra Gulch, Blair, Ingersoll, and Higgins were at work on the Aspen ore system, and the Little Giant continued production. With the obvious veins now claimed, the prospectors who arrived in 1874 invested in searching inaccessible areas. Gregory and Brower picked their way along the gulch's shear, west wall, where, nearly opposite the Little Giant Mine, they found a clearly exposed vein. One of them claimed it as the Gray Eagle. But because the vein cropped out high on the cliff face, the prospectors had to scale the wall to determine the vein's orientation, measure the claim boundaries, and place corner monuments, all on uncertain footing. Gregory and Brower began production and shipped 1,200 pounds of high-grade ore to New York

[50] Nossaman, 1989:162.
[51] Nossaman, 1989:184, 207; Nossaman, 1993:20, 161.
[52] Nossaman, 1989:106, 169, 178, 261.

for processing. Meanwhile, the Black Hawk smelter in Gilpin County could have treated the material at a much lesser cost.[53]

In addition to hosting the region's first ore production, Arrastra Gulch also was the scene of the region's first serious conflict. After Emery Hamilton used his mill to win a prominent position in the Little Giant, Samuel Wallihan continued to protest Hamilton's involvement but found it difficult to dislodge the wily investor because the mill was now an important part of the operation. To maintain control, Wallihan and Bishop hired Gassy Thompson and crew to work through the winter, hold the property, and turn it over when Wallihan and Bishop arrived in the spring. When Hamilton learned that Wallihan and Bishop were to take physical possession of the property, he resorted to trickery. In Del Norte, Hamilton paid for four gunmen to seize and occupy the mine in advance of Wallihan and Bishop. They hastily made their way into Arrastra Gulch, met Thompson and claimed ownership without raising his suspicions. Leaving the gunmen at the mine, Hamilton accompanied Thompson to Del Norte to meet Wallihan and Bishop. Hamilton then filed claim amendments on the argument that the property had to be relocated when the Brunot Treaty conveyed the San Juans over to the Territorial government in 1873.[54]

Wallihan and Bishop arrived in Del Norte in June to meet Thompson and take possession of the mine, when Thompson innocently informed them of Hamilton's actions. The trio quickly figured out Hamilton's deceit and rushed to the Las Animas district to reclaim their operation, leaving Hamilton behind in Del Norte. Hamilton hit the trail to beat them to the Little Giant. Hamilton overtook the party and tried sneaking around but was noticed. Thompson responded by pursuing Hamilton, and they raced until Hamilton's horse proved to be have better endurance. Hamilton barricaded himself in the tunnel and ordered his gunmen to form a shield. Thompson in turn appealed to Miles Johnson, who called the miners' court into special session because claim jumping was a grave offense in any mining district. William Kearnes and Alexander Wilson armed themselves for battle and crept into the mine and confronted Hamilton. More armed miners arrived and the party threatened Hamilton with public hanging. Ultimately, they banished him from the region without reimbursement. Hamilton later continued to attempt to wrest control of the Little Giant through a series of lawsuits in distant courts.[55]

Meanwhile, the Little Giant failed by the end of 1874. During the summer, miners encountered an end to one portion of the gold-bearing vein after another, and the company operated the mill fitfully until the payrock was gone. Wallihan let a contract to have miners drive exploratory workings in search of an extension of the vein, but when profits evaporated and legal fees mounted, Wallihan suspended operations. Wallihan closed the mill and Arrastra Gulch quieted.[56]

[53] Nossaman, 1989: 178.
[54] Nossaman, 1989: 173-5.
[55] Ibid: 173-175.
[56] Nossaman, 1989: 175-6, 214; Ransome, 1901: 19; *Rocky Mountain News* (8/26/74): 4; Sloan and Skowronski, 1975: 15.

In 1874, outside of the Animas River drainage, the geographically expansive Eureka district boasted the most activity. The district featured the subsequently named mountains including, north to south, California, Treasure, Hanson, and Eureka, the peaks of which were the focus of considerable prospecting. The mountains were neatly framed by a circular arrangement of drainages, such as California around the north half, Eureka at the southwest edge, and the Animas River on the east side. Placer Gulch, which offered limited amounts of placer gold, descended northeast through the peaks.

The Sunnyside Vein, discovered the previous year by McNutt and Howard, drew the most interest, and prospectors traced it from what was later named Lake Emma, at the head of Eureka Gulch, at least one mile northeast into Placer Gulch. In advance of the other prospectors, McNutt and Howard had all of 1873 to examine the bold formation and claim what they thought was the best section, which crossed Hanson Peak and over to Placer Gulch. McNutt paid Howard for his share of the Sunnyside property and began shallow development in 1874. On the other side of Hanson Peak, prospectors staked additional segments of the vein, such as the Sunnyside Extension. Elsewhere, prospectors began work opening the Crispin, Niagara, Silver Wing, and Tom Moore.[57]

Because Eureka and California gulches were the two gateways into the cluster of peaks, prospectors established camps at the mouths of both drainages. McNutt's log cabin, built in 1873, became a magnet for prospectors at Eureka Gulch. Local speculators predicted that because of the strategic location, the camp would probably evolve into a formal settlement. They quickly organized the Eureka Townsite Company and platted a townsite of the same name. The founders lacked in promotion, however, and did little to secure businesses and residents. They, like the rest of the camp's residents, were busy prospecting.[58]

Albert Burrows was largely responsible for the Eureka district's second camp at the mouth of California Gulch. After the working season of 1873, Burrows remained fixated on the veins at the watershed between the Animas River, which flowed south, and Mineral Creek, which trickled northwest. In 1874, he led a party that included Henry E. Wood and E. Bradford Greenleaf back into the area, and pitched camp a short distance south. As with McNutt's cabin at Eureka Gulch, prospectors began to congregate around the camp, enlarging the settlement. The name of Animas Forks derived because the river began at the confluence of the three drainages there.[59] Burrows apparently maintained a second camp at the watershed, northwest of Houghton Mountain. The reason for the dual residence was that he, Charles McIntyre, and partners also developed the Red Cloud and other claims. Their camp was on the edge of a marshy meadow at treeline, and it was most likely Burrows' party that named the camp after the explorer.

With the Las Animas district busy and competition increasing in the Eureka district, frontiersmen went farther afield to unexplored territory in the northwestern river drainage. At least one group picked their way up Cement Creek, found many exposed mineral formations, and

[57] John Marshall and Zeke Zanoni, *Mining the Hard Rock in the Silverton San Juans* (Silverton: Simpler Way Book Co., 1996) 119; Wolle, 1995: 405.
[58] Brown, 1984: 87; Nossaman, 1993: 203.
[59] Nossaman, 1993: 184.

established a camp. Within several months around twenty individuals joined them, and the camp grew into a noteworthy collection of crude cabins and wall tents. Several prospectors developed the Porcupine and Gopher claims and actually began producing ore. Farther west, more wealth-seekers examined Mineral Creek, and on Sultan Mountain someone discovered the Hercules, which held great promise.[60]

Even though a number of veins throughout the river drainage were in development during 1874, the work qualified more as prospecting than mining. The operations were shallow, simple, and yielded only small tonnages of ore due to a lack of capital and efficient transportation. Despite the slow start to mining, Reese and the Greenes were confident enough to continue with their smelter idea. During the spring, Greene organized Greene & Company, gathered the components for a smelter and sawmill, and hired John J. Epley and Thomas E. Bowman to accompany them to Reese's new townsite. Epley was an expert with heavy machinery and Bowman was a formally educated metallurgist and assayer.[61]

Greene's son Edward arrived in advance of Epley and made preparations to break ground for the smelter where Cement Creek emptied into the Animas River. Part of the preparations involved establishing a supply business for the smelter and crew, which Edward did as Greene, Eberhart & Company. Seeing an opportunity to profit from retail to local individuals as well as from smelting, the Greenes opened a public mercantile, which was gladly welcomed as the first in lower Baker's Park.

Other entrepreneurs simultaneously saw the opportunity presented by the growing mining industry in the Animas River drainage. Two other parties constructed smelters during the summer of 1874 to compete with the Greenes. Christian Schoellkopf, Ashley Cooper, and Henry Remington constructed the Little Pioneer Furnace and the Little Dutch Smelter on flat ground just west of Arrastra Gulch's mouth. The facility was primitive and relied on an arrastra made of brick to crush silver ore, and a furnace to roast then melt the material. Schoellkopf, an ethnic German, likely based the furnace on designs he worked on in Swansea, Wales, smelting capital of the world. The choice of an arrastra for crushing was unusual since the Little Giant mill exemplified superior machinery requiring less manual labor. It therefore seems likely that a lack of capital was the reason for Schoellkopf's choice of a labor-intensive arrastra. Calder, Rouse & Company built the second facility, the Rough & Ready Smelter, on Cement Creek near the Greene operation.[62]

When the three smelters of various sizes were finished, the river drainage finally saw the last crucial component needed to bring the nascent mining industry to fruition. The Greene Smelter was perceived as the best facility and used ore from the Gray Eagle Mine for its trial run. After the furnace had been heated and charged with ore, a crowd gathered to see the silver matte, an unrefined blend of silver and industrial metals, pour out of the ports. They were not

[60] Nossaman, 1993: 169; Wickersheim and LeBarron, 2005: 397.

[61] Brown, 1984: 29; *"Mining News"* *EMJ* (8/14/80): 111; Nossaman, 1993: 15; Nossaman, 1989: 210; Sloan & Skowronski, 1975: 19, 46; Duane A. Smith, *Song of the Hammer and Drill: The Colorado San Juans, 1860-1914* (Golden, CO: Colorado School of Mines, 1982) 26.

[62] Nossaman, 1989: 211, 213.

disappointed, initially. But when Brown, Epley, and Edward Greene compared the results with the amount of metals that the ore was supposed to contain, they were embarrassed to find that the smelter recovered only a fraction. Schoellkopf and the Rough & Ready Smelter had similar disappointing experiences. Word quickly circulated that the smelters were failures. Disappointment pervaded, the backers of the smelters lost precious capital, and confidence in the region faltered. Greene & Company, however, refused to concede defeat and applied their capital and metallurgical expertise to identify a process that would work. One important factor was ultimately that the region's ore was more complex and resistant to treatment than first suspected.

Meanwhile, Reese continued to formalize and promote his townsite. Reese, Blair, and Kearnes interested William Mulholland, Francis M. Snowden, Nathaniel E. Slaymaker, and William Munroe in the venture, and organized the Silverton Townsite Company. Reese acted as president and Munroe, a surveyor, arranged the lots and streets on paper. Slaymaker, a lawyer who came to prospect, reverted to his former profession and administered the legal aspects. On slightly different dates, Blair, Snowden, and Slaymaker built the first three cabins in Silverton to anchor development. Greene & Company erected buildings, followed by prospectors who constructed a few more cabins. By summer, Silverton featured at least twelve residences and the Greene mercantile, while the smelter stood on the north fringe.[63]

While Silverton grew slowly and its role as a milling center was tentative due to the smelter failures, Bullion City saw nothing less than a boom. Donald Brown was correct in his faith that the mouth of Cunningham Gulch was an excellent location, and Bullion City quickly became the region's principal hub. During the spring, speculators and businessmen rushed to the townsite and claimed the best lots, while prospectors took up residence on the outskirts. The north side of Cunningham Creek offered the best land, and a small business district materialized there. John C. Sullivan and James N. Galloway opened the first blacksmith shop, Thomas Trippe established a surveying office, William Nichols formed an assaying business, and F.B. Hackett organized a law practice. All these men were experienced and provided the services necessary for the successful evolution of a mining industry. Trippe was born in Brooklyn in 1848, earned a degree in engineering and surveying, worked as a surveyor for a railroad, and came to Colorado in 1872. Nichols was an early arrival in Colorado, ran an assaying business in Clear Creek County, and closed shop to come to the Las Animas district. Due to his skill, he was later appointed Territorial Assayer for the San Juan region.[64]

Other entrepreneurs established businesses catering to the prospectors and miners. John and Amanda Cotton, the first woman to permanently reside in the river drainage, opened a mercantile-cum-restaurant. George Howard first sold liquor, followed by the formal saloons of George L. Wright and John Burrow. During the summer, additional businesses including another mercantile, boot maker, and bakery opened. Located at the crossroads of important transportation arteries, Bullion City attracted a livery and the first cattle herd as stock for a butcher.[65]

[63] Nossaman, 1989: 187.
[64] Nossaman, 1989: 160, 170-2; Nossaman, 1993: 214-5.
[65] Henn, 1999: 146; Nossaman, 1989: 171, 177, 185; Nossaman, 1993: 279; Sloan and Skowronski, 1975: 19; Wolle, 1991: 401.

As the business district began to take form, residents built cabins on surrounding lots and in a cluster near George Howard's establishment on the south side of Cunningham Creek. Based on this association, residents named their suburb Howards. During 1874, residents petitioned for a post office, which the Postal Service granted as Howardsville. The post office, the first in the drainage, furthered Howardsville's role as a commercial center.[66] To complete Howardsville's supremacy over Silverton, after the Brunot Treaty was signed, the Territorial Government realized that the considerable new tract of land would be prospected and homesteaded in time. Forecasting the demand for government administration, the Territorial Legislature divided the southwest quarter of Colorado into La Plata, Rio Grande, and Hinsdale counties in 1874. La Plata County encompassed the Animas River drainage with Hinsdale as its eastern neighbor. When the legislature surveyed for the best seat, they identified the largest, most promising town, Howardsville. George Howard offered his small cabin for the administrative building, and a second log cabin was rented as the court house. Howardsville's status as county seat was not to last, however, Reese and partners petitioned the Territorial Legislature and managed to have the seat transferred. The victory was important to Silverton, but the failed milling center still paled in comparison to Howardsville.[67]

Settlement and Establishment of Industry, 1875 – 1881

At the beginning of 1875, the San Juan Mountains possessed the ingredients necessary for a tangible rush, despite the smelter failures. Prospectors had proven rich silver ore and regularly made new strikes, the limitless mountains offered plenty of unexplored territory, the Animas River drainage featured several towns, and residents could live on site year round. The only key element missing was outside investment, and developments elsewhere in Colorado siphoned off the attention of capitalists willing to risk money in the frontier. In 1873, Richard C. Irwin, William J. Robinson, and James Pringle proved rich silver in the Wet Mountain Valley, southwest of Canon City. Their discovery incited the Rosita rush of 1874, one of Colorado's most important silver excitements of the mid-1870s. Concurrently, miners at Gold Hill in Boulder County realized that a dark material previously discarded as waste rock was actually telluride gold. Boulder thus saw its most intense period of prospecting since the initial gold rush of 1859. The development of the Moose, Dolly Varden, and other silver mines in the Mosquito Mountains stimulated a wave of prospecting and mining west of Fairplay. Montezuma in Summit County experienced a similar trend. Mining in Nevada also drew considerable share of investor attention. Remote, new, and unproven, the Las Animas district could not compete with these rushes. As a result, the mining industry grew slowly during the mid-1870s and may have even become static were it not for several important advancements in 1875.[68]

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[66] William H. Bauer, James L. Ozment, and John H. Willard, *Colorado Post Offices: 1859-1989* (Golden: The Colorado Railroad Museum, 1990) 74; Henn, 1999: 70; Nossaman, 1989: 184; Sloan and Skowronski, 1975: 19.

[67] Henn, 1999: 145; Nossaman, 1989: 158, 172; Nossaman, 1993: 214, 279; *Rocky Mountain News* (2/19/74): 4; Sloan and Skowronski, 1975: 17, 19; Wilbur Fisk Stone, *History of Colorado* Vol. 1 (Chicago: S.J. Clarke Publishing Co., 1918) 198.

[68] Weston, W. *"The San Juan Mines"* *Engineering & Mining Journal* (3/2/78):150-151.

The Greenes were behind the first fundamental development, which began when John A. Porter arrived at Silverton in 1875. Porter was born into privilege in Berlin, Connecticut, in 1850. Intent on a career in mining, Porter attended the Columbia School of Mines before studying metallurgy at the Royal Academy of Mines in Germany. Porter returned to the United States in 1872 and went to Eureka, Nevada, where he gained practical frontier experience as an assayer for the Richmond Consolidated Mining & Smelting Company. After several years, Porter moved on to Cherry Creek, Nevada, and served as assayer and assistant metallurgist, before establishing a consultancy. At the behest of investors, Porter traveled southeast through the Great Basin into the San Juans to report on the region's potential. Porter approached the San Juans from the south and ascended along the Florida River, through sedimentary geology rich with coal beds. As a mining expert and metallurgist, Porter took an interest in the coal, a resource always in demand, and noted the location for future reference.[69]

Edward Greene and John L. Pennington, business manager for Greene & Company, saw in Porter the expert who could solve the smelter's problems. Within a short time, Greene & Company secured Porter as chief metallurgist. Porter may have also sensed that Silverton was the gateway to a lucrative trove for capitalists.[70] Porter refitted the smelter. Repeating the sequence of events that preceded the 1874 failure, the furnace was blown in, charged with ore, and company officials impatiently waited to see what came out of the spouts. Not only was the material liquid metal, but also in the proportions necessary for the smelter to be an economic success. Due to Porter's acumen, the Greene Smelter was now open for business, which electrified the Animas drainage. The Rough & Ready Smelter showed promise anew as well. The owners came to an agreement, rallied, and fired up the facility. After the furnace generated a ton of matte, however, they resumed fighting and suspended operations, leaving Greene & Company with a monopoly. Even though the Greene Smelter was the only regional ore treatment facility, the company wisely secured contracts with mines for ore and even went so far as to lease the Aspen from Blair and partners, who were glad for the effortless income from royalty payments.[71]

The Greenes could not have expected their monopoly to last long. While Porter worked, the Crooke brothers engaged in similar activities in the Summitville Mining District, located southeast over the range. The Crookes were highly experienced, and Jonathan in particular was a New York City smelting and mining financier with a twenty-five-year year record. Instead of entering direct competition with the Greenes, the Crookes hastily built a smelter in the Lake City area to capture trade there. The mines of the Lake Fork drainage, however, were part of what the Crookes hoped would be a larger empire to include the Animas River drainage.[72]

Before the Crookes even completed their smelter, they aggressively solicited contracts for ore throughout the San Juans, initiating a trade war with the Greenes. To ensure reliable sources of ore, both companies either leased or purchased mines outright during 1876. The Greenes

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[69] Henn, 1999: 134; Nossaman, 1989: 270; *"Prominent Men in the Mining Industry"* EMJ (9/26/91): 213; Sloan & Skowronski, 1975: 46; Duane Smith, *Rocky Mountain Boom Town: A History of Durango, Colorado* (Niwot, CO: University Press of Colorado, 1992 [1980]) 9.

[70] Nossaman, 1989: 268; Sloan and Skowronski, 1975: 46.

[71] *"Mining Notes from Colorado, Missouri, Montana, Nevada, and Northern Carolina"* EMJ (7/29/76): 77; Nossaman, 1989: 267-8, 271; Nossaman, 1993: 153; Sloan and Skowronski, 1975: 19.

[72] Nossaman, 1993: 144; Smith, 2002: 5.

claimed Hazelton Mountain as their territory, leased the Aspen Mine, and invested $11,000 in properties elsewhere in the Animas drainage. In their home territory of Hinsdale County, the Crookes purchased the Ute and Ulay mines, and in the Animas drainage bought the Royal Tiger claim and an interest in the North Star Mine.[73]

The demand for ore and the superior returns provided by the two smelters finally fostered a long-awaited wave of intense mining, property transactions, claim development, and additional prospecting. Because the Las Animas district hosted more prospecting to date and featured the highest number of mines, however simple, it naturally led the way in ore production. Greene & Company did well with the Aspen, and independent parties drove tunnels from several directions to develop different sections of this ore system. Several prospectors pushed the Legal Tender Tunnel from a point downslope and north, and, striking the vein in 1876, found Greene & Company petitioning them for a lease. Higgins and Ingersoll continued to advance their Susquehanna Tunnel from Arrastra Gulch. In 1877, after penetrating 515 feet of rock, miners struck the ore formation, which featured a bonanza of silver; they named the vein the Victor. Higgins and Ingersoll renamed the operation the Ingersoll Tunnel and enjoyed significant profits. Nearby, James L. Briggs attempted to imitate the success with his Briggs Tunnel, which progressed slowly. The Gray Eagle, around the corner in Arrastra Gulch, produced and shipped to the Greene Smelter.[74]

Prospectors in the Animas district tried to profit from the smelting war by hitting the trail in search of new ore formations. A fortunate few found silver veins in areas that had been examined at least once already. In 1875 Howardsville assayer William Nichols prospected the north face of King Solomon Mountain a short distance above town, found a small system of veins, and claimed the apex as the Little Nation.[75]

Most prospectors, however, sought new ground in the district's remote reaches, where few others had yet been. Théophile Ressouches and Alfred Py chose Little Giant Basin, which was a glaciated, hanging valley on the east side of Arrastra Gulch. Ressouches and brother Louis were born in France and came to Denver in 1866. Laurent found employment as a premier gardener, but Théophile and Louis left for the San Juans when they were able and of age. The brothers arrived in the Animas drainage with little money and worked as miners until they saved enough to prospect. Théophile met Py, and the partners ascended into Little Giant Basin and made camp on the valley floor. In 1875, they examined King Solomon Mountain on the valley's east side, found a vein with a rich showing of silver, and claimed it as the Jura. But before the partners could develop the formation at depth, dwindling finances forced them back to work. The following year, they returned with Louis, staked the adjoining King Solomon, repeated the pattern in 1877 with the Mountain Queen (not to be confused with the Mountain Queen in California Gulch). When other prospectors learned of the discovery, they joined the Ressouches brothers, picked over the opposite side of the valley, and found a vein so large they named it the Big Giant.

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[73] Henn, 1999: 6; Nossaman, 1989: 313; Pangborn, 1878: 52.

[74] *"Mining News" EMJ* (5/12/77): 319; Nossaman, 1989: 313, 271; Nossaman, 1993: 118.

[75] Nossaman, 1993: 215.

At the same time that Ressouches and Py examined King Solomon Mountain, several independent prospectors made the dangerous ascent into the upper reaches of Arrastra Basin, a short distance south. During the first several years in the Animas district, prospectors on the floor of Arrastra Gulch undoubtedly gazed up and south at the imposing headwall and wondered what lay beyond. The wall was locked in ice and snow for all but several months of the year, which discouraged ascent. John Reed was the first prospector documented to satisfy his curiosity, and in 1876, he scouted a route up the headwall.

What he found was another hanging valley carved by glaciers from between Kendall Peak and Round Mountain to the west, and North Star and other peaks to the east. Their flanks, with 1,000 feet of relief, were as sheer and rugged as those in Dives Basin, which was the next valley to the east, and the peaks presented a lacework of veins and dykes that would have excited any prospector. At the valley's center lay a pristine glacial lake, and its outflow cascaded northward until it roared over the headwall into Arrastra Gulch. Examining the flank of Round Mountain on the valley's west side, Reed quickly found more than one vein that carried silver and industrial metals. He claimed two on Round Mountain as the Whale and the Round Mountain, and located the Silver Lake near the lake. Around the same time, another prospector working at the valley's head identified a huge fault and traced it southeast, where it featured a vein he claimed as the Buckeye. During the summer, both men excavated shallow workings to prove ore and retain title to the claims, then left for the season. When the prospectors returned the following year, Silver Lake Basin, as the valley came to be known, saw its first production, which was shipped by burro to the Greene Smelter. To the Greenes, the volume of ore was insignificant because the arduous and dangerous approach discouraged Reed and the other prospectors from packing much out and importing anything but the most essential materials, which limited production.[76]

In the Eureka district, the success of the Greene and Crooke smelters stimulated a wave of activity in 1875 and 1876. A greater number of wealth-seekers than ever climbed through the peaks and valleys in the district's center. Eureka and California gulches, and the peaks between, were thoroughly examined and most of the principal veins claimed. Prospectors also began to seriously explore the district's southern portion, including Minnie and Maggie gulches, soon realizing that the area was not as mineralized as the north side of the Animas River.

Even though rich ore had been proven in veins scattered throughout the district, there was little production because lack of capital retarded development. This began to change when handfuls of adventurous investors took an interest in the most promising properties, and tepidly fronted limited funds. Milton M. Engleman was one such individual, coming to the Animas River drainage in 1876 on the assumption that the region was on the brink of a boom. Engleman was born in 1842 in Carrolton, Illinois, and became involved in a men's clothing business in his hometown. Within a short time, Engleman was a partner, and through the business met Emma Thompson, who operated a millinery shop. Engleman and Emma married but enjoyed their life in Carrolton for only a short time before a change in the business partnership forced Milton to

[76] Nossaman, 1993: 35, 118; Ransome, 1901: 149.

examine other regions, and he targeted Colorado as a potentially lucrative market. An exploratory trip in 1872 confirmed his hopes, and Engleman established a clothing outlet in Canon City. When Engleman arrived in the Animas River drainage, he settled in Eureka and sent for Emma, and they brought with them dearly needed capital.[77]

The Englemans bought a share in the Eureka Townsite Company to open a mercantile and also acquired mining property. In particular, Engleman bought a half interest in the Sunnyside from Ruben McNutt, and Emma purchased interests in George Washington and Poughkeepsie No.2. Afterward, they had little left over for development of the claims, but managed to hire several miners who began sending down ore from shallow workings. Thus the Sunnyside assumed the role of one of the Eureka district's first productive operations, although the mine remained small for years.[78]

The Silver Wing was another important property, and it was among the earliest in the Eureka district to attract an organized company. In 1874, prospectors found the vein near the mouth of Burns Gulch on the east side of the Animas River valley, between Eureka and Animas Forks. Investors learned of the find, organized the Silver Wing Mining & Reduction Company, and purchased the group of claims. Nathan S. Culver, a physician in Colorado Springs, was a company principal, and used his success as a gateway for other mining investments. Matt France, the other principal, owned a ranch in Colorado Springs and came equipped with considerable experience from developing several mines in Clear Creek County. Because of his experience, the company appointed France as on-site manager, and under his guidance, a small crew of miners conducted development and began production.[79]

Probably because of the potential offered by as yet undeveloped claims, John Epley broke away from Greene & Company with the intent of building his own smelter in the Eureka district. The timing was questionable because few mines in the district produced enough ore to sustain such a costly enterprise, but Epley and Newton A. Foss interested H.C. Brown in the idea, and they allocated the necessary capital. In 1876, Brown, Epley & Company began construction in the Animas valley south of Animas Forks and made considerable progress before winter stopped work. Epley suddenly sold to his partners and moved to Ouray. Foss and Brown reorganized as the San Juan Smelting & Refining Company and resumed construction. When the facility neared completion, an avalanche destroyed it, and the company dissolved, leaving the local market for a smelter untested.[80]

Epley was not alone in assuming that the Eureka district was ready for an ore treatment facility, although productive mines were few in number. In 1875, Charles McIntyre organized the Dakota & San Juan Mining Company to develop the Red Cloud and other claims at Mineral Point and build a mill to treat the ore. The mill was not intended to produce gold bullion like the Little Giant nor silver matte as with the Greene Smelter. Instead, McIntyre planned a concentration facility to separate as much waste from the metalliferous material as possible.

[77] Nossaman, 1993: 205.

[78] Nossaman, 1993: 206; *"Mining News"* *MSP* (3/3/88): 141.

[79] *Colorado Mining Director, 1883* (Denver: The Colorado Mining Directory Co., 1883) 674; Nossaman, 1993: 250; Wickersheim and LeBarron, 2005: 425.

[80] Nossaman, 1993: 39, 193.

Following conventional concentration processes, machinery was supposed to crush the ore into sand and slurry, special appliances would achieve the separation, and the concentrates were to be shipped to a smelter for final processing. In so doing, McIntyre hoped to save the costs of transporting waste-laden ore and some of the fees that smelters levied for full treatment. McIntyre also planned to accept custom orders in addition to material from the Red Cloud to pay for construction, but the prospects at Mineral Point were not ready to support a mill. Thus McIntyre eyed Animas Forks as a better location. He projected that the mill would require a year to complete, and by the time it was ready, the district would be far enough along to keep the facility busy. In 1876, he interested E. Bradford Greenleaf in the project, secured investors, and began what was known as the Greenleaf or Dakota & San Juan Mill. Although the facility was small, it lent legitimacy to the small camp of Animas Forks.[81]

It was outside capital from Edward Innis that made the Highland Mary Mine, at the head of Cunningham Gulch, the most advanced operation in the Animas River drainage, if not the entire San Juans. Innis poured money into the property for reasons that defied logic and economics. Edward and brother George inherited a fortune and profitable businesses in New York: a wood dye plant, investment banks, the Pennsylvania & Erie Railroad, and the Poughkeepsie Bridge over the Hudson River.[82] Edward kept an advisor on retainer who guided him in business matters. Interested in the potential offered by mining, Innis consulted his advisor, who suggested that he examine the Las Animas district. What Innis kept to himself was that the advisor was actually a psychic medium. Rather than follow the criteria of most capitalists, legend has it that she chose the Las Animas district by placing her finger on a map and declaring that there lay a lake of gold awaiting discovery![83]

Confident in the seeress' advice, Innis journeyed to the Animas River drainage and surveyed the mines in production. It perhaps seemed reasonable to assume that a lake of gold in a region rich with silver veins would logically be the only gold mine. The psychic claimed that the lake of gold lay underneath a mountain in the area, but could not be specific about which one. Seeking further clarification, Innis examined several operations and consulted with Emery Hamilton, but did not divulge his source of advice. Hamilton informed Innis of extremely rich ore specimens collected from the Highland Mary claim, which Christian Schoellkopf had bonded for purchase. Innis quickly purchased not only the Highland Mary, but adjoining claims to the west for the exorbitant sum of $30,000.[84]

Innis then consulted with H.D. Whittemore to drive a tunnel into the lake of gold. Whittemore was an agent of the Ingersoll Rock Drill Company in New York City conversant with the new technologies of compressed air and rockdrills, although he was by no means an

[81] Nossaman, 1993: 176.
[82] Henn, 1999: 13; Nossaman, 1989: 259.
[83] *Denver Times* (7/10/01): 5; Nossaman, 1989: 261; *Rocky Mountain News* (9/14/58): 65.
[84] Henn, 1999: 15-6; Nossaman, 1989: 178, 261-2.

experienced mining engineer. Whittemore naturally made rock drills a centerpiece of the operation, which pleased the company he represented.[85]

So sure was Innis that he would realize his Holy Grail within a short time, he financed the construction of a small smelter at Howardsville in 1875. With the support of Hamilton, Innis attempted to pillage the idle Little Giant Mill not to save capital, but because he did not want to wait for machinery that otherwise had to be shipped from the East. Goaded, Innis sued Wallihan for possession and lost, forcing Innis to have mill machinery sent anyway. Completion of the smelter undoubtedly excited Howardsville residents, who looked forward to challenging Silverton as an ore treatment center.[86]

In 1876, Whittemore arrived at the Highland Mary with the rock drills and immediately put them to work driving the Innis Tunnel. Whittemore returned to New York, leaving a significant and lasting impact on the western mining industry. His introduction of rock drills to the mine in 1876 was one of the earliest commercial applications in the Rocky Mountain west. Not until the 1890s did the mining industry truly embrace rock drills, and ten years passed again before they were commonplace.[87]

A year after Innis began developing the Highland Mary, the lake of gold still eluded him, although he remained confident in the psychic's advice. Because progress was slow, Innis decided to approach from two directions, so he purchased the Little Giant Mine in hopes that it would lead to the gold. He consulted the psychic regarding the direction that the Innis Tunnel should take, but she often gave inconsistent directions. As a result, miners drove the tunnel until it was serpentine. When the miners penetrated perfectly fine, profitable veins of silver ore, they were astounded when Innis commanded them to ignore the veins and drill and blast onward to some unknown destination.[88]

The Highland Mary complex became a community hub by 1878, in part because Innis was generous at his residence known as the Whitehouse, which cost around $10,000 to build, or $175,000 today. The cost was for construction alone, as the land on which the log building stood was public. Innis took in the occasional guest, offered a few meals to prospectors and other mine owners, provided a polling place for elections, and obtained a post office under the name Highland Mary. Innis ordered a stamp mill with a battery of twenty-five stamps and hired Lewis Schantl, expert metallurgist, to replace Mosely. Schantl was to oversee construction of the mill, but quit within the year.[89]

As mining and prospecting gained momentum during the mid-1870s, many single men collected in the growing settlements. Silverton experienced the greatest change and mushroomed to 210 buildings by 1876. One new building housed the San Juan County courthouse when the Territorial Legislature carved out of La Plata County to administer the concentration of activity

[85] Henn, 1999: 16; Nossaman, 1989: 262, 319; Nossaman, 1993: 120.
[86] Nossaman, 1989: 264, 266.
[87] Nossaman, 1989: 319; Nossaman, 1993: 120.
[88] Nossaman, 1993: 120; Nossaman, 1998: 104.
[89] Bauer, et al., 1990: 72; *"Colorado Mines"* *EMJ* (10/19/78):278; Nossaman, 1993: 136, 252.

in the Animas River drainage. Designation as county seat ensured that Silverton would remain the dominant town. James Briggs took a break from his Briggs Tunnel on Hazelton Mountain and opened the first hotel in 1875. Four saloons opened. The community also erected a combination school, courtroom, and meeting hall.[90]

Howardsville continued to rival Silverton as the region's commercial and social hub. In 1876, Charles and John Pearson established a slaughterhouse and a stockyard to supply butcher shops and mines with meat. John, James, and Joseph Gunsolus ran pack trains to the surrounding mines. Charles Fischer and Henry P. Gill built western Colorado's first brewery, the Rocky Mountain Brewery (Gill & Fischer). In 1877, Edward W. Johnstone and Andrew Bigger both opened saloons. Johnstone was a family man and Bigger was a bully who shot a man in Del Norte and fled to Howardsville. He went to prison for subsequent murders after he left. Prostitutes set up several tents on the edge of town. The enterprise was unsuccessful, however, and the ladies failed to return the following year.[91] Individuals who did not gravitate to Silverton or Howardsville established residences in one of the six other settlements. On Hazelton Mountain, local prospectors and miners referred to their informal collection of cabins around the Aspen vein as Quartzville. A similar demographic maintained the small camp at the head of Cement Creek, the name of which remains unknown.

While Burrows Camp on Mineral Creek was also a primitive settlement, members of the original Burrows party actively guided its development into something more. In 1875, they named the collection of tents and cabins Mineral City and applied for a post office, but another town with the same title already existed. Thus, the community chose Mineral Point after a prominent quartz outcrop, which the Postal Service recognized. Ironically, Mineral Point featured offices for several mining companies before a single retail or service business opened. In 1875, McIntyre's Dakota & San Juan Mining Company established headquarters, and J.S. Buell and brother organized the Buffalo & San Juan Mining Company. The following year, entrepreneurs brought in a few businesses. Henry Ketchum and John Dowling ran a miners' supply store, Ehrenfried Steinbach an assay shop, and Albert Dyes a mine brokerage business. To accommodate travelers, B.F. Weeks and H.B. Perry served meals, and Perry's restaurant doubled as the Forest House, the first hotel at Mineral Point. The population, including all the prospectors scattered in the area, numbered around 75.[92]

Animas Forks, which began in a manner similar to Mineral Point, rapidly progressed due to a more diverse group of interests. Because the settlement was a gateway into the mineralized portion of the Eureka district, it naturally hosted prospectors. Miners lived in town as well, and worked on one of several properties in development within walking distance. Entrepreneurs chose Animas Forks because they were interested in the potential offered by the upper Animas River drainage but felt that Mineral Point was too small, remote, and harsh in climate. Animas Forks, located at treeline, was not much better. Even though the settlement was little more than a prospectors' camp in 1875, community activists confident in the future secured a post office.

[90] Nossaman, 1989: 238, 283; Nossaman, 1993: 12.
[91] Nossaman, 1989: 252; Nossaman, 1993: 215, 218, 219; *Rocky Mountain News*, (10/17/77): 2.
[92] Bauer, et al, 1990: 98; Nossaman, 1993: 176, 178, 179.

William Randall and Martin Codding built the first mercantile. Unlike Mineral Point, Animas Forks enjoyed a boom the following year. For those who called Animas Forks home, Henry Warren, William and Frank Stein, and Edward Suydam opened three more stores, and regional meat dealer Henry Helmboldt and another individual established two butcher shops. Lewis and Clara Mercer and Esther Ekkard ran boardinghouses for workers. The Mercers opened the Mercer House hotel and livery and Frank McGivern served meals in the Flagstaff House restaurant and bakery. In contrast to the stereotypes of western mining camps, Animas Forks featured only one saloon, which Albert and Anna Brendel tended. Specialized businesses also served the nascent mining industry. An assay shop and blacksmith provided services needed by prospectors, and several freight packers established headquarters. Charles McIntyre began building the Greenleaf Mill to receive ore from local mines.[93]

Curiously, Eureka lagged far behind Animas Forks in development, although it shared a similar function and geographic relationship with the mining district. In 1875, the townsite company secured a post office and cleared trees and stumps from the platted streets but neglected to follow with promotion. As a result, few businesses and residents chose Eureka. Founder Fred Blaisdell opened a tiny store, and in 1876, Henry O. Montague established a second, while Suydam moved his mercantile down from Animas Forks. Eureka had lodging, but no saloons or restaurants. It seems likely that Milton Engleman chose to settle in Eureka prior to his involvement with the Sunnyside because the vacuum in business afforded opportunity.[94]

The other settlement that drew some of the prospectors and miners was Niegoldstown, located in the Las Animas district where Stony Gulch opened into Cunningham Gulch. Reinhard Niegold, the eldest of four German brothers, came to the Las Animas district in 1872 to prospect, and brother Gustave, joined him within a year or two. Despite the tardy arrival, Gustave found a vein rich with silver and industrial metals south of Stony Gulch in 1874, and the brothers claimed it as the Philadelphia and Little Fanny. Two more brothers joined the Niegolds in 1876 and they began production according to the simple, labor-intensive methods commonly employed in the mining district. The brothers had select ore samples assayed in Howardsville, probably by William Nichols, and the reports indicated that the payrock featured as much as $1,100 in silver per ton. With visions of wealth, the Niegolds hired a crew to increase the output.[95]

Like Charles McIntyre, the Niegolds decided to build a concentration mill at the mouth of Stony Gulch instead of sending waste-laden crude ore directly to a smelter. In 1877 or early 1878, the brothers started the mill, and it worked at first. But as the ore increased in complexity with depth, the mill lost too much of the metal content and forced the Niegolds to ship the payrock to a smelter anyway. The bunkhouses for the miners and mill workers became the seed for a small settlement that the brothers modestly named Niegoldstown. Taking advantage of opportunity, the brothers decided to formalize the settlement and requested a post office, which the Postal Service granted in 1878. They also built a sawmill for their operation and sold the

[93] Nossaman, 1993: 186-9.
[94] Bauer, et al, 1990: 52; Nossaman, 1993: 203-205.
[95] Henn, 1999: 68; Nossaman, 1993: 40, 224.

surplus lumber, which was always in demand. The Niegolds' employees and a few prospectors and miners who moved into the settlement fostered enough demand to support a mercantile, saloon, and hotel, which may have been operated by the Niegolds. The town, however, remained small and primitive and never grew beyond a cluster of log buildings, even though it lay directly on the heavily traveled Stony Pass route.[96]

By 1877, both the promotion and proof of ore in the Animas River drainage created a sensation that spread through Colorado and onward to the greater mining industry. The region possessed a small smelting industry, despite initial failures, as well as a permanent population, formal settlements, and businesses. A leading mining journal noted:

> In the spring of 1872, when the San Juan excitement first began, few people regarded it in light of anything but a common mining stampede, which would shortly die out or prove to be only an ordinary furor over a fairly good mineral district. Instead of this, however, the five years that have passed since then have, in their results, not only upheld all but the most exaggerated of the assertions first made in regard to the wealth of the district, but have brought to light many new resources which are at present being developed with an energy equal to that found in any part of the West. In a word, San Juan is an undoubted success. Its mines are not myths, nor its rich ore products solely of the imagination.[97]

While the statement may have been slightly ahead of the actual situation in the San Juans, the Animas River drainage seemed to be headed for greatness. The cornerstone, of course, was mining, which continued to gain momentum. The Crookes and Greenes battled for sources of ore, and the Greenes retained their exclusive rights to Quartzville, Arrastra Gulch, and Silver Lake Basin. The Greenes had so many contracts and independent deliveries that metallurgist John Porter decided to add a second furnace to the smelter. North Star Mountain remained the domain of the Crookes, and they tightened their grasp on the productive operations there. In addition, the Crookes had a relatively easy time establishing a presence at Animas Forks and Mineral Point because of the easy route northeast over Engineer Pass and down Henson Creek to Lake City.

The Crookes' presence was as symbolic as practical because most of the operations around the Animas River headwaters were still being developed and only a few had just begun to produce ore in meaningful tonnages. Some of those that did generate ore were financed by outside investors, which was a noteworthy trend. Cleveland capitalists Alfred A. Hard and Harry L. Bull backed the Mastodon Mining & Reduction Company, which brought the Mastodon Mine into production. The Mastodon was on the Sunnyside Vein. Local prospectors developed the Mountain Queen, at the head of California Gulch, into one of the Eureka district's most important producers for the year. Small amounts of ore trickled from other mines such as the Columbia and Vermillion.[98]

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[96] Bauer, et al., 1990: 105; Nossaman, 1993: 85.

[97] *"The San Juan Mines"* *EMJ* (5/5/77): 291.

[98] *Colorado Mining Directory*, 1883: 650; Nossaman, 1993: 173; Ransome, 1901: 21.

Some of the mines saw more activity on paper than in the ground. C.H. Graham organized the Graham Silver Mining Company to speculate with claims in the area, and when he lost interest in 1877, Graham left. His partners William and Alexander G. Bowman bought in and reorganized as the Sioux City & San Juan Mining Company. Jonathan S. Buell established the Buffalo & San Juan Mining Company with a like intent and reformed it as the Colorado Mining & Land Company. Charles McIntyre ran short of funds for his mill in 1877; he subsequently found investors and included them as the Animas Forks Mining Company. None of these entities produced much in 1877.[99]

The Red Cloud, the only truly promising property at Mineral Point, was shallow but served as an anchor for one of the most important operations in the upper reaches of the Animas. It appears that in his effort to allocate capital, McIntyre sold the claim to Franklin Josiah Pratt, who represented a group of wealthy investors in Massachusetts. Instead of developing the vein from the top down through a shaft, Pratt promoted the idea of undercutting the formation at depth with a long haulage tunnel. Even though the Red Cloud was near Mineral Point, Pratt proposed driving the tunnel northward from California Gulch because this offered the lowest point of entry. The tunnel would have to penetrate around one mile of rock to reach the vein, and Pratt probably forecasted that the tunnel was likely to intersect other ore formations over this distance. If these veins were not claimed, then Pratt and partners could obtain rights, and if they were, then the owners could work them from bottom up through the tunnel and pay a royalty. Such a scheme made the tunnel attractive in theory, and the investors provided Pratt with the funds to start. Pratt then commissioned what was known as both the Bonanza and the Mineral Point tunnel in 1877, and the following year, organized the Mineral Point Tunnel Company. Animas Forks benefited as the nearest commercial and communication center, and Mineral Point, where the target vein was located, received some publicity as well.[100]

Previously quiet portions of the county finally began to see significant claim development and some production in 1877 and 1878. This deeply interested the Greenes because these areas lay to the west of the Eureka district and within their territory. One of the most remote was Poughkeepsie Gulch, which was a drainage to the north of Cement Creek. There, prospectors made a number of discoveries in 1875 and 1876, designated the Poughkeepsie Mining District, and developed their claims. Ruben McNutt and George Howard, who already extracted payrock from their Poughkeepsie Mine, were probably principals in the district's creation. By 1877, partnerships had the Alaska, Bonanza, Columbia, Forest, and Red Roger mines in limited production. Packtrains carried the ore in sacks south over Poughkeepsie Pass and down Cement Creek to the Greene Smelter. Sale of the Old Lout Mine for $10,000, even though it was shallow, caused a stir and stimulated a small rush to the district.[101]

The center of new activity that was nearest the Greenes lay on Sultan Mountain, which loomed west of Silverton. In 1876, several prospectors found a lengthy vein they named the Empire, and within a short time, other prospectors identified several parallel formations

[99] Nossaman, 1993: 191-2; Wickersheim and LeBarron, 2005: 371, 382, 426.
[100] Nossaman, 1993: 121; Wickersheim and LeBarron, 2005: 376.
[101] Ransome, 1901: 192; *Silverton Standard* (10/20/17): 1; Wickersheim and LeBarron, 2005: 370, 376, 418.

including the Hercules, Little Dora, and North Star. Simultaneously, parties began driving tunnels to develop the veins, and all but one of the operations were small. Knight, Slocum & Company began work on the Hercules, and John Williams started his tunnel toward the North Star. The most significant endeavor was the Diamond Tunnel, which the Silver Producing Mining Company pushed to undercut the Hercules and other veins. Ironically, all but the well-funded Diamond Tunnel began minor production by 1878.[102]

In 1877 and 1878, the Crookes and Greenes no longer competed only with each other for the ore produced by San Juan County's young mining industry. Each faced potential rivals in their home territories, and some of the threats were serious while others were not. In Hinsdale County, three new plants posed the possibility of diverting some of the ore that the Crookes relied on. The Ocean Wave Smelting & Mining Company built a smelter in Lake City, George Lee started the Lee Smelter at Capitol City, and both of these made the Crookes uneasy because they were relatively efficient. The Van Giesen Lixiviation Works at Lake City, however, was not much of a threat because during its brief life, the mill proved to be a failure.[103]

In San Juan County, five organizations built facilities that made the Greenes wary. In 1876, James H. Winspear began promoting a smelter he proposed for Eureka, formed the Eureka Reduction Works the following year, and convinced investors in Ohio to provide him with money. He saw the smelter completed by 1878, sought contracts for ore, and apparently purchased an interest in the North Star Mine on North Star Peak for its payrock. When Winspear started the plant, however, it proved to be a complete failure due to mismanagement, debt, and inappropriate processes. The Greenes were relieved, and Winspear quietly escaped his creditors and left for Rosita.[104]

W.G. Melville paralleled Winspear in terms of both timeframe and outcome, but his method for recovering silver differed. In 1876, he organized Melville & Summerfield and built a lixiviation mill at Silverton. Developed in Europe, lixiviation was specific to silver and used chemicals and water as a solvent to leach the metal out of roasted payrock. While lixiviation had been proven to work with simple silver ores, it was no match for the complex material in the Animas drainage, and the mill's immediate failure in 1877 sent Melville back to the drawing board. He tried again in 1878 with the same result and, like William H. Van Gieson at Lake City, suspended operations.[105]

Thomas P. Medly, Lorenzo Dow, and J.H. Earnest Waters planned another lixiviation mill in Cement Creek that would intercept the ore that passed from mines in that canyon and the Poughkeepsie district to the Greene Smelter. Melville had not yet demonstrated that lixiviation was inappropriate for San Juan silver, and also failed to run adequate tests to prove that the process would work. This seems curious because two of the three principals had considerable experience in the mining industry.

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[102] Nossaman, 1993: 147-8; Ransome, 1901: 251; *Silverton Standard* (3/12/10): 1; Wickersheim and LeBarron, 2005: 397, 425.

[103] *"Mining News" EMJ* (7/14/77): 30; Pangborn, 1878: 52; Lee Scamehorn, *Albert Eugene Reynolds: Colorado's Mining King* (Norman, OK: University of Oklahoma Press, 1995)178; *Silver World* (10/5/78).

[104] Nossaman, 1993: 23, 210, 252; Pangborn, 1878: 54; Ransome, 1901: 21.

[105] *"Mining News" EMJ* (7/14/77): 30, Nossaman, 1989: 316; Nossaman, 1993: 39, 116; Pangborn, 1878: 52.

Waters was born in Parsonstown, Ireland, in 1851, son of prominent physician John Waters. Interested in mining and not medicine, he received a formal education at the Royal School of Mines in London and the School of Mines at Freiberg, Germany. In 1872, Waters became an apprentice in the machine shops of John & Henry Gwynne in London for practical experience with machinery. Ready for the field, Waters traveled far and wide. Under the employment of a London investment syndicate, he traveled to Gilpin County in 1873 and examined mines there, then went to Japan where the imperial government hired him to serve as State Mining Engineer and build the Japanese Imperial Mint. In 1875, Waters resumed his practice as a consulting engineer and examined mines in the Lake Superior area and Mexico, then came to Colorado and joined the Leadville rush in 1877. He spent the next four years primarily in Leadville and the San Juans, where he made his mark.[106]

Dow, much older than Waters, was born in Maine in 1824, received a formal education at Wesleyan University, and moved to Topeka, where he was elected mayor in 1859 and then to the state supreme court. Dow traveled widely, and on a visit to Europe during the early 1860s, became fascinated with mining and engineering. He became an expert with explosives, brought one of the first diamond drills for mining from Europe to the United States, and became involved with several mining companies.[107]

The San Juan Lixiviation Company, which the trio established in 1877 with British backing, was Dow's latest venture. The group sited the new mill at the confluence of the South Fork and main fork of Cement Creek, and named the associated settlement Gladstone, after the British prime minister who held office at that time. The company began operations in 1878 and, along with Melville at Silverton, immediately ran into trouble. To obtain capital for the improvements deemed necessary, Dow and Waters reorganized the firm as the San Juan Reduction Company and managed to win 200 pounds of silver from Poughkeepsie district ore. That small amount was the crowning achievement, and the company spiraled into bankruptcy in 1879.[108]

Charles McIntyre's Greenleaf Mill was not much of a threat to the Greene Smelter either. David Nevin, brother of the inventor of the Nevin jig, a concentration apparatus, designed the mill and saw it completed in 1877. To his embarrassment, the jigs, which used water currents to separate heavy metalliferous particles from light waste, proved to be only moderately successful on the complex ore of the upper Animas. Thus, the mill operated intermittently, may have been refitted, but drew away no business from the Greenes.[109]

Edmund T. Sweet and Oliver Matthews opened the only facility that presented the Greenes with competition. Even then, the threat was limited because the new plant filled a specific niche. Specifically, Sweet and Matthews erected an ore sampler in 1878, which catered to small mines with sporadic production. A sampler was a combination assay house, smelter, and ore buyer, and it specialized in providing assays, testing batches of complex ore to identify the

[106] Nossaman, 1993: 170; *"Obituary"* EMJ (5/13/93): 444; *"Prominent Men in the Mining Industry"* EMJ (8/22/91): 213; Clark C. Spence, C. *Mining Engineers and the American West* (Moscow, ID: University of Idaho Press, 1993) 8.
[107] Nossaman, 1993: 170.
[108] *"Colorado Mines: San Juan Region"* EMJ (10/19/78); Nossaman, 1993: 170; Ransome, 1901: 21; Smith, 1982: 27.
[109] Nossaman, 1993: 187.

best treatment methods, and buying small lots of ore from outfits that needed immediate income. At the sampler, the purchased ore was segregated into piles by composition and when enough of a single type had accumulated, the batch was smelted in a custom run. Ordinarily, samplers posed no immediate threat to smelters such as Greene & Company although the smelters, set up for large volumes of specific ore types, were unwilling to make process adjustments just for the small, specialty batches. Sweet and Matthews, however, did have some impact on the Greenes, who wanted every pound or ore that they could secure. Instead of building a facility anew, which would have been costly, Sweet and Matthews refitted the idle Rough & Ready Smelter. Because the Animas drainage possessed an array of small mines with complex ore, the Sweet Sampler enjoyed success from the start.[110]

To simultaneously nurture and profit from the growth of mining, local investors and community activists backed the development of a primitive infrastructure in the county. Because the industry depended on the movement of supplies, ore, and people, improvements to the transportation system were among the most important.

Prior to the smelting war, the Animas River drainage lacked formal roads, and horses, mules, and burros were the principal movers of materials and people. Given the reliance on draft animals, it comes as no surprise that the original transportation system in the Animas River drainage consisted of a network of pack trails. As alluded to in the pages above, several well-beaten artery trails entered Baker's Park from the east over Stony, Cunningham, and Cinnamon passes, and from the south over Molas Pass. From the commercial and transportation hubs in the county, more packtrails extended up all the major valleys and gulches to the centers of mining. The trails naturally followed the paths of least resistance and fewest obstacles and usually wound along the flattest ground. Feeder trails branched off the main routes and zigzagged up to nearly every mine and prospect of note, and because these were the responsibility of the users, they tended to be well-constructed. By winter, these trails became impassable, however, and all but the most daring and resourceful on snowshoes attempted to follow only the principal routes out of the region. For a mining district with aspirations of notoriety and fulltime ore production, this simply would not do.

Otto Mears, pathfinder of the San Juans, understood this problem and foresaw great profit in toll roads. During the 1870s, he hired crews to grade a network of roads from the San Luis and Arkansas River valleys west toward the San Juans and the Gunnison area. The fathers of Lake City, including the Crookes, realized that roads were necessary for their well-being and graded several trunk lines in the eastern San Juans. The principal interests in the Animas River drainage, however, were slightly less developed.

Most of the goods consumed in the drainage came from shipping points in eastern Colorado and so it would seem logical to improve the Stony and Cinnamon pass trails first and establish links with the Lake City and Otto Mears' road networks. Instead, Dempsey Reese and lumberman Henry F. Tower commissioned the first toll road, which took a route south and down the Animas River canyon to Hermosa and Animas City in 1876. Reese and Tower's direct

[110] Nossaman, 1993:153.

experience with the region's weather superseded geographic distances. They understood that wagon roads over Stony and Cinnamon passes would become blocked by snow while the Animas River valley route, although much longer, was serviceable most of the year. Further, a road graded by the Park View & Fort Garland Freight Company already linked Conejos, in the San Luis Valley, with Animas City and provided the essential connection with eastern Colorado. Reese and Tower saw their road carrying traffic by 1877 and began to recover the construction costs by charging a lofty $6 for teams and $6 round trip for stages, which equates with about $100 today.[111]

An embarrassment to the Greenes and other Animas River drainage interests, Lake City investors apparently completed a road to Animas Forks before they did. The Lake City interests widened the trail over Cinnamon Pass, obviously to encourage residents to conduct business in Lake City. In 1875, the Animas Forks Toll Road Company began a road from Silverton up to Animas Forks, but the project took two years because it was under-funded. The road was poorly engineered and a bog in places, but it granted the desired shortcut over the range to Otto Mears' eastern network. San Juan County now had two routes that could accommodate wagons, which lowered the cost of both mining and living. Because wagons carried freight in some volume, they were able to haul larger loads into the county at lower rates than the pack animals.[112]

Several areas of mining in the county were important enough to justify the construction of rough but negotiable spur roads. In 1876, the Innis brothers assumed that a toll road would be graded over Stony Pass and funded the first segment from Howardsville to Stony Gulch. Probably at the behest of the Greenes and Blair's party, the county graded a road up Hazelton Mountain to the Aspen vein system in 1877, which increased the volume of ore packed to the Greene Smelter. In 1879, local investors funded a toll road up Cement Creek, over Poughkeepsie Pass, and into the Poughkeepsie district, whose miners were glad to now ship ore by wagon to the Greene Smelter.[113]

Communication with the outside world was necessary for the success of mining in San Juan County, and it saw great improvement during the mid-1870s. The mail, newspapers, and word-of-mouth were the principal sources of information. In the early 1870s, someone from the Animas River drainage had to fetch the mail from Del Norte, where the nearest post office lay. By 1875, post offices at Animas Forks, Eureka, Highland Mary, Howardsville, Mineral Point, and Silverton served the county, and a carrier delivered the mail at regular intervals. Newspapers were an indispensable institution, and county residents had a choice of several, which they read, reread, and passed on to others. The *Rocky Mountain News*, published in Denver, usually covered important national and territorial stories as well as cultural topics, but because it arrived by post, the news was usually outdated. In 1875, John R. Curry established the *La Plata Miner* in Silverton, which became the *Silverton Miner* in 1879. Curry's paper, the first in the Animas River drainage, covered local news, extracted stories from Denver and eastern publications, and served as a promotional voice for the region.

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[111] Nossaman, 1993: 87; Nossaman, 1993: 294; Pamgborn, 1878: 50

[112] Nossaman, 1993: 95, 113; Sloan & Skowronski, 1975: 21.

[113] Nossaman, 1993: 98, 113; Ransome, 1901: 21; *"San Juan Silver Mines"* *EMJ* (12/20/79): 452; Sloan & Skowronski, 1975: 21.

To keep pace with new construction, several firms erected additional sawmills at the timber stands. In 1876, Greene & Company merged its logging operation with Tower & Stevens on Mineral Creek (north of Silverton), and Melville & Summerfield set up another sawmill in the same area. After the company finished its lixiviation mill, it began selling the lumber in Silverton. H.F. Schenk brought a third sawmill into the Cement Creek drainage, previously untimbered. The San Juan Reduction Company erected a fourth sawmill at Gladstone in 1878.

In 1878 and 1879, several trends and forces set in motion events that permanently changed the social, industrial, and economic landscapes of San Juan County. One of the trends had to do with the value of silver. In 1878, the Federal government passed the Bland-Allison Act, which was, in essence, a massive subsidy for the silver mining industry. Initially, the government declared that the federal treasury would recognize a gold standard to the exclusion of silver. Concerned over the impact to silver mining, western senators and representatives drafted the Bland-Allison Act, which reinstituted the partial monetization of silver and required the government to buy the metal at an average of $1.20 per ounce, or around $21 today. Previously, silver fetched $1.15 per ounce, and the increase in value, coupled with the stability imparted by the Act, instilled considerable confidence among investors, mine owners, and ore buyers. This should have generated considerable interest in the Animas River drainage, where rich silver ore had been proven at a number of mines in need of development.[114]

A conspiracy of factors, however, prevented interest from taking hold. First, Colorado hosted two of the most significant booms in the West in 1878 and 1879, which captured the attention of investors. The first was Leadville and the second was Silver Cliff, ironically in the same area as Rosita, whose boom distracted investors from the Animas drainage in 1874. Second, the wave of mill and smelter failures in the San Juans and San Juan County specifically, clouded the region's reputation among individuals knowledgeable about sound mining investment. The ore could be profitably treated, as the Greenes, the Crookes, and Sweet's Sampler demonstrated, but investors instead focused on the failures. Third, the Meeker Massacre resulted in considerable caution. The Brunot Treaty granted various bands of Ute Indians title to the lands surrounding the San Juans, and following the established pattern, settlers encroached on the territory anyway, and the Utes were moved several times. The Southern Utes quietly settled on a reservation in southwestern Colorado. Nathaniel Meeker, in charge of the White River agency in northwestern Colorado, tried to force the Northern Utes into an agricultural lifestyle. As tensions between the Northern Utes and Meeker escalated, Meeker sent a communication to the army, which headed for the White River area against warnings by the Utes. The Meeker Massacre ensued. Subsequent virulent hysteria developed, although the settlers themselves had ultimately been the perpetrators. With the resultant Ute removal of 1881, however, the tribe was left with only two reservations in the state.

[114] Joseph King, *A Mine to Make A Mine: Financing the Colorado Mining Industry, 1859-1902* (Texas A&M University Press. 1977): 92; *Report of the Director of the Mint* (Washington, D.C., Government Printing Office, 1894) 20; Glenn O. Saxon, *Colorado and Its Mining Industry (1859-1959)* (New Haven: Yale University, 1959) 7, 8, 14, 16; Smith, 1982:92; Smith, 1994: 148.

For San Juan County, these factors proved to be very troublesome. Why, investors reasoned, should they risk capital on an underdeveloped and remote region where the climate was uncertain and problematic, when Leadville, Silver Cliff, and other booms held great potential? As a result, the mining industry in the drainage remained static and many of the small operations even ceased as their high-grade ore gave out. Production figures for the county reflect the downward trend. In 1876, the county's mines produced $56,000 in silver, $5,000 in gold, and $15,000 in lead. By 1879, the value dropped to $35,000 worth of silver, $6,000 in gold, and $20,000 in lead.[115]

Competition between the smelters and mills, built on the expectation of an increase in ore production, intensified and the vulnerable ones closed. In a move that stunned the Animas River drainage, the Greenes decided to suspend their operations at Silverton in 1879. Financial troubles, emotional exhaustion, and the distance of the Greenes from Silverton were partially responsible, but competition and ore that grew increasingly complex and difficult to treat were the major underlying reasons. The physical frailty of George Greene, the engine behind the business, certainly contributed as well.

Caught by surprise, the county's miners tried to assess how the smelter's closure would impact them. Other mills and smelters existed at Lake City and Ouray, but the costs of shipping ore over the mountains consumed most of the profits. Sweet's Sampler and the San Juan Reducing Company lixiviation works at Gladstone were able to process some of the ore, but the mining companies relegated themselves to producing only the highest grades of ore. As the county subsided into a depression, many wage laborers left, but visionary mine owners and business interests held fast because an end to their problems was already in sight.

William J. Palmer, William A. Bell, and other principals with the Denver & Rio Grande Railroad clearly saw the inevitable growth of southwestern Colorado and the potential offered by mining in the mountains. They began grading a line in 1876, spent three years traversing south around the San Juans, and established the town of Durango as a terminal. The track required several years to finish, but assurance of service in the near future increased optimism and confidence in San Juan County. The close proximity of the railroad would bring immeasurable benefit because trains could carry greater volumes of freight at much lower rates than wagons. Not only would this reduce the cost of living in the county, but also ore could be shipped to the large smelters in Black Hawk, Golden, Denver, Pueblo, and Leadville. Further, these facilities were prepared to profitably treat the district's complex ore.

While the residents of San Juan County were certainly excited about the Durango railhead, few thought that the Denver & Rio Grande would bear the exorbitant costs of grading a spur up the Animas River to Silverton. Palmer and associates, however, quietly made arrangements for exactly that. They envisioned Durango as the hub of an empire that would capture the two surest and most profitable aspects of mining, transportation and smelting. As track gangs pushed toward Durango in 1880, Palmer contacted John Porter, who had returned to

[115] Henderson, Charles W. *USGS Professional Paper 138: Mining in Colorado: A History of Discovery, Development, and Production* Washington, D.C., 1926, U.S. Geological Survey, Government Printing Office:216.

Eureka, Nevada, in 1877 and explained his strategy. He planned to build a massive smelter in Durango, capable of treating the most resilient ores the San Juans had to offer and at rates that would undercut the facilities in the mountains. A railroad to Silverton would carry ore down and send supplies and coal up, and similar lines to other portions of the San Juans were to be considered. In so doing, the Denver & Rio Grande would dominate the freight and smelting business with the investors as beneficiaries. Palmer offered Porter the position of chief metallurgist and manager of the smelter, which Porter accepted.

As a first step, Palmer, Bell, and associates organized the New York & San Juan Mining & Smelting Company in 1880 and, through Porter, secured the Greene Smelter. Porter then hired Thomas Bowen and John Pennington as metallurgists, and began securing contracts for ore at highly competitive rates. Porter had the Greene equipment freighted down to a site on the lower Animas at Durango, then unloaded. At the same time, the company came to an agreement with Edmund Sweet where Sweet would serve as ore buyer if he agreed not to expand his sampler into a smelter. To ensure a constant supply of ore, the company surveyed the best mines in the Animas River drainage and came to the conclusion that the Aspen, Ingersoll, Legal Tender, and the other mines on Hazelton Mountain offered the greatest potential. In 1880, the company approached Blair, Ingersoll, Higgins, and the other claim owners with an offer of $60,000, or $1,073,483 today, for their interests.[116]

News of the project traveled fast in the San Juans, and the inhabitants of San Juan County learned not only that they were to have direct rail service, which was a benchmark for any mining region, but also a new smelter. The greater mining industry had finally accepted San Juan County as legitimate, which stimulated attention. Prospectors returned, investors examined proven properties, optimistic individuals cautiously invested in new properties, however, and existing companies and successful mines saw greater development. Curiously, the county's production figures continued to fall instead of rise. In 1880, the existing companies generated only $13,000 worth of silver, $6,000 in gold, and $21,000 of lead. The reason for the trend was that, instead of shipping ore to the distant smelters at high costs, the mine owners engaged in some production, much underground development, and patiently waited for Palmer and Porter to finish the railroad and smelter. By 1882, the owners deposited around 1,200 tons of payrock at the future railroad depot in Silverton and stockpiled more at their mines.[117] The dismal production figures belied an overall increase in activity among the county's mines, although the industry remained depressed. Mine owners in particular benefited from the wave of confidence and either invested capital developing their properties or sold to one of a number of new companies.

In the Las Animas district, most of the owners were unwilling to sell because they knew their mines were valuable and would only become more so. Instead, owners self-funded development and improvement. The Aspen complex remained one of the district's most important mines, and the New York & San Juan company consolidated the 4,000 feet of

[116] *"Mining News"* EMJ (3/27/80): 222; Nossaman, 1993: 295-296; Nossaman, 1998: 39, 58; Smith, 1992:18.
[117] Henderson, 1926:216; Nossaman, 1998: 180.

disparate workings into a single operation. Foreman C.M. Osman kept a crew of thirty-five miners based in Quartzville busy driving development workings and stockpiling ore in anticipation of the railroad's arrival.[118]

North Star Peak and Dives Basin remained the Las Animas district's other key center of ore production. During the summer, Martin Van Buren Wason, Theophile Benjovsky, George Ingersoll, and others maintained production from the Shenandoah and Dives mines, as well as several surface operations. In complete control of the North Star, the Crooke brothers became unsatisfied with the seasonality of operations and decided to consult with a professional mining engineer in 1880. At this time, Ebenezer Olcott arrived in Lake City at the Crookes' doorstep.

Olcott came from a wealthy New York family, and from an early age was interested in mining and had the opportunity to enter the industry from the top. Olcott studied engineering and metallurgy at Columbia School of Mines in New York, graduated in 1874, and took a job as a chemist for the Ore Knob Copper Company in North Carolina. In 1875, he accepted a position as superintendent of the Pennsylvania Lead Company, and then jumped at an offer the following year to work as an engineer for the Orinoco Exploring & Mining Company in Venezuela. In 1879, Olcott returned to the United States, established a consulting practice, and easily secured several important clients due to his experience. D. Willis James of Phelps, Dodge & Company was one of Olcott's best clients, and Olcott quickly packed his bags when Willis requested a survey of a number of significant mining districts in the West. Olcott started in Colorado and perused Leadville, Silver Cliff, and Caribou, before heading to Lake City in 1880 specifically to examine the Crooke Mining & Smelting Company.[119]

The Crookes were open to showing Olcott the North Star Mine in hopes of securing additional investment. The North Star was probably unlike anything that Olcott had yet seen, and during his visit, he was immediately impressed by the harsh environment. Seemingly as an act of fate telling him that the North Star was to play a role in his future, Olcott was literally struck by a small lightning charge, which electrified him all the more. When Olcott returned to Lake City, he and the Crookes came to a mutual understanding. They realized that Olcott had what it took to bring the mine into substantial production, and Olcott saw the Crookes and the mine as an exciting physical and management challenge. Olcott negotiated a sound deal with the Crookes that included a $25,000 investment in the North Star from Willis and associates in exchange for a monthly salary of $500, or $8,946 today, plus expenses.[120]

While the North Star was arguably more difficult to work than nearly all the other mines in the county, it exemplified the typical operation above treeline. Olcott kept a crew of eight miners busy developing the North Star vein through three levels, with the lowest tunnel as the principal point of entry. Each tunnel had one small blacksmith shop and either a platform or bin in which the miners stored sacked ore for shipment by burro. The living quarters were within a crude boardinghouse integral with the tunnel house and blacksmith shop at the lower level.

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[118] *"Mining News"* EMJ (12/11/80): 384; Nossaman, 1998: 99, 202.

[119] Nossaman, 1998: 18; Duane A. Smith, *San Juan Gold: A Mining Engineer's Adventures, 1879-1881* (Montrose, CO: Western Reflections, 2002) 6.

[120] Nossaman, 1998: 18; Smith, 2002: 29, 115.

Though the operation was seasonal in theory, winter came early at 13,000 feet and presented the crew with considerable challenges. As the temperatures plummeted and the winds picked up in fall, the miners may have grown claustrophobic in the cramped quarters. The interior was more like a ship than a boardinghouse. The miners spent nearly all their time in one large room when not at work because the outside was intolerable. They slept in a set of bunks three tiers high, warmed themselves around a single stove, ate meals together, and competed for the few pieces of furniture during leisure. Sacks of provisions were suspended from the ceiling, boxes were stacked along the walls, and tools leaned against the corners. On windy nights, warm air promptly left the drafty building and the stove was insufficient for heat. Damp rags froze and workers could see their breath. The crew simply had no escape from each other, the ambiance of mining, or the cold. But like their counterparts elsewhere in the county's high mines, they labored until Olcott called an end to the season in November or December.[121]

On the opposite side of North Star Peak in Little Giant Basin, the positive climate of 1880 and 1881 fostered not only prospecting, but also the development of several of the ore veins discovered earlier. Prospectors searching the rock formations at the gulch's head found a rich vein that carried silver and industrial metals exposed at the surface and claimed it as the Potomac. They had no trouble finding buyers, who organized the Potomac Silver Mining Company and immediately began development. As early as 1879, prospectors were driving a tunnel south into a cliff on the floor of Little Giant Basin to undercut the Big Giant vein at depth. They erected several buildings including a tunnel house to support activity underground and, in 1880, found investors who furnished capital for major development. A small crew of miners drove the tunnel to the impressive length of 400 feet where they struck a vein laced with gray copper and silver ore. Excited, the investors increased the crew to seven miners who began extracting and stockpiling the ore. Down the gulch to the north, a party of prospectors hoped for the same result and pushed an exploratory tunnel toward the Black Prince vein.[122]

The King Solomon Mine was Little Giant Basin's most important operation, although it, like most of the producers in the Las Animas district, remained small, shallow, and labor-intensive. In 1879, the Ressouches brothers realized that their King Solomon would never pay in desirable quantities without capital for development. Despite the regional economic slump at the time, they interested Robert Hook, a lawyer who practiced in Silverton during the warm months and in Chicago during the winter. Hook convinced other investors in the Windy City of the King Solomon's potential, and together they organized the Solomon Silver Mining Company to work the property. The Ressouches brothers retained a significant share of the company and probably personally oversaw development in 1880 while Hook acted as superintendent.[123]

Once the King Solomon began proving its potential in 1881, the Ressouches and Hook elicited additional money from the Chicago investors to pay for an expert engineer capable of increasing production. The nationalistic Ressouches brothers had an individual in mind, who was Victor Vincent, a fellow Frenchman. While Vincent actually had little direct experience with

[121] Smith, 2002:115.
[122] *Denver Republican* (9/24/81):5; *"Mining News" EMJ* (2/21/80):137; *"Mining News" EMJ* (3/13/80):189; *Rocky Mountain News* (10/19/79):4.
[123] Nossaman, 1993:23; *Rocky Mountain News* (8/26/79):5.

mining, he was an accomplished engineer in France, as well as a talented artist. Vincent had aspirations of becoming a well-practiced American mining engineer and came to the Animas River drainage in the late 1870s. Hoping that the King Solomon would be his first step in a career, Vincent convinced the Ressouches to hire him. During the year, Vincent was given charge of a crew of sixteen, who increased development of the vein while bringing ore to daylight.[124]

Within the Las Animas district, the movement of prospecting and claim development crept over to the northwest face of Kendall Mountain above Silverton. After the sale of the Ingersoll Tunnel, Thomas Higgins pursued other interests, including backing his wife Mary Anne in a lease on the Grand Central Hotel in Silverton in 1881. He also invested in two highly promising claims staked in Swansea Gulch during the late 1870s. One, the Lackawanna, was within a short walk from Silverton and consisted of a group of claims that covered several veins on the gulch's east side. The other, the Scranton City, lay at treeline at the base of a cliff on the gulch's west side. In light of the coming railroad and the smelter in Durango, Higgins sensed that the time was right to bring the claims into production and hired several miners to work with him in initial development. At the same time, prospectors were at work driving tunnels and sinking shafts into six other claims on Kendall Mountain.[125]

The Eureka district, and especially the core area around California Gulch, drew more interest among new investors than perhaps any other portion of San Juan County. Capitalists local and distant organized at least ten new companies, which developed seven mines into substantial operations and speculated on numerous other claims. In addition, the six companies and partnerships already in production during the late 1870s continued to conduct development and store their ore.

Increased activity fostered the growth of Eureka and Animas Forks, which evolved from tenuous camps into small towns with business districts. By 1880, Eureka had a population of around 125 residents, although less than half lived in the town year round. A full assemblage of businesses satisfied their needs, as well as those of individuals who came to find work or examine the surrounding mines for investment. Thomas G. Andrews and Peter Tallman opened a combination restaurant and hotel. H. Bert Clifford ran another, while the wives of local investors kept several boardinghouses. Tallman also tended a mercantile that competed with Engleman's store, and Henry Helmboldt established a branch meat market. Tallman and Andrews served liquor in their hotel, and other entrepreneurs opened two saloons in 1881. That year, the townsite company also formally platted and surveyed Eureka. While Winspear's smelter was silent, the sawmill was not and produced construction materials desperately needed.[126]

Several individuals noteworthy in Colorado's history claimed Eureka as home. One was James R. McKinney, who arrived in Eureka in 1879 to direct the Moline Silver Mining Company

[124] Nossaman, 1998: 307.

[125] *"Mining News"* *EMJ* (8/13/87): 119; Nossaman, 1993: 38; Nossaman, 1998: 44.

[126] *Colorado Business Directory* (Denver: 1879); J.A. Blake: 196; *Colorado Business Directory* (Denver: 1881); J.A. Blake: 168; Nossaman, 1993: 211, 125; Susanne Schulze *A Century of the Colorado Census* (Greeley: University of Northern Colorado, 1976): 1880-5.

for investors in Illinois. The company developed the Confidence prospect in Eureka Gulch and the Sultana Mine on Sultan Mountain. The venture was largely a failure, although the Sultana produced in later years, and McKinney sought income by opening a livery stable in Eureka. He ran the business for several years before moving to Colorado Springs, where he became involved with the Exchange National Bank. Through this organization, McKinney invested in Cripple Creek when that district boomed and realized a huge fortune. He reinvested some of this in Colorado's beet sugar industry, which assumed a prominent role in national production.[127]

Theodore B. Comstock opened an assay shop in 1879. Described by peers as overly energetic, Comstock was born into an upper class family in Cutahago Falls, Ohio in 1849 and immediately embraced the sciences. He gravitated toward geology at Cornell University, establishing the school's renowned geological department. In 1873, Comstock combined a lust for adventure with his penchant for science and joined Captain W.A. Jones' exploratory party to Yellowstone in 1873, producing the first geological report of the area. He subsequently led his own expedition into Canada's Northwest Territory and made some of the first scientific observations of the far north. Afterward, Comstock decided to use his geological knowledge for profit and came to the Animas River drainage to examine the possibilities of establishing an ore treatment facility, knowing that this would be difficult due to the complexity of the ore. He solved some of the region's treatment problems and later moved to Arizona, founded the University of Arizona School of Mines in 1891, and maintained a consulting practice as a mining engineer.[128]

Animas Forks did not grow quite as dramatically as Eureka, in part because the town was already established. A basic business district included several mercantiles, a drugstore, several lodging establishments, a blacksmith, and an assayer. Animas Forks also boasted two ore treatment facilities and a sawmill. One of these was Charles McIntyre's Greenleaf Mill, which ran intermittently because not well-suited for the district's ore. The other was Eclipse Smelter, which James Cherry built in 1880 as part of one of the district's promising new ventures. Cherry and fellow investors organized the Eclipse Mining & Smelting Company with a plan of buying several proven properties and building the smelter to treat the ore. Like McIntyre, Cherry also forecast treating custom lots from local outfits to increase income. He purchased the Eclipse, Red Cross, and Mountain Queen mines at the head of California Gulch, the latter of which had been ready to provide ore since 1877. In 1880, Cherry erected the smelter in the Animas drainage several miles south of Animas Forks, testing Mountain Queen ore in 1881 with complete success. At least, this is what the eastern investors believed. The smelter actually had great trouble with the complex ore, and Cherry realized that he would need more capital to refit the facility. However, without informing the investors, Cherry had applied some Eclipse capital and most of the proceeds from the test run to another mining scheme that collapsed. In 1881, the

[127] Carl Abbott, Stephen Leonard, and David McComb, *Colorado: A History of the Centennial State* (Niwot, CO: University Press of Colorado, 1994 [1982]): 181; *Colorado Mining Directory*, 1883: 654; Nossaman, 1993: 336.
[128] Nossaman, 1998: 210; *"Obituary" EMJ* (8/7/15): 243; Spence, 1993: 58.

multiple failures came to a head. As the investors discovered the truth, Cherry disappeared and the smelter abandoned like so many other failures.[129]

The Eclipse was one of two monumental failures that gave remote investors pause. The other was the Bonanza or Mineral Point Tunnel. Franklin Pratt, a businessman, but no mining engineer, underestimated the cost of boring a mile-long tunnel in the San Juans. The operation started well, and Pratt took the highly progressive approach of using rock drills to expedite the drilling and blasting process. In 1878, Pratt lured drill expert Whittemore away from the Highland Mary to install a compressed air system at Mineral Point. The system was the second in the county and among the earliest in Colorado. As noted above with the Highland Mary, rock drills and air compression were new technologies in the late 1870s, and became indispensable for mining around twenty years later. The system and general expenses of operating in the San Juans consumed $300,000 to $400,000 by 1880, which placed Pratt in a difficult position. He had a tunnel only 1,000 to 1,500 feet long to show for such an astounding cost, with triple the distance yet to go. The Mineral Point Tunnel Company went bankrupt in 1881, and the Silver Peak Mining Company of London bought the property and continued work. They suffered a similar fate and suspended operations in 1884.[130]

Despite the failures, a number of investors maintained a general sense of confidence in the operations around Animas Forks. In Placer Gulch, Rasmus Hanson discovered what he thought was an extension of the Sunnyside Vein, which he named the Sunnyside Extension. L.C. Osborne may have grubstaked Hanson because Hanson granted him a share of the claim. The Mastodon Mining & Reduction Company continued developing the adjoining Mastodon, and nearby, the Gordon Mining Company developed the Sound Democrat. This promising property was under female directorship, rare in western mining. In 1881, Canadian Martha A. Gordon organized the company to speculate.[131]

Eureka enjoyed its share of mining ventures during 1880 and 1881. Mercantile owner Milton Engleman received news that miners struck rich gold ore in the Sunnyside on the east shore of Lake Emma, named for his wife. The word was welcome, but the operation uncertain because of conflict among the owners. In particular, when Engleman began development during the late 1870s, he offered interests in the property to his in-laws for capital. They squabbled over profits, control, and ownership, which poisoned the relationships between Emma, Milton, and the family. Barely in control of the Sunnyside, Engleman ordered the ore to be stockpiled instead of sold. On California Mountain above the Sunnyside, Ruben McNutt discovered rich ore in his Washington claim and sold to the Colorado Mining, Smelting & Investment Company.[132]

In 1881, several new companies began work in Picayune Gulch, east of Lake Emma. Chicago investors established the Treasure Mountain Mining & Milling Company and developed the Pacific on Treasure Mountain. New York capitalists organized the Great Animas Gold & Silver Mining Company with two purposes. One was to speculate with hardrock claims and the

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[129] Marshall and Zanoni, 1998: 142; Nossaman, 1998: 111-4, 203-4; *"San Juan Mining News" EMJ* (9/11/80): 170.
[130] *Colorado Mining Directory*, 1883: 672; Nossaman, 1993: 194; Nossaman, 1998: 98.
[131] *"Mining News" EMJ* (8/7/80): 93; *"Mining News" EMJ* (7/19/90): 81; Nossaman, 1993: 202; Nossaman, 1998: 106.
[132] Nossaman, 1993: 206; Nossaman, 1998: 124; *"San Juan Mining News, Colorado" EMJ* (10/2/80): 2.

other was to operate what may have been the first large-scale placer mine in the county. In particular, the company began processing the gold-bearing gravel of Picayune Gulch with hydraulic placer methods. Around one mile up the Animas River canyon from Eureka, the Silver Wing Company continued to drive a deep tunnel to undercut its claims at depth. Miners did so with rock drills, marking another early use of the machines in the San Juans.[133]

The Mineral Point district finally saw its first serious activity since the mid-1870s. Because the region was near Hinsdale County, the few productive mining outfits in the district did not wait for the railroad to arrive at Silverton and instead shipped to the Lee and Crooke smelters. The Polar Star on Engineer Mountain was the largest, and because the Crookes owned the mine, the ore naturally went to the Crooke Smelter. The Red Cloud was the other major operation at Mineral Point. In 1879, E.B. Greenleaf's Mineral Mountain Mining Company bought the Red Cloud and adjoining claims from Pratt, possibly when he needed capital to save the Mineral Point Tunnel from going bankrupt. The company then invested in a concerted development campaign. James Trezona, a Cornish miner with extensive experience in California, Nevada, and Michigan, hired thirty miners and sank several shafts on the Red Cloud Vein with steam equipment. The company was rewarded at the end of 1880 with a rich strike and sustained production.[134]

Most other operations in the Mineral Point district were little more than prospects. Chicago interests established the Palmyra Mining Company and installed one of the district's first steam hoists and sank a shaft. The Colorado Mining & Land Company, the Chicago & San Juan Mining Company, and other interests developed other prospects.[135] James K. Herring oversaw development of the Maid of the Mist on the divide between Mineral Point and Poughkeepsie Gulch. Herring earned minor fame in 1883 as groom in North America's highest-altitude wedding to Mary Beck at Mineral Point. Herring purchased a share in Sound Democrat Mine and served as superintendent at the Red Cloud under Trezona. In 1880, he was given charge of the Maid of the Mist.[136]

As can be expected, the town of Mineral Point enjoyed a growth due to activity in the district. The town center was a cluster of around forty cabins, a mercantile, butcher, saloon, and blacksmith. A boardinghouse provided accommodations for local miners, while visiting dignitaries chose between the Forest House and Mineral Point hotels. The population was around 200, but this included the workforce scattered amid surrounding mines.

The Poughkeepsie Mining District deviated from the sluggish trend in the rest of the county and saw major activity between 1879 and 1880. Firstly, in terms of location, Lake City and Ouray were almost as easy to reach as Silverton. Thus when the Greene Smelter closed, the

[133] *Colorado Mining Directory*, 1883: 637, 678; Nossaman, 1993: 250.
[134] *Colorado Mining Directory*, 1883: 653; *"Mineral Point Mines, Colorado"* *EMJ* (9/4/80): 155; *"Mining News"* *EMJ* (8/28/80): 143; *"Mining News"* *EMJ* (11/27/80): 351; Nossaman, 1998: 117.
[135] *Colorado Mining Directory*, 1883: 624, 660, 663; *"Mineral Point Mines, Colorado"* *EMJ* (9/4/80): 155; "Mining News" *EMJ* (11/27/80): 351; Nossaman, 1998: 119.
[136] Henn, 1999: 47; *"Mineral Point Mines, Colorado"* *EMJ* (9/4/80): 155.

mining outfits found it economical to pack their ore, however small the production, to the Lee or Crooke smelters in Hinsdale County or to the Windham and Norfolk & Ouray smelters. Either trip remained protracted, however, and therefore costly.

Secondly, Horace Tabor's interest in the district stimulated confidence that, in actuality, may have been disproportionate with the prospects. In 1878, Alfred Hard, a principal with the Mastodon Company, purchased the Alaska Mine in Alaska Basin, which descended northeast into Poughkeepsie Gulch. He convinced Tabor to provide capital for development, and they organized the Alaska Consolidated Mining Company. Tabor was a national celebrity through his fortune made at Leadville and a romance with the diva Baby Doe. The Alaska proved rich, and Tabor announced that he would finance a concentration mill in Cement Creek. While the mill was never built, the success of the operation, its association with Tabor, and his personal examination of the mine made a news sensation.[137]

By 1880, the district featured nine mines in production. Of these, only the Alaska, Bonanza, Red Rogers, and Old Lout were well-developed, the rest shallow and small operations. Two prospectors staked the Bonanza in 1877, which the Kalamazoo Bonanza Mining Company bought in 1879, driving the Bonanza Tunnel, and sinking a shaft. The Old Lout yielded small amounts of ore from 1877 until 1879, when it saw substantial development.[138]

Business entrepreneurs arrived in the district on the heels of Tabor and the swarm of prospectors that followed. As early as 1877 or 1878, freight packers traveling between Silverton and Ouray maintained a camp on Lake Como, which became the seed for a small mining hamlet. William Boot took time from his Mineral Point mercantile to open the first store and saloon in 1879, and others established a restaurant. The Poughkeepsie post office established in 1880, when Lucius B. Kendall began printing the *Poughkeepsie Telegraph* newspaper.[139]

Kendall was overly optimistic about the future of Poughkeepsie, however, as the boom died within a year. In 1881, the Alaska went bust, Tabor lost interest, and most prospectors were unsuccessful. Nearly all the nascent mines were quickly exhausted. When the prospectors, business owners, and most of the mining outfits left for winter in 1881, they did not return. Poughkeepsie lost its post office, although the store may have opened seasonally for several years afterward. The Poughkeepsie district would not participate in the boom that swept the rest of San Juan County when the railroad arrived in 1882.[140]

The Early 1880s Boom, 1882 – 1885

In 1881, the Denver & Rio Grande Railroad prepared to lift the mining industry of San Juan County out of its slump. The railroad was not motivated by altruism, however, and stood to gain huge profits. The carrier organized the subsidiary Denver & Rio Grande Extension and

[137] *Colorado Mining Directory*, 1883: 611; Frank Fossett, *Colorado: Its Gold and Silver Mines, Farms and Stock Ranges, Health and Pleasure Resorts* (New York: C.G. Crawford, 1880): 528; Henn, 1999: 59; Nossaman, 1993: 173, 250.
[138] *"Mining News" EMJ* (8/7/80): 93; Nossaman, 1998: 118.
[139] Bauer, et al., 1990: 116; Nossaman, 1993: 226.
[140] Bauer, et al., 1990: 116; Henn, 1999: 59; Nossaman, 1998: 101.

began grading a narrow gauge line up the Animas River canyon from Durango to Silverton, despite the challenges construction presented.

In the summer of 1882, the first formal train arrived in Silverton bearing capitalists and dignitaries. It was greeted by jubilant spectators, as well as 1,200 tons of ore that had been stockpiled in anticipation of the railroad's completion. Finally, the county had an all-season link with the outside world and New York & San Juan Smelter, the largest ore treatment facility in southwestern Colorado. The railroad was revolutionary for day-to-day life, business, and mining. Commerce exploded because a wider array of goods became readily available at a much lower cost,. During the mid-1870s, residents paid as much as $400 per ton of freight from Denver, a cost which fell as low as $100 when the Denver & Rio Grande established its railhead at Durango. The Denver & Rio Grande Extension, also known as the Silverton-Durango railroad, reduced the cost to $16 per ton, which tumbled to $12 when regional business interests protested the rates. The railroad also opened the county to affluent capitalists who could travel more comfortably and stay in one of the hotels in Silverton.[141]

At the same time, John Porter and Thomas Bowman brought the New York & San Juan Smelter, popularly known as the Durango Smelter, into action. The smelter was large enough to process ore in economies of scale, which allowed the New York & San Juan company to undercut smaller facilities in the mountains. The combination of rail service and the discounts offered by the Durango Smelter dramatically reduced mining overhead. Whereas freighting outfits charged $35 to $40 to haul a ton of crude ore to the Front Range for treatment, a mere $12 would send the same material to Durango. Delighted, mining companies reassessed the worth of their properties because abundant medium-grade ores were now profitable to produce.[142]

While popular history claims that the discount service offered by New York & San Juan crushed the local smelting industry, this was not completely true. Smelters continued to operate in Lake City, Ouray, and Telluride because the cost of freighting the ore over to Silverton for shipment remained high, and in Silverton, the industry did not collapse; it merely adjusted. The complex ore and numerous small mines in the county guaranteed a market for a few custom independent smelters and samplers.

As early as 1881, Seth R. Beckwith forecasted the need for a local smelter in the vacuum left by the removal of the Greene facility. He, Edward C. Dean, Lemon G. Hine, and Almon M. and Henry H. Clapp organized the Martha Rose Smelting & Mining Company in hopes of filling what was a void, despite the presence of the Durango Smelter. Beckwith was an experienced metallurgist who had surveyed mining districts in Arizona, Nevada, and Colorado. With British capital, Beckwith and Arthur Macy, another metallurgist, began construction of the Martha Rose Smelter on the northwest edge of Silverton in 1882. They competed aggressively with the New York & San Juan for ore contracts and locked in the Potomac, Silver Lake, Gray Eagle, and a few nascent operations in the Ophir area.[143]

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[141] *"Mining News"* EMJ (12/30/82): 350.

[142] *Report of the Director of the Mint*, 1882: 545; Henderson, 1926: 11; *"Mining News"* EMJ (9/16/82): 151; Nossaman, 1998: 215; Smith, 1992: 27.

[143] *Report of the Director of the Mint*, 1882: 545; *Colorado Mining Directory*, 1883: 650; Nossaman, 1998: 204, 206; *Rocky Mountain News* (5/10/82): 2.

Beckwith started the smelter in September, confirming claims that the Animas River drainage's mining industry was prolific enough to support both a local facility and the Durango Smelter. After a successful trial run, Beckwith and Macy ordered their workers to dig into the 1,000 tons of stockpiled ore. Like most smelters, the Martha Rose furnaces had to be stopped periodically to remove slag and input more ore, but after the third or fourth day, no new charges were added. The operation stalled due to financial, legal, and management issues and the owners spent additional money suing each other over the problems. Even though the Martha Rose was an engineering success, it became a financial failure soon idle.[144]

Ore samplers, however, continued to serve the needs of the small mines that yielded complex payrock. Although the New York & San Juan certainly wanted the business, their small difficult batches of ore were ultimately not financially feasible due to the adjustments and interruptions required for custom treatment. As a result, Sweet's Sampler thrived. Sweet also wisely adapted to the railroad and Durango Smelter combination by expanding the sampler's niche, but within the terms of his arrangement with the New York & San Juan Company. In addition to providing custom treatment, Sweet bought ore, tested it to identify the best smelting methods, segregated the payrock, then brokered shipments to the Durango Smelter. This strategy was so effective that, in 1883, Germans Edward G. and Gustavus H. Stoiber came from Leadville to open their own sampler near the Martha Rose.[145]

The rise of concentration mills in the Animas River drainage was another response to the New York & San Juan. As aforementioned, concentration mills were not intended to produce matte or refined metals, but merely separated the metalliferous ore content from waste. By concentrating the ore, mining companies could avoid shipping waste-laden payrock to the Durango Smelter and the fees levied for full treatment. The concentrating process began when crushers pulverized crude ore into gravel, following which Cornish rolls, pan grinders, stamp mills, and ball mills gradually reduced the gravel further into particles ranging from sand to slurry. Screens segregated particles by size, followed by concentration in jigs, vanners, and other appliances using gravity and water currents. While the process seems simple, it was nothing of the sort. The character of the ore's host rock, the chemical compounds of the metals, and the different types of metals conspired to render concentration in the Animas River drainage a science fraught with difficulty and the potential for failure. Particle size, the behavior of crushed material and metals, and the specific gravity of the rock types required calculation, experience with machinery and metallurgy, experimentation, and outright cunning to win them from the host rock.

Few metallurgists and engineers in the Animas River drainage possessed all these abilities, but several persevered during 1882 and 1883 to make concentration a viable adaptation to the changed circumstances of the ore treatment industry. Although the Niegolds pioneered ore concentration at Niegoldstown, Theodore B. Comstock developed truly effective methods using his assay shop in Eureka as a front to understand the character of the county's ores. When the

[144] *Report of the Director of the Mint*, 1882: 545; *"Mining News"* *EMJ* (12/30/82): 351; Nossaman, 1998: 206; *Rocky Mountain News* (10/17/82): 6.
[145] Henderson, 1926: 49; Warren C. Prosser, *"Silver Lake Basin, Colorado"* *EMJ* (6/20/14): 1229; Sloan and Skowronski, 1975: 29.

railroad arrived in 1882, Comstock applied his knowledge and understanding of scientific processes to complete an efficient sampler in Silverton. What separated Comstock's facility from the Sweet and Stoiber samplers was that, in addition to small-batch sampling, the Comstock Sampling Works also included a complete concentration process that separated metalliferous material from waste without smelting. Comstock contracted with the North Star on Sultan Mountain and other mines for ore, enjoyed early success, and shipped the products to smelters in Denver, Omaha, and St. Louis for final refining. He carefully avoided doing business with Sweet and New York & San Juan because they were now staunch competitors.[146]

Comstock's precedent of concentration began to take hold in the region, and the county saw construction of three mills in 1882 and five more facilities the following year. Late in 1882, George Ingersoll erected a small mill at Green Mountain Mine in Cunningham Gulch. The Green Mountain Mill proved a success probably because the Green Mountain ore was fairly straightforward. The other two mills treated custom ores solicited from mines in the Las Animas and Eureka districts. The Solomon Silver Mining Company built one of the two custom mills in the western portion of Howardsville. J. Woodbury Jones built the Middleton Mill at a new settlement between Eureka and Howardsville. Jones and New York investors organized the Uncompahgre Mining & Smelting Company and built the mill to process ore from both their Uncompahgre Chief Mine and other contributors. The Solomon Mill was an outright failure even though it featured adequate equipment. The mill's simplicity, juxtaposed with complex ore and improper adjustments were to blame. The Middleton Mill proved only partially successful because it was tailored for ore in the district's northern reaches, which differed greatly from material produced elsewhere. Thus the mill treated payrock produced from a relatively narrow geographic area.[147]

Of the five mills erected in 1883, three were for in-house use while the other two accepted custom ore. Milton Engleman financed one of the in-house mills at the Sunnyside Mine, despite a conflict with his extended family. Engleman hired John H. Terry to build the facility at Eureka in 1883, with Terry fresh from milling the complex gold ores of Gilpin County. Terry was Comstock's equal in designing an effective process, in part because the Sunnyside ore was similarly complex gold compound that resisted traditional methods. Terry built a ten-stamp mill at Lake Emma which used mercury to amalgamate with free-gold and concentration machinery to recover the material that would not amalgamate. The mill produced concentrates and some gold bullion, which the Englemans in turn used to fund their legal squabbles.[148]

Comstock built the other successful in-house concentration mill at the North Star Mine on Sultan Mountain. When planning his sampler, Comstock forecast that the North Star Mine would become one of his largest clients due to proximity and the affinity of his process to North Star ore. Further, the mine was on the brink of becoming a major producer. In 1881, eastern investors organized the Sultan Mountain Mining Company, purchased the North Star, and hired Oliver Posey as manager. Posey drew John Williams and the Sultan Tunnel into the company

[146] *"Mining News"* EMJ (8/26/82): 112; Nossaman, 1998: 210-3.
[147] *Colorado Mining Directory*, 1883: 679; *"Mining News"* EMJ (12/30/82): 350, *"Mining News"* EMJ (12/29/83): 401; Nossaman, 1998: 262.
[148] Marshall and Zanoni, 1998: 119; Ransome, 1901: 176.

and began production. In 1882, Comstock offered to build a concentration mill adjoining his sampler and lease the facility to the North Star. Posey agreed, and Comstock's mill began in earnest in 1883.[149]

Gladstone, largely idle since the lixiviation mill failure of 1879, hosted the county's third in-house concentration plant. Theodore Stahl operated an assay shop in Howardsville during the late 1870s and became involved with the Gladstone Mining & Reduction Company, which attempted to restart the lixiviation mill in 1881. Although the operation was a failure, Stahl became aware that prospectors had found an unusual vein on Bonita Mountain that featured a combination of silver and bismuth. They claimed it as the Sampson, which Stahl purchased in 1882 to recover the metals, especially the bismuth. Satisfied by his assay experiments, in 1883 Stahl organized the Southern Colorado Bismuth & Silver Mining Company, allocated investors, and began development of the Sampson. He built a surface plant at the mine, a concentration mill near Gladstone, and the second tramway in the San Juans linking the two. During 1883, Stahl's miners made a rich strike that ordinarily would have elated owners, but in fact confounded the operation. In particular, they encountered gold, and exploration revealed that with depth, the gold content increased while the silver and bismuth decreased. Whereas Stahl thought he had a silver and bismuth mine, the Sampson turned out to be a gold mine. He produced some ore and shipped it to distant smelters in hopes of enough income to refit the mill. Regardless, the Sampson Mill drew the first substantial population to Gladstone in years, and the workers filled the available housing.[150]

Like the in-house mills, the custom concentration plants built in the county in 1883 met with mixed success. Cherry's idle Eclipse Smelter below Animas Forks was one custom facility converted from a failed smelter with limited success. As with the Middleton Mill, the metallurgist found the ore differed in character depending on the source, and batches from different portions of the Eureka district must be treated variably. After three years of experimentation, intermittent operations, and constant adjustments the Eclipse investors withdrew.

The other custom plant was the product of an entirely new center of activity in the county's northwestern portion. As early as 1874, prospectors found mineralized veins along both sides of the main and middle forks of Mineral Creek, but because the formations were scattered and offered largely low-grade ore, the drainage attracted only minor attention. The Silver Crown on Mill Creek, western tributary to Mineral Creek, was the most promising mine during the late 1870s and saw some development. At the same time, prospectors examining Red Mountain Creek on the north side of Red Mountain Pass found deposits of silver ore. In 1881, John Robinson prospected the east side of Red Mountain Creek and staked the Guston, and John H. Haynes located the Congress. These were promising discoveries, and yet, from outward appearances, were too low in grade to generate serious interest. However, these initial assessments proved deceiving. Convinced that it was only a matter of time before they found a significant vein, Robinson returned in 1882. Near camp, they discovered rich samples of float,

[149] *Colorado Mining Directory*, 1883: 658; *"Mining News" EMJ* (10/21/82): 217; Nossaman, 1998: 202, 213.
[150] Bauer, et al., 1990: 62; *"Mining News" EMJ* (9/22/83): 187; *"Mining News" EMJ* (10/13/83): 235; Nossaman, 1998: 310.

chunks of ore broken off a parent vein and scattered on the ground by erosion. The party traced the float to its source and unearthed a vertical stock of ore they named the Yankee Girl. The find was so large and pure that it incited a true rush to Red Mountain valley. The event was at first a local, and quickly a statewide phenomenon. When Robinson and Haynes turned their attention back to the Guston and Congress, they found that at depth, these ore bodies were as significant as the Yankee Girl, which further fueled the rush.

By 1883, prospectors organized the Red Mountain Mining District, established several camps, and staked hundreds of claims. The district extended north from Red Mountain Pass and encompassed the valley on the west side of the Red Mountains, which lay mostly in Ouray County. The Mineral Creek district was to the south and the Poughkeepsie district to the east, both in San Juan County. The Red Mountain district developed quickly due to the proximity over Red Mountain Pass of commercial centers, communication systems, and transportation routes.

Just as San Juan County residents laid the foundation for the Red Mountain rush, they were also poised to profit from the event. The county was the main port of entry into the Red Mountain district, and Silverton the starting point for two routes. One logically followed the main fork of Mineral Creek to the base of Red Mountain Pass, where a settlement known as Sweetville began to grow in 1882. E.T. Sweet's saloon was the first business and became a seed for the camp. C.P. Mallett opened a restaurant, followed by William Emerson's butcher shop and Frank W. Barnes' lumberyard. The rival camp of Chattanooga materialized adjacent. In 1883, the two camps merged under the name of Chattanooga and one secured a post office. Afterward, T.E. Guerin started the Enterprise Restaurant, prospector Charles Robinson and Benjamin Brown opened mercantiles, and J.W. Shields erected a hardware store. Chattanooga was ready to serve the basic needs of prospectors and investors in the Red Mountain district.[151]

Other entrepreneurs completed key infrastructure that deepened the relationship between the Red Mountain district and Chattanooga. In 1883, the San Juan County commission awarded George W. Seaman a contract to grade a wagon road from Chattanooga. At the same time, Silverton pioneer Henry Adsit, George H. Brown, and James Downey organized the Red Mountain Sampling & Concentrating Company and built a custom mill at Chattanooga. This was San Juan County's second concentration facility built in 1883 and apparently modeled after Comstock's dual flow path. The intent was to provide processing for the Red Mountain district's low-grade material. The same year, the Mineral Creek Concentrating Company prepared to build a mill at Chattanooga, although it may have been the same facility.[152]

The other route from Silverton into the Red Mountain district ascended Cement Creek, from which prospectors crossed west over several passes between the Red Mountain peaks. The traffic increased business in the Gladstone mercantile, which already did a sound trade with the Sampson miners. But Gladstone failed to grow, and entrepreneurs established two nearby and competing settlements in 1883. The most promising was Del Mino, which George W. Bachman and William Bowman started at the mouth of Prospect Gulch. Other businessmen founded Vernon at the mouth of Georgia Gulch a short distance south of Del Mino. During 1884, Mineral

[151] Bauer, et al., 1990: 32; Nossaman, 1998 :278-9.
[152] *"Mining News" EMJ* (8/25/83): 119; Nossaman, 1998: 289, 291.

Creek became the most popular route, and traffic in Cement Creek declined and neither hamlet survived. Del Mino's buildings were moved to Gladstone.[153]

In stark contrast, Silverton literally boomed due to the railroad, its role as Red Mountain gateway, and as the center of the county's growing mining industry. Thomas Blair and Dempsey Reese saw their quiet hamlet evolve into a noisy hub of industry, freight, commerce, finance, and communication. By end of 1882, Silverton had eleven telephone subscribers. In 1883, the San Juan County Bank was formally chartered as the First National Bank of Silverton. Green Street became the commercial district and its side streets offered diverse businesses and services. Silverton hosted the first mining business exchange in the San Juans. Cushing M. Bryant, a successful metallurgist from Boston, opened Bryant's Mining Exchange in 1882, as a clearinghouse stocked with reference books and periodicals as well as access to investments. In 1883, Henry Adsit, Edmund Sweet, W.G. Melville, and other investors organized the Silverton Electric & Gas Light Company, although they did not immediately act.[154]

As the county's main point of contact with the outside world, Silverton was the principal cultural center. John and Amanda Cotton ran Cotton House, a community performance and celebration hall of sorts. The saloon was one of the most important social institutions in any mining camp, and Silverton featured around thirty, as well as two dance halls, mostly on Blair Street. The saloons in Silverton served as communication centers, public meeting halls, and entertainment centers. Silverton's residents even finally found time for God during the early 1880s. The Congregational Church Society built the first church in 1881, and the Catholics built their church in 1883. Many of Silverton's residents brought the tradition of fraternal orders with them, which was another important institution on the mining frontier. Fraternal orders provided social contact, assistance, guidance, death benefits, and even a primitive form of unemployment support. Men joined the Masons, the Odd Fellows, the Order of Eastern Star, and the Woodmen of World, while some women belonged to the Women of Woodcraft and the Rathbone Sisters.[155]

These and other organizations served as surrogate families for the few residents bold enough to winter in the county, and the organizations hosted holiday celebrations. Silvertonians and regional residents made sure that they enjoyed every holiday to the fullest and orchestrated social events on the slightest pretense. In 1876, young men established a baseball league and the older residents organized dances that drew men from miles away. Summer was a time for the Animas River drainage residents to celebrate their mining culture and, starting in 1882, miners' contests became a part of every July Fourth event.

A few visionary residents, mostly from Silverton, continued Dempsey Reese's low-level promotional campaign during the early 1880s, although by now, Silverton earned a name in the greater mining industry. As a showing of local pride, some of the mine owners in the Las Animas district contributed show-quality ore specimens for presentation and a contest at the

[153] Bauer, et al., 1996: 43; Nossaman, 1998: 289.
[154] Nossaman, 1998: 38, 68, 302, 236, 304, 306.
[155] Ronald Brown, *Hard Rock Miners: The Intermountain West, 1860-1920* (Texas A&M Press, 1979) 45; Henn, 1999: 151; Nossaman, 1998: 317, 323; Wolle, 1995: 422-4.

National Exhibition in Denver in 1882. Several local voices and experts maintained contact with reporters for the *Rocky Mountain News*, various mining industry journals, and the United States Mint. The most reputable individuals such as Theodore Comstock even produced their own articles on the region for publication.[156]

Paralleling the rise of positive attributes, crime and vice increased in the Animas River drainage, although it never approached the levels misrepresented by popular history. Through 1878, Howardsville, Silverton, and greater San Juan County were able to claim only one shooting each. By 1881, there was certainly more violent crime such as shootings, but it was proportional to the overall increase in population and occurred mostly among the rough element in Silverton. Robbery and theft, reliant on the anonymity of a large population, also increased. To prevent crime from reaching the epidemic proportions experienced in other boom towns, Silverton fathers hired legendary Bat Masterson to keep order while other concerned citizens formed midnight vigilance committees, which made use of the noose on more than one occasion. In contrast to another myth of the mining frontier, the Animas River drainage was nearly bereft of prostitutes. "Aunt Jane" Bowen brought the first of these service workers to Silverton around 1878 as the town grew and found the market quite limited. The entire Animas River drainage was unable to support more than around twelve prostitutes into the early 1880s. To be near the potential customers, the prostitutes set up shop on Blair Street, which was the region's only red light district. Amusingly, to distinguish themselves apart from the strip of sin, those respectable citizens who already lived on Blair Street renamed the ends of the avenue Empire Street.[157]

While the Red Mountain rush was certainly an important local event, the county's established mining industry was even more significant. The three public samplers, the Martha Rose Smelter's brief life, and four successful concentration mills directly reflected a highly productive and growing industry. The number of mines either in development or production between 1882 and 1886 doubled. In particular, the county hosted around ninety-one small mines, eight medium-sized operations, two large producers, and two placers. A small mine is defined as a shallow operation with basic surface facilities, a handful of miners, and limited output. A medium-sized mine had between five and thirty workers, fairly extensive workings, and a surface plant with at least several buildings. A large mine had extensive workings, a surface plant with substantial buildings and some machinery, a workforce greater than fifty, and a significant output. While the number of operations doubled, their tonnages of ore mushroomed by a factor of ten. The ore value soared from $53,000 in silver, $10,000 worth of gold, and $16,000 for lead in 1882, when the railroad arrived, to $749,000 in silver, $40,000 worth of gold, and $207,000 in lead by 1885. Mineral exploration continued largely as before, and prospectors developed around 375 claims, only a slight increase from the late 1870s.[158]

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[156] *Rocky Mountain News* (6/20/82): 2; *Rocky Mountain News* (7/18/82): 8; *Rocky Mountain News* (7/22/82): 2; *Rocky Mountain News* (9/15/82): 2.

[157] Robert L. Brown, *An Empire of Silver* (Denver: Sundance Publications, 1984) 53; Nossaman, 1993: 166; Smith, 2002: 80; Wolle, 1995: 422.

[158] Henderson, 1926: 216 for production figures. The number of mines derives from a survey of 1879 and 1883 *Colorado Mining Directories* and weekly county summaries in *EMJ*.

Las Animas Mining District

In contrast to the rest of the county, the roster of active mines in the Las Animas district barely increased after 1882, although almost every significant operation began sending ore down to Silverton. At the Aspen, the New York & San Juan company appointed Thomas Hackett as foreman because of his experience driving the Ingersoll Tunnel. Under Hackett, a large crew of miners drilled and blasted six to seven tons of ore per day, which Sweet's Sampling Works prepared for shipment to the Durango Smelter. By 1883, the Aspen featured at least 7,000 feet of underground workings.[159]

To the southwest, new properties high on the flank of Kendall Mountain began to make good on their promise of ore. In 1882, the Lackawanna Tunnel & Mining Company drove two tunnels to undercut the J.B. Smith and A.J. Craine veins. A short distance up Swansea Gulch, miners pushed Thomas Higgins' Scranton City Tunnel toward another vein. Almost one mile to the west, above Silverton, prospectors discovered a vein with potential in Idaho Gulch and staked the Idaho Group of claims. During 1883, a small party of miners leased the property and shipped ore to a Denver smelter for testing and treatment. The ore was visually impressive but difficult to treat and therefore less profitable than the lessees hoped for.[160]

In Little Giant Basin, the operators of the Big Giant Mine encountered similar problems when their tunnel reached the target vein. The ore assayed well but was too complex to treat at a profit, and the operation stalled. The nearby Solomon and Potomac mines more than made up for the Big Giant's lack of production. At the Potomac, miners enjoyed the relatively easy work of drilling and blasting ore from the vein's surface and shipped the particularly rich payrock to Durango.[161]

Still aspiring to become a mining engineer and operator, Victor Vincent deepened his involvement with the Solomon Mine, which proved his undoing. In 1882, Vincent interested fellow Frenchmen Jules Rifflard and Richard Salembier in the Solomon and discussed leasing the property from the Solomon Silver Mining Company. The trio agreed, Vincent appealed to the wealthy Arthur C. King in New York City for capital, and they organized the French Silver Mining Company. The outfit retained the Solomon company's crew of twenty miners and kept them busy all winter producing ore. After encountering a 10"-wide vein of solid copper and galena ore, the French petitioned the Ressouches brothers and Solomon Silver Mining Company to sell the claims. The owners agreed, but only on condition of regular payments and specified underground development should the French default and abandon operations.[162]

After signing the sale contract, Vincent was suddenly caught in a difficult position. In an unrealistically short time, King began demanding returns on his investment while the Ressouches reminded Vincent about their payment schedule. To appease King, Vincent procrastinated on the required development and directed the miners to extract ore as fast as they could. After several

[159] Nossaman, 1998: 100, 203, 307; Ransome, 1901: 162.

[160] *Report of the Director of the Mint*, 1882: 547; *Report of the Director of the Mint*, 1883: 409; *Rocky Mountain News* 10/17/82): 6; *Rocky Mountain News* (7/21/82): 2; *Rocky Mountain News* (8/30/83): 2.

[161] *Report of the Director of the Mint*, 1882: 547; Nossaman, 1998: 206; *Rocky Mountain News* (6/24/82): 3; *Rocky Mountain News* (8/18/82): 2.

[162] *"Mining News" EMJ* (11/11/82): 259; Nossaman, 1998: 308.

months, the Ressouches found out about the neglected development and immediately ordered a stop to ore production, which left Vincent in an impossible situation. He was not allowed to produce ore until he paid the Ressouches, and he could not pay the Ressouches without mining ore. The French defaulted on the contract and the Ressouches attempted to reclaim the Solomon Mine, but the French resisted. At a deadlock, both parties filed suit at the end of 1883 and shut down the operation. Deflated, Vincent quit the French and returned to France.[163]

To the southwest Silver Lake Basin began to resound with activity. In 1881, several prospectors imitated John Reed and made the dangerous ascent into the basin, where they examined the west wall a short distance south of Reed's claim. After climbing rock cornices, they found a rich vein, staked it with the Iowa and Stag claims, and began development of a tunnel and shaft. At the end of the season, the party had ore samples assayed in Silverton. The report surprisingly found that the ore was not only rich with silver and industrial metals, but also gold. In 1882, the party returned and began production. The members enticed a crew of miners to make the sheer cliff at the Iowa their home for the working season with all the supplies and lumber necessary to build a basic surface plant.[164]

While the Iowa miners acclimated, John Reed labored on Silver Lake a short distance to the north. During 1880 and 1881, he traced the Silver Lake vein for a considerable distance with shallow excavations hewed into solid bedrock. In 1882, he produced several tons of ore from a tunnel he drove while lamenting the slothful progress due to the short working seasons. To be caught by a heavy snow in the basin would be a life-threatening event, which forced him down relatively early each year.

During a stay in Silverton in 1883, Reed convinced John W. Collins that the Silver Lake and Round Mountain claims would pay well if worked, but required an initial investment. For a share of the Silver Lake, Collins and Reed formed a partnership, ascended into the basin, and began production. Reed and Collins also packed in enough lumber and equipment to build a small blacksmith shop and cabin. They hired a small crew of miners to begin a second tunnel. Once the miners reached the vein, the party produced around five tons per day and packed it down to Sweet's Sampler.[165]

On the east side of Silver Lake Basin, Julius Johnson drove a tunnel underneath the Royal Tiger claim. An old-time prospector, he leased the property from McPherson Lemoyne. The lease ended around 1883 when Lemoyne sold the Royal Tiger to Innis, who hoped to approach his fabled lake of gold from the opposite side of the mountain should the Highland Mary fail, which it was.[166]

After ten years of confusing instructions, conflicting orders, and decisions that railed against common sense, Edward Innis finally ran out of money. In 1885, he closed the Highland Mary. Innis' reliance on a psychic confirmed the suspicions of workers and caused a minor sensation in the Colorado press. *Rocky Mountain News* announced: "The Silverton *Miner*

[163] *Report of the Director of the Mint*, 1882: 548; Nossaman, 1998: 308.

[164] Ransome, 1901: 157; *Rocky Mountain News* (8/1/82): 3; *Rocky Mountain News* (9/19/82): 3.

[165] *Report of the Director of the Mint*, 1883: 409; Henderson, 1926: 49; Nossaman, 1998: 307; Ransome, 1901: 149; *Rocky Mountain News* (8/30/83): 2.

[166] Nossaman, 1998: 325; Prosser, 1914.

pronounces the Highland Mary Mine a howling failure. This mine has been worked, says the *Miner*, under the direction of spirits."[167] Innis left the county broke and embarrassed, with little recognition that, despite the complete lack of ore production, he had made the Highland Mary one of the most advanced operations in the San Juans to date. In the process, he squandered around $1 million (or $19,000,000 today) and paid his seeress $50,000.[168]

Eureka Mining District

Unlike the Las Animas district, Eureka enjoyed a major boom between 1882 and 1885. Capital flowed, the number of substantial operations increased, and ore production rose as a result. California and Placer gulches, in the district's northern portion, saw the most activity. After limited success with the Alaska Mine, Alfred Hard settled in Animas Forks or Eureka. Hard served as manager of the Mastodon Mining & Reduction Company in Placer Gulch, which was so productive that he planned for a mill. When not at the Mastodon, Hard worked as a superintendent at several other mines and participated in new ventures. In particular, Hard and his Cleveland friends organized the Silver Lead Mining Company in 1882 and speculated on claims near Eureka.[169]

Rasmus Hanson was easily as busy as Hard, if not as successful. Born in Denmark in 1847, Hanson immigrated to Quebec at age twenty-one, and moved on to Chicago. The opportunity for adventure drew Hanson west, as far as Cheyenne where financial circumstances forced him to work for the Union Pacific Railroad. He became interested in mining, saved pay, and tried his luck prospecting in Nevada. Unsuccessful, Hanson migrated to Central City in 1870, Clear Creek County, and ultimately Park County, where he prospected and worked as a miner. In 1873 or 1874, Hanson realized that the San Juans presented possibilities, being recently opened.

He built a cabin and realized his dream in 1880 by discovering the Sunnyside Extension at the head of Placer Gulch. As noted above, he worked the claim with L.C. Osborne, but Osborne apparently tired of the labor and leased the property to Hanson in 1882. Hanson struck rich ore during the year and realized enough income to buy the property in 1883. From that point, Hanson engaged in a cautious development strategy anathema to most profit-hungry mine owners. Specifically, he did not overcapitalize the operation and instead reinvested his profits in development and improvements. Progress was slow, but steady, and once the mine was ready for major production, Hanson stood to profit significantly. This pattern characterized the first years of the Sunnyside Extension, and in 1885, Hanson was ready to treat ore in his own mill and save the fees levied by custom plants. He leased the Greenleaf Mill at Animas Forks. The Greenleaf, however, performed no better on Hanson's ore than on material from the rest of the Eureka district, so he relinquished the lease, planned his own mill, and patiently saved his money. Hanson attempted to increase his income by working the Atlantic for the Red Gulch Mining &

[167] *Rocky Mountain News* (8/10/85): 6.
[168] *Denver Times* (7/10/01): 5; Eberhart, 1987: 345; *Rocky Mountain News* (9/14/58): 65.
[169] *Colorado Mining Directory*, 1883: 650, 672.

Milling Company at the same time as the Sunnyside Extension. A fire in the Atlantic tunnel house, however, destroyed his equipment.[170]

To the west in California Gulch, new owners of the Mountain Queen prepared to bring the mine into production. When James Cherry left the county following the Eclipse failure, investors sold company assets to two camps. One bought the smelter and refitted it as a concentration facility. The other group purchased the Mountain Queen, originally supposed to provide the smelter with excellent silver ore. While sources conflict regarding the exact date, S.W. Thorne likely bought the mine in 1882 for the high price of $125,000, which inspired confidence among other investors. Thorne pursued a development campaign and brought the mine into meaningful production. Shortly afterward, Thorne formalized the operation as the Mountain Queen Mining Company.[171]

Despite the positive economic climate of the early 1880s boom, some of the established operations ran into considerable difficulty. After significant investment in advanced equipment, Matt France drove the lower tunnel on the Silver Wing and finally reached the target vein. Unfortunately, the vein did not feature ore in the same amount or character as it did near the surface, and instead offered complex, low-grade material that was difficult to treat. Although France may have been confident that he could find profitable ore, investors were unwilling to risk more money and suspended work. France probably produced small amounts of ore from the upper workings in an attempt to pay the costs of further exploration. Conversely, mining engineer J.F. Taylor at Mineral Point Tunnel in California Gulch, previously the Silver Peak Mining Company, grossly underestimated the cost of driving the mile-long tunnel. By 1884, the tunnel was still far from its destination and had not encountered any of the hidden veins that were expected. Taylor had little to show, his British investors granted no more capital, and the operation went bankrupt due to unpaid debts. The town of Animas Forks lost a major employer, and the tunnel remained closed for decades.[172]

Numerous other operations and a large population at Animas Forks mitigated the loss. During the early 1880s, Animas Forks had a distinct business district, numerous cabins, a population of at least 160 residents with an additional 300 scattered amid the surrounding mines. The business district catered to the needs of workers primarily and visiting company officials secondarily. This can be expected because of the town's role as the Eureka district's northern commercial hub and the eastern gateway into the county. Eureka was the second most important town in the mining district and the commercial hub for its central portion. The population was similar to that of Animas Forks, but the surrounding mountains featured fewer mines and the area population was therefore less. Thus, Eureka did not grow as quickly as Animas Forks and had a smaller business district.[173]

The southern portion of the Eureka district finally saw activity during the early 1880s as prospectors began to develop claims in Minnie and Maggie gulches. Oliver and Frank Gorsage

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[170] Brown, 1984: 92; *"Mining News"* *EMJ* (7/19/90): 81; Nossaman, 1989: 178; Nossaman, 1993: 193, 202; Nossaman, 1998: 261.

[171] Marshall and Zanoni, 1998: 143; Nossaman, 1998: 265.

[172] Nossaman, 1993: 121.

[173] *Colorado Business Directory*, 1884: 200; *Colorado Business Directory*, 1885: 228; George A. Crofutt, *Crofutt's Grip-Sack Guide to Colorado: A Complete Encyclopedia of the State* (Omaha: Overland Publishing Company, 1885) 90.

built cabins at the mouth of Maggie Gulch and worked the Auburn, Charity Ann, Minnie, Silver Lead, and other nascent mines. Their camp evolved into the settlement of Middleton, which attracted a mercantile and the Middleton Smelter. The Hover Brothers found the pasture offered by the wide Animas River valley was excellent for cattle and established a dairy. Middleton was never formally platted as a town, but it remained an important local settlement for decades.[174]

The mines on the east side of Cunningham Gulch were among the county's earliest producers and enjoyed additional improvements during the early 1880s boom. It remains debatable whether the east side was in the Eureka district's far southern extent or the east edge of the Las Animas district. In either case, Reese, Mulholland, Blair, and Mickey Breen sold the Green Mountain Mine to British interests in 1881, who in turn leased it to George Ingersoll and partner. The concentration mill that Ingersoll built in 1882 functioned correctly, unlike most, and provided Ingersoll sound returns for several years. Nearby, Christian Schoellkopf kept twenty miners busy extracting a substantial tonnage of ore from the Pride of the West. Around 1880, he developed the vein through three tunnels, and each had its own tunnel house and ore bin. To the north, another party began preparing the Old Hundred for production.[175]

Mineral Point Mining District

The Mineral Point district enjoyed a small wave of interest during the early 1880s. Even though the district was far from Silverton, the samplers there provided mining companies with an alternative to the smelters in Hinsdale County, and the cost of goods and materials was less due to the railroad. The Polar Star and Red Cloud continued to be the principal operations. By 1882, the Crookes developed the Polar Star to the point where the underground workings were accessed through tunnels on both the San Juan and Hinsdale county sides of Engineer Mountain. The mine was more important to the Crookes than ever because their smelter was in financial difficulty and they needed the high-grade ore. Greenleaf and his Mineral Mountain Mining Company maintained production at the Red Cloud through two shafts and expanded work to the nearby Burrows No.2. In addition to these principal producers, a few partnerships began shipping high-grade ore from shallow mines such as the Big Giant, Bill Young, San Juan Chief, and Palmyra.[176] The remote town of Mineral Point changed little during the early 1880s. The population increased slightly to 200, which supported two mercantiles. The town featured the Forest House and Mineral Point Hotel.[177]

Mineral Creek Mining District

While Silverton was popularly known as a mining town, the definition came mostly from a role as the milling, ore shipment, and business center of San Juan County. In actuality, few

[174] Nossaman, 1998: 262.
[175] Nossaman, 1998: 101
[176] Nossaman, 1998: 123.
[177] *Colorado Business Directory*, 1884: 276; *State Business Directory*, 1885: 326; Crofutt, 1885: 120.

mines of significance lay within a reasonable distance by foot, at least until 1882. At that time, the development of some of the county's largest and most important operations granted Silverton a direct association with ore production. The mines were centered on the Hercules and North Star vein system at the base of Sultan Mountain, an easy walk from town.

As noted above, the Sultan Mountain Mining Company purchased the North Star in 1881, hired Oliver Posey as manager, and began heavy production. The company gladly leased the concentration mill that Theodore Comstock built at the mine and enjoyed substantial profits. The mill generated so much concentrate that the Denver & Rio Grande graded a siding just for the mine. However, the available ore underground began to dwindle and the company responded by selling the entire operation to Lucius B. Kendall for $75,000 in 1884. Kendall obtained the money from investors and profits earned from the Bonanza Mine in the Poughkeepsie district. He astutely observed that the Sultan Mountain company merely extracted the shallow ore and failed to fully develop the vein at depth, leaving vast ore reserves. Kendall sold a one-third interest to W.M. McKelvey for $72,500, and they organized the Silverton Mining Company. Through the sale, Kendall recovered his own costs and had plenty of capital for formal development. Posey was out of a job, although the Congress and Yankee Girl mines, two of the best in the Red Mountain district, now consumed his attention. He purchased them in 1882 with George Crawford of Pittsburgh, in addition to the National Belle in 1884, and soon realized a fortune. Kendall and McKelvey did well also, because the North Star became one of the county's longest-lived producers.[178]

A short distance to the south, several other companies were at work on the Hercules and Little Dora veins. One outfit had been driving the Empire Tunnel toward the Little Dora in 1881 in anticipation of the railroad and struck the formation. When trains began service, the company sent its ore to the Durango Smelter. After John Williams sold his interest in the Sultan Tunnel, he turned his attention to the Victoria section of the vein system. Knight, Slocum & Company did a little work on the system and likely started the Montezuma Tunnel. In 1881 or 1882, Williams became involved with the Victoria Consolidated Mines Company, which purchased the incomplete Montezuma and Ajax tunnels and began pushing them toward the Victoria and Hercules veins. By 1884, Williams had both tunnels in production.[179]

During the mid-1880s, subtle change began to creep through the county. The first sign was that many small pocket mines and shallow operations either curtailed or suspended production altogether. Another indicator was that investors grew tight with the capital necessary to develop small mines into sound producers. In 1886, a combination of internal and external problems brought to an end the boom stimulated by the railroad and Porter's smelter. Miners exhausted the shallow veins, overestimated their ore reserves, and found that the substantial veins decreased in value and increased in complexity with depth. In short, miners had finished off the easily treated, shallow ore and were left with deeper unprofitable material. Outside the

[178] *"Mining News"* EMJ (8/4/83): 71; *"Mining News"* EMJ (6/14/84): 448; Nossaman, 1998:265; Smith, 1994: 37.

[179] *Colorado Mining Directory*, 1883: 680; *"Mining News"* EMJ (12/22/83): 387; *"Mining News"* EMJ (11/8/84): 320; *Silverton Standard* (3/12/10): 1.

district, a synergy of forces eroded confidence in the silver market and not only caused the value of the white metal to slip, but also made investors wary. In particular, opponents of the silver standard shifted Treasury policy in favor of paper currency and opposed the free coinage of silver. In 1885, the value of silver decreased from $1.12 per ounce to $1.06 and continued a downward trend until it bottomed out at $.94 in 1888. The watershed year, however, was 1886, when silver reached $1.00 per ounce, which seemed to be the threshold for mining investors. The prices for industrial metals fell in parallel, and they constituted a significant portion of the county's ore. Copper dropped from $.21 to $.16 per pound, and lead decreased by a penny to $.04 per pound.[180]

The net result was that the mine owners and operators in San Juan County saw their profits evaporate and closed many of the remaining operations. In the Las Animas district, almost all the mines went idle except for the Aspen, North Star, and Titusville (recently developed on Kendall Peak). In the Eureka district, the roster of productive mines fell until the Sunnyside, Hanson's Sunnyside Extension, and the Mountain Queen remained the only reliable principals. Mineral Point's miners exhausted the shallow ore, and investors were unwilling to risk more capital on deeper work. Cement Creek was quiet and grew even more so when the Sampson Mine, the most promising operation, went bankrupt in 1885. To the west, activity in the Mineral Creek district contracted around Sultan Mountain and Chattanooga, which shrank in size and depended on Red Mountain district traffic more than ever.

A third symptom of the countywide problems was that well-funded companies scaled back their operations and tried cutting costs, much of which was labor. In 1885, S.W. Thorne reduced the wages of his miners at the Mountain Queen from the already low rate of $3.00 per shift to $2.50 without reducing the price of room and board in tandem. Miners protested and threatened to strike. At the Aspen Mine, John Porter decreased wages from $3.50 to $3.25. For additional savings, however, he stopped providing miners with the luxury foods they had grown accustomed to. Pay and food being sacred to miners, they still threatened to strike and Porter, unwilling to negotiate, tested the miners' will.[181]

Unfortunately for Thorne and Porter, they underestimated the miners' resolve and set in motion the county's first serious labor dispute. The miners walked away from both operations, and the Aspen crew appealed to the Silverton chapter of the Knights of Labor, the most powerful miners' union in Colorado during the 1880s. The union met with Porter, who proved intractable, and word quickly spread and other groups of miners threatened to strike in sympathy. Porter and Thorne's actions appeared to initiate a wage-cut trend that other mine owners throughout the county would imitate. To nip this in the bud, miners in support of their Aspen and Mountain Queen brethren gathered in huge numbers in Silverton and pressured Porter to accede. Tensions ran high and the fate of the region's entire mining industry teetered on Porter's decision.[182] Backing up their threat in writing, a reporter for the *Engineering & Mining Journal* noted: "At a

[180] Brown, 1984: 191; *"Mining News"* *EMJ* (8/14/86): 119; *Report of the Director of the Mint*, 1894: 20; Saxon, 1959: 7-9, 14-7; Smith, 1994: 184.
[181] *Rocky Mountain News* (1/31/85): 1.
[182] *Rocky Mountain News* (1/31/85): 1.

meeting of miners held at Silverton, a resolution was passed and signed by all who were present, pledging themselves not to work for less than $3.50 a day."[183] Unwilling to precipitate a catastrophe, Porter conceded and his miners went back to work. Thorne instead closed the Mountain Queen. When the investors found out about this and Thorne's other mismanagements, they ousted him. The Aspen Mine, a bellwether of the Las Animas district, went silent for the first time in over ten years. It was now obvious that a depression was at hand.

The Late 1880s Slump, 1886 - 1889

San Juan County entered a dark period in 1886, and the principal mining interests of the county had reason to believe that silver's value would continue to slide. And yet, they instituted a handful of significant projects using mostly their own capital. The projects did not involve fabulous discoveries, new veins, or rich ore. Instead, they were an attempt to improve efficiency through mechanization and other infrastructure improvements, increase production, and reduce the extraction cost per ton of ore mined. Some of the projects were costly, and they collectively maintained some momentum to mining industry in the county.

The Las Animas district hosted a significant share of the activity. Howardsville assayer Thomas Trippe spearheaded one of the county's most important projects in 1888 when he convinced investors to build a $50,000 concentration mill for the Titusville Mine. Trippe asserted that separating the waste from the metalliferous content and then shipping the concentrates to the Durango Smelter would provide significant cost savings. Instead of building the mill at the mine, Trippe sited it on Deer Creek near the Animas River where he could harness water power. Moving the ore to the mill, however, was a problem and in response, Trippe contracted for a Huson aerial tramway to carry the ore for a distance of around 8,000 feet. This may have been the county's third major tramway system. Because the construction season was short, the mill was not ready when winter set in. Trippe, however, had been courting St. Louis investors who accepted his word as an experienced mining expert that the operation was one of the best in the region. There was certainly some truth in this because the tramway was the second ever built in the Las Animas district, and the mill was one of a few constructed within the last five years. Trippe then negotiated a deal for an astounding $250,000, which he divided among his investors.[184]

The North Star Mine on North Star Peak was among the few operations to weather the 1886 recession, but not without difficulty. The Crookes finally wearied of the high operating costs engendered by the challenging location and floundered for ways to trim the budget. With their Lake City smelter closed, the Crookes accepted the reality that they had to send the ore to the Durango Smelter. The teamsters took the shortest route to the railroad at Silverton, leading mule trains on a well-built trail that wound around the exposed east summit of North Star Peak, down Little Giant Basin, and to a transfer station in Arrastra Gulch. There, workers hefted the sacked payrock into wagons and completed the final leg to Silverton. This cumbersome process

[183] *"Mining News"* EMJ (2/14/85): 112.
[184] *"Mining News"* MSP (3/31/88): 205; *"Mining News"* EMJ (10/5/89): 299; *"Mining News"* EMJ (11/22/90): 605; Ransome, 1901: 161.

consumed a huge proportion of the profits, and so the Crookes finally decided to invest in a concentration mill to separate out some of the waste. Why they waited until 1889 is a mystery since the benefits of concentrating ore for a mine such as the North Star were well known by then. Regardless, the Crookes invested $40,000 to $50,000 in a facility similar in scale to Thomas Trippe's Titusville Mill. The North Star facility, however, was not nearly as well planned. The Crookes could have followed Trippe's template with the Titusville and sited the facility on the floor of Cunningham Gulch. The distance from mine to mill had the ideal fall line for an aerial tramway. Instead, the Crookes chose a location at the head of Little Giant Basin along the Silverton route, which required that the crude ore be packed around North Star Peak first. In addition, the physical environment presented the same impediments that convinced Trippe to build his mill lower down on the Animas River. When finished during 1889, the *Engineering & Mining Journal* praised the mill as the highest in the nation at 12,700 feet. This, however, was an exaggeration because the mill actually lay at around 12,160 feet. The Crookes ran the mill until 1892, when they moved it down to the mouth of Boulder Gulch.[185]

At the time that Trippe and the Crookes were building their mills, the New York & San Juan Mining & Smelting Company was reorganized as the San Juan Smelting & Mining Company and consolidated its assets to achieve the business practice known as vertical integration. The massive company controlled coal mines, coke ovens, the Durango Smelter, transportation, and several silver mines including the Aspen complex. Given the low price of silver, San Juan Smelting & Mining decided to remedy the awkwardness of managing the Aspen's five separate tunnels and improve efficiency by driving a central haulageway to undercut the vein system at great depth. In 1888, the company commissioned the Amy Tunnel, named for Henry Amy, manager of the Durango Smelter, on the north base of Hazelton Mountain, 1,000 feet lower than the mine's early workings. In so doing, miners could work the ore veins from the bottom up and haul the ore through the tunnel to a proposed concentration mill. By 1889, miners drove the tunnel more than 1,000 feet where they struck the ore system and brought the property back into profitability. In later years, the tunnel was renamed the Aspen to reflect its association with the Aspen ore system.[186]

The Eureka district had grown relatively quiet except for two of its principal mines, which were the Sunnyside and Sunnyside Extension. The high gold content of their ores was the reason that these two mines did well during the recession. Although the value of silver ebbed, that of gold did not, but the recession created difficult economic conditions. As a result, the owners of the mines attempted to reduce their operating costs in the same manner as Trippe and the Crookes. Both, however, needed no outside investors and instead had their saved earnings for exactly such purposes.

Rasmus Hanson, owner of the Sunnyside Extension, continuously if not cautiously reinvested his profits in formal development for long-term operations. Progress was slow for several years because Hanson's funds were limited, but by 1886, he finally shifted from development to substantial production. He generated so much gold and silver that his income

[185] *"Mining News"* EMJ (6/29/89): 595; *"Mining News"* EMJ (9/21/89): 252; Ransome, 1901: 23.
[186] *"Mining News"* MSP (5/5/88): 285; *"Mining News"* EMJ (5/12/88): 347; Ransome, 1901: 162; Smith, 1982: 56; Smith, 1992: 27.

partially offset the decline of the other mines in terms of the county's overall production figures. Hanson also saved enough capital to build his own mill. Thus, he organized the Sunnyside Extension Mining Company and began construction at the mine in Placer Gulch. Originally, Hanson entertained grand plans of electrifying the facility with power generated at a hydro plant on the Animas River, but quickly shelved the idea. In 1889, Hanson finished the mill and found it to be a metallurgical success.[187]

John Terry combined elements of Trippe's Titusville model and Hanson's electrification plan when he erected a mill in Eureka Gulch for the Sunnyside Mine. He was unsatisfied with the small capacity, inefficiency, and remote location of the stamp mill at Lake Emma and petitioned Milton Engleman to fund a new facility. Like Hanson, Terry wanted to electrify the mill, and similar to Trippe, he thought a lower location and an aerial tramway were best. Also like Hanson, Terry was unwilling to incur too much debt and so planned to build the system in financially sustainable phases. Thus, he began construction in 1889 at a confluence deep in Eureka Gulch, around one mile west of the town. The mill featured two processes that relied on mercury to amalgamate with free gold and concentration equipment to recover the material that resisted amalgamation. A small hydro-power plant was installed at the mill, which provided lighting and probably ran the machinery. When finished in 1890, the facility performed well and allowed Terry to increase production at the mine, but he waited until capital reserves were replenished before adding the tramway.[188]

The other major project in the county was a fifth mill erected during the late 1880s. This one went up within sight of Silverton on the base of Sultan Mountain at what was now known as the Victoria Mine. During the mid-1880s, John Williams brought either the Ajax or Montezuma tunnel into production under the Victoria company and demonstrated that the Hercules and Little Dora vein system were productive. On this premise, even though the value of silver was at a low point in 1888, Williams managed to sell the Victoria company to a group of Boston capitalists. They reorganized Williams' outfit as the Victoria Mining & Milling Company and continued production. It remains uncertain who proposed the idea of a mill, but Williams was convinced that shipping concentrates to the Durango Smelter was far less costly than waste-laden ore. In 1889, the investors fronted the money for the mill and secured Alonzo Smith to build it. Smith claimed he had superior experience from his participation in erecting Colorado's first stamp mill, which is unproven. The new Victoria Mill and the nearby North Star complex, which may have been the most productive mine in the county during the late 1880s, contributed greatly to Silverton's popular image as a gritty mining town.[189]

Otto Mears backed the last major project completed in the Animas River drainage during the late 1880s, and it had a regional impact. After assembling a network of lucrative toll roads in the eastern San Juans, Mears saw a railroad as the next logical step in his transportation empire and proposed a line from Silverton northwest up Mineral Creek, over Red Mountain Pass, and down into the Red Mountain district. No one but Mears, John Porter, and the most powerful

[187] *"Mining News"* EMJ (12/29/88): 551; *"Mining News"* EMJ (9/21/89): 252; *"Mining News"* EMJ (12/7/89): 505.
[188] Marshall and Zanoni, 1998: 119; Ransome, 1901: 176.
[189] *"Mining News"* EMJ (12/1/88): 465; *"Mining News"* EMJ (9/21/89): 252; *Silverton Standard* (11/9/89): 2.

mine owners thought that it could be done, and they brought their capital to bear and completed the Silverton Railroad in 1888. The railroad astonished the mining industry and the Denver & Rio Grande directors, who claimed that such a venture was impossible. The mine owners in the Red Mountain district had a direct interest in the new line because the railroad reduced their high operating costs and restored profitability despite the low value of silver. Porter in particular wanted the railroad because he needed the ore for the Durango Smelter, which had trouble securing enough payrock due to the recession. Even though the Silverton Railroad better served the Red Mountain district than Silverton, the railroad benefited San Juan County. In essence, the railroad ensured that the county, and especially Silverton, remained the all-season portal into the Red Mountain district. This was crucial during the late 1880s because, despite the new mills, the rest of the county's mining industry was in poor condition.[190]

[190] Whitman Cross, Earnest Howe, and F.L. Ransome, *Geologic Atlas of the United States: Silverton Folio, Colorado* (Washington, .D.C: U.S. Geological Survey, Government Printing Office, 1905) 26; Henn, 1999: 134; Sloan & Skowronski, 1975: 35; Smith, 1982: 50; Smith, 1994: 166; E.F. Tucker, *Otto Mears and the San Juans* (Montrose, CO: Western Reflections, 2003) 91.

The Value of Silver Restored, 1890 – 1893

The residents of San Juan County were rewarded for their perseverance through uncertain times when the politics surrounding the value of silver turned in their favor. During the late 1880s, western legislators clamored for a return to a pro-silver policy to bolster sagging mining industries in their states, as well as their own personal silver stock portfolios. Well organized, they succeeded in 1890 in passing the Sherman Silver Purchase Act, which required the federal government to buy 54 million ounces of silver per year at $1.05 per ounce. The figures fostered a demand and price capable of resuscitating the west's silver mining industry, creating jobs, revitalizing regional economies and improving the popularity of the legislators among constituents.[201]

San Juan County was caught up in the return to mining, and more than just its economy was revitalized. The mountains boomed with sound, and an atmosphere of industry and purpose returned. During 1890, investors loosened their purse strings and purchased some of the proven mines, invested in mills and machinery to lower operating costs, and enlarged existing operations. The net result was an increase in the number of operations, amount of ore produced, and population. During the late 1880s recession, the county featured between ten and twenty small mines, around seven medium-sized operations, and one substantial producer. During the early 1890s, this increased to at least twenty small mines, ten medium-sized operations, and two substantial producers. The production of metals almost doubled from the 1890 figure of $337,000 in silver, $187,000 worth of gold, and $156,000 in lead.[202]

During the revival, mining companies in the county and Red Mountain district sent more ore through Silverton than the Durango Smelter could process. Otto Mears saw this as an opportunity, organized the Standard Smelting & Refining Company, and built a second smelter in Durango in 1892. Mears' strategy was threefold. First, he attempted to compete directly with the Durango Smelter and subsume a share of the smelting business. Second, Mears operated the smelter in coordination with his Silverton Railroad, which strengthened both companies. Last, Mears wanted to provide a low-cost treatment facility for the mines that he and friends operated and pocket the savings. Although the facility was equipped to treat the copper-rich ores of the Red Mountain district, it also processed similar payrock from San Juan County. The San Juan Smelting & Mining Company responded by adding several furnaces to its Durango Smelter, lowering its fees, and improving the returns. The Crookes also attempted to profit from the high volume of ore and built a silver leaching mill at the mouth of Boulder Gulch, near Howardsville.[203]

Las Animas Mining District

[201] Brown, 1984: 193; Smith, 1982: 92; Ken Reyher, *Silver & Sawdust: Life in the San Juans* (Montrose, CO: Western Reflections, 2000) 179; Stephen M. Voynick, *Colorado Gold: From the Pike's Peak Rush to the Present* (Missoula: Mountain Press Publishing Co., 1992) 62.
[202] Henderson, 1926: 216 for production figures. Active mines were derived from a survey of *EMJ* and *Silverton Standard*.
[203] *"Mining News"* *EMJ* (2/6/92): 187; Nossaman, 1998: 252; Ransome, 1901: 23; Smith, 1982: 101; Smith, 1992: 28; Tucker, 2003: 114.

In the Las Animas district, the key mining outfits that managed to survive the recession were among the first to boom in response to positive climate of 1890, and several of these were in Silver Lake Basin. What followed laid the groundwork for that basin to become one of the most advanced centers of mining technology in Colorado. Benjamin W. Thayer and James H. Robin thought they had outsmarted the recession when they examined the Iowa Mine in 1888 and found a vein that offered an unusual combination of gold and silver. The Sunnyside Vein system was the only other similar known ore formation. The partners leased the property in 1889, began production, and were elated when the Sherman act restored silver's value and rendered the new ore even more valuable than before. Thayer and Robin increased the workforce to expedite development and discovered a second vein of galena, which ensured even greater profits.[204]

Thayer and Robin were well on their way to realizing a dream shared by other local businessmen who dabbled in mining. Thayer arrived in Silverton in 1881 with the railroad and found a job in a mercantile. Dissatisfied, he migrated to Durango in search of opportunity and married Nellie, daughter of John L. Pennington. Probably with Pennington's capital, Thayer returned to Silverton in 1883, opened his own mercantile, and invested in real estate. A solid businessman, Thayer ascended into Silverton society, where he met Robin.[205]

Born on the Isle of Jersey in New York, Robin was one of the first entrepreneurs to establish a business other than a mine in the Animas River drainage. In 1875, Robin and several brothers leased a brick yard near Silverton, which generated handsome profits that they reinvested in real estate. The brick yard also demonstrated that construction materials, always in demand, provided surer income than uncertain mining ventures. With this in mind, Robin and John Pennington pooled their resources, established a sawmill on Cement Creek in 1880, and sold the lumber in a yard in Silverton. At the same time, Robin maintained a real estate office and speculated with his own money. He cemented his role in Silverton society by entering local politics and working as a community activist alongside his wife Amelia. Once Robin had enough capital, he ventured into more uncertain mining projects, including the Iowa.[206]

During the summer of 1891, the Iowa consumed of Robin and Thayer's attention. They hastily repaired the buildings up on Kendall Peak's cliff, brought in additional supplies, and made arrangements for a small crew of miners to stay the winter. When the mine became snowbound, all the crew could do was develop the several veins and stockpile ore for the coming thaw. And when it arrived in June, Robin and Thayer eagerly received the precious payrock and reports that the veins looked better than ever. Thayer and Robin realized that their meager investments would constrain production and more money was necessary for the mine to blossom. Robin approached Gustavus Stoiber, a trained mining expert with funds, and together, the men organized the Iowa Gold Mining & Milling Company in 1893. Stoiber served as president, Robin secretary, and R.W. Watson and H.W. King as vice-presidents.[207]

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[204] *"Mining News"* *MSP* (11/2/89): 339; *"Mining News"* *MSP* (3/1/90): 140.

[205] Nossaman, 1998: 62.

[206] Nossaman, 1989: 62, 238; Nossaman, 1993: 32, 60, 310.

[207] Colorado Mine Engineers' Reports: Iowa Mine; Iowa Gold Mining & Milling Company *Stock Prospectus* Denver, CO, 1896; *"Mining News"* *MSP* (11/21/91):331; *Silverton Standard* (8/20/92.

While the Iowa was a confirmed bonanza, developments on the Silver Lake claims a short distance north dwarfed Robin and Thayer's relatively simple operation. After running the Stoiber Brothers Sampling Works for four years, brothers Edward and Gustavus had a significant disagreement in 1887 and divided their mutual assets. Gustavus assumed the sampling works and Edward the Silver Lake claims. Gustavus' choice was the safer because the sampling works provided a reliable source of income, while Edward based his decision on the educated guess that Silver Lake would provide great rewards for its high risk.[208]

The Stoibers were proper, conservative Germans reared in a privileged socioeconomic climate. Edward was born in 1854, began studies in engineering at a young age, and attended the famed School of Mines at Freiberg. In 1879, he and Gustavus sought their fortune in Leadville where Edward experienced immediate success as a mining engineer and metallurgist. Competition among professionals increased in Leadville while the Animas River drainage begged for metallurgists, and so the Stoibers came to Silverton in 1883 and built their sampling works. While on business in Denver, Edward met Lena Allen Webster, described as a very liberated divorcée. Lena embodied the image of frontier woman and was well-suited for the remote and industrial environment to which Edward brought her.[209]

When Edward assumed the Silver Lake, he spent two years sampling, examining the property's geological features, conducting assays, staking claims with Lena, and calculating the most effective manner of development. Unlike most mine owners, Edward took a primary interest in the low-grade ore and considered high-grade material to be merely a bonus. The main problem, however, was that the costs of shipping the low-grade payrock from the basin and processing it in the sampling works exceeded the returns. Stoiber realized, however, that if he could mine and concentrate the ore in large volumes with a highly efficient system, the economies of scale would render the low-grade material profitable through a nominal cost per ton. Devising an efficient system and working out the economic calculations was easy for the German engineer, and by 1890 he had a plan devised.

During the late spring when Silver Lake Basin's snow blockade stabilized, a small army of workers with mule trains packed in thousands of board feet of lumber, tons of hardware and machinery, and the basic necessities of life. This they assembled into the largest surface plant and mill yet in the county. When finished, the mill was able to generate 50 tons of concentrates per day, which provided Stoiber his economy of scale. Because Silverton lacked a facility or storage area capable of accommodating the hundreds of tons of concentrates and high-grade ore that Stoiber expected to store at a time, he built his own. Stoiber chose the abandoned Little Dutch Smelter site on the west side of Arrastra Gulch's mouth. While the exact structures remain unknown, they certainly included large bins, freight platforms, and a corral and stable for the constant procession of draft animals.

The crown jewel to Stoiber's instant empire was an electric power plant that he commissioned on the Animas River. In 1890, electricity was a revolutionary technology under

[208] Bureau of Mines, *Manuscripts MSS Box 640, v27* (Denver: Colorado Historical Society) 20; Sloan and Skowronski, 1975: 29.
[209] Henderson, 1926:4 9; Allen Nossaman, *Personal Interview*, Durango, 2002; *"Obituary"* *EMJ* (5/5/06): 865; Prosser, 1914; Sloan and Skowronski, 1975: 29.

experimentation, and the San Juans served as a cradle for its application to mining. In 1888, the Virginius and Tomboy mines above Telluride installed the first electric plants in the San Juans, followed by John Terry's small facility at the Sunnyside Mill in Eureka Gulch. These early power plants were small and generated direct current (DC), which was able to run variable speed motors but only could be transmitted short distances before suffering a debilitating power loss. As a result, DC current had to be consumed near the point of generation, giving mining engineers pause for thought. What, they reasoned, was the advantage of electricity if it had to be generated on-site? Even if a DC power plant could be run by hydropower, a costly steam engine and boiler usually had to be kept on standby in case the water system failed. Why not do away with the electrical equipment and merely use the steam engine alone to operate mine machinery for a fraction of the capital? Alternating current (AC) provided a partial answer to this problem. AC current could be transmitted for miles without power loss, but as of 1890, AC motors were unable to run variable speed equipment. AC current could, however, energize lighting and run constant speed motors that operated with little drag, such as those used in machine shops and some mill applications. With this in mind, progressive electrical engineers near Telluride finished the first AC power plant in the San Juans and Colorado at Ames in 1891, which set the precedent.[210]

Stoiber was not far behind. Around the same time, he completed what appears to have been the second AC power plant in the San Juans and Colorado. According to archival references, a power plant built on the Animas River, most likely at the concentrates storage terminal, and power lines carried the electricity two miles up to Silver Lake Basin, which was too far for DC current. Given this, Stoiber's power plant had to generate AC current, which lit the interiors of the buildings and ran several small motors in the mill.[211]

At the beginning of November 1890, Stoiber started the mill and it ran to perfection, although the electrical equipment may not have been working initially. Over the course of the summer, mule skinners hauled up supplies and coal so the mine and mill could run through the winter. After around a year, Stoiber and Lena pored over the balance sheets of their Silver Lake Mines Company. The conclusion was $255,000 net, or around $5,148,286 today, which constituted around twenty-five percent of San Juan County's total production. This was far from pure profit, however, because an operation as large as the Silver Lake Mines Company at an elevation of 12,000 feet was very costly.[212]

After two years of constant production and milling, Stoiber declared the Silver Lake a success. While his strong work ethic may have prevented him from the retirement sought by other successful mine owners, Stoiber instead spurred him to expand operations in 1893. Lena, personnel manager for the company, requested a second boardinghouse at the mine and increased the workforce to 130. Like the first boardinghouse, it featured uniquely luxurious amenities in such as running water and steam radiators.[213]

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[210] W.S. Burbank, E.B. Eckel, and D.J. Varnes, "The San Juan Region," *Mineral Resources of Colorado* (Denver: Colorado Mineral Resources Board, 1947) 396; *"Mining News" EMJ* (12/29/1888): 551; Smith, 1982: 98.
[211] *"Mining News," EMJ* (4/26/90): 479; *"Mining News," EMJ* (11/15/90): 581.
[212] Ransome, 1901: 149.
[213] *"Mining News" EMJ* (9/9/93): 273.

While the Silver Lake was clearly the most significant operation in the Las Animas district, if not the county, other mines participated in the wave of renewed activity. At the Titusville, new director Thomas Kane started up the mill and tramway in 1890 on stockpiled ore, and the facility apparently recovered a satisfactory amount of the metalliferous content. Kane ordered his miners to increase production, and when the tonnage they generated exceeded the mill's capacity, he ordered the mill to operate around the clock.

In Dives Basin, Martin Van Buren Wason and Theophile Benjovsky finally reopened their Dives Mine in 1890 after patiently waiting for the value of silver to rise. Their operation was small but sound. At the North Star, the Crookes found that the run-of-mine ore now provided excellent returns, and in 1891 saw profits increase when miners happened into a vein rich with high-grade material. To increase production, the Crookes increased the workforce to thirty. In 1892, they moved the North Star Mill from Little Giant Basin down to the mouth of Boulder Gulch to process ore from their other holdings in the county. Meanwhile, several lessees at the Highland Mary wisely remembered the silver veins that Innis left in place in the upper workings during his misguided search for gold. They had an easy time bringing the workings into minor production.[214]

Mineral Creek Mining District

The Mineral Creek district finally assumed a position of prominence in the county during the early 1890s, after receiving little attention for decades. While it saw no developments quite as grand as the Silver Lake, Mineral Creek surpassed the Eureka district in terms of investment, large operations, and production. Ore poured from the Hercules and North Star ore systems on Sultan Mountain and comprised a significant proportion of the county's total production, but not without challenge.

Ever since Lucius Kendall bought the North Star Mine in 1884, his Silverton Mining Company concentrated the ore in the mill that Theodore Comstock built. Over time, however, the mill recovered less and less of the metals content. Comstock based his concentration process, highly successful at first, on the character of the ore that was available during the early 1880s. Most of this material came from upper, oxidized areas of the ore system. As the Silverton company developed the deep reaches of the system, its miners entered a zone where the ore became increasingly complex and resistant to Comstock's concentration process, however. By 1890, company directors conceded that too much of the metals content was leaving as tailings and admitted that the facility had to be refitted at great cost. They consulted an expert who reiterated that the mill would actually have to be almost totally rebuilt. Under contractor John Thexton, the Denver & Rio Grande built a siding to deliver the construction materials and equipment, and a large crew installed a system to power the mill by water. By October, Thexton opened the mill cautiously. The company was relieved to find higher recovery of metals content, and during the year, the North Star produced well over $100,000. In 1892, the Silverton

[214] Bureau of Mines *Manuscripts MSS Box 640, v. 27*: 6;*"Mining News,"* EMJ (3/28/91); *"Mining News"* EMJ (9/9/93): 273; Silverton Standard (5/24/90).

company optimistically and increased the workforce to thirty-five miners, but mill returns fell off dramatically the following year. Company directors scaled back operations and let some miners go. The company faced the decision of permanently reducing operations, and hence income, or parting with yet more capital to troubleshoot problems. They chose the latter course, which began a protracted and costly trial-and-error process of making the mill effective.[215]

The Victoria Mining & Milling Company followed a similar trajectory, sited as it was adjacent to the North Star on the same ore system. The company produced heavily through 1890 and its mill ran with some success at first, but when mill trouble materialized, the directors lost confidence and engaged in avoidance. The company put the entire operation up for lease, hoping that someone else would solve the milling problem while paying the lease royalties. In 1891, the partnership of Morrison & Fitzgerald took a three-year lease and found enough ore to keep the mine in production. Within the first year of their term, the Victoria company went bankrupt due to unpaid debts, however. The sheriff seized the mill and Little Dora Mine, appointed a receiver, and put them up for sale in 1891. It is unclear whether the partnership was allowed to continue work in the interim. Threatened by the loss of their entire investment, company principals repaid outstanding debts during 1892 and repossessed the mine. In an attempt to restore the operation to profitability, they found additional capital in 1893 to refit the mill and improve the flow of ore by building an aerial tramway up to the Little Dora.[216]

A third company floundered, despite huge capital investment. In 1889 or 1890, the San Bernardino Syndicate of London spent a considerable sum on a mill and tramway for the San Juan Tunnel and adjoining San Bernardino claim, both on Sultan Mountain. The investors immediately overextended themselves, went bankrupt, and sold to other British capitalists who organized San Bernardino Silver Mines, Ltd. The mine appeared to be a ready-made producer, except that ore was not much different from that at the North Star and Victoria. The complex material confounded the mill, and after several years of struggling, the company failed.

The area around Chattanooga, at the head of Mineral Creek, was a center of activity. The town of Chattanooga was a key stop on the Silverton Railroad, which, coupled with road traffic to the Red Mountain district, incubated it from too much contraction during the late 1880s recession. Chattanooga featured a tiny business district that included a mercantile and a combination saloon, restaurant, and boardinghouse run by James Sheridan.[217]

When the value of silver increased in 1890, Sheridan and other Chattanooga residents grew optimistic that several important mining ventures would revive the town. To the south lay the Bonner, in which Gustavus Stoiber recently invested. The mine was small but began to yield payrock in 1890. The other was the Silver Ledge between the town and Red Mountain Pass. The Silver Ledge vein was discovered in 1883 but lay fallow until J.C. Kingsley sank a shaft in 1890. A catastrophic fire in the shaft house the following year cooled his interest. Several miners were at work at the bottom of the shaft during the event, but pursued their work unaware. When the

[215] *"Mining News,"* EMJ (9/9/93): 273; Ransome, 1901: 251; Silverton Standard (5/17/90): 1; Silverton Standard (7/14/90): 2.
[216] *"Mining News,"* EMJ (3/1/90): 256; Silverton Standard (1/25/90): 2; Silverton Standard (4/25/91): 2; Silverton Standard (10/10/91): 5; Silverton Standard (3/26/92): 2; Silverton Standard (5/13/93): 2.
[217] Colorado Business Directory, 1892: 152; Colorado Business Directory, 1893: 182.

fire unleashed the signal bell cord, it drifted down to their station and the miners realized that something was wrong. When the ore bucket followed with a crash, they knew it was time get out. The fire apparently turned them back down the shaft, which was wise because a full box of dynamite exploded and scattered burning debris. The miners managed to survive without suffocating, however.[218] Shortly after the fire, Kingsley sold the Silver Ledge to the partnership of O'Brien and Anderson, who repaired the damage. The partners then leased the mine to a British syndicate in 1891, which purchased the property but defaulted on payments. William Feigel bought the mine at bankruptcy auction and finally brought it into meaningful production.[219]

Eureka Mining District

In the Eureka district, the Sunnyside and Sunnyside Extension remained the dominant operations and followed similar development paths. The advantage that both mines had over most others in the county was both fiscally prudent management and gold ore. Like Stoiber's Silver Lake Mine, the Sunnyside and Sunnyside Extension possessed a preponderance of low-grade ore over rich material, which the managers made profitable. Any remaining rich material could then be pure profit.

John Terry was already processing the Sunnyside's low-grade ore with the Midway Mill that he built in Eureka Gulch in 1889. His economic calculations were proving correct and the Sunnyside remained profitable, although how much so was uncertain due to secrecy. Until 1890, most of the profits, with deductions for improvements such as the mill, went to the feuding Engleman family. Then, Milton Engleman, the family's principal contact with Terry, died. Terry saw in this an opportunity to take possession of the mine as no one in the Engleman family was willing to assume Milton's administrative duties. They sold to Terry, and with the Englemans out of the equation, Terry had more money to devote to the mine. By the early 1890s, the operation featured several principal tunnels driven on the vein, a large surface plant at the lowest entry, a mill on Lake Emma, the Midway Mill in Eureka Gulch, and a herd of pack animals that fed the lower mill in an endless procession. The next large project would be a tramway to replace the tired animals, but Terry put this on hold.[220]

Rasmus Hanson was sole owner of the Sunnyside Extension almost from the beginning of operations and cautiously invested in improvements. With the new Hanson Mill in regular operation by 1890, Hanson increased the workforce to around twenty-five miners and ten surface employees. They generated forty to fifty tons of ore per day, ran the mill around the clock, and produced $15,000 per month. Some of the ore came from the adjoining Mastodon Mine, which Hanson linked to the Sunnyside Extension through underground workings. By 1891, Hanson felt that he had enough capital to finance the next move toward efficiency, a tramway from one of the main tunnels down to the mill. Once complete, Hanson's operation began to approach

[218] *Silverton Standard* (6/28/90): 2; *Silverton Standard* (4/11/91): 3.
[219] *Silverton Standard* (6/6/91): 2; *Silverton Standard* (10/24/91): 2.
[220] Marshall and Zanoni, 1998: 119.

Stoiber's Silver Lake Mine, although Hanson's workforce was a fraction of that employed by Stoiber.[221]

Just as the Sunnyside Extension appeared to reach a peak of production and complexity, Hanson curiously sold the operation in 1892. Perhaps Hanson knew something about the ore reserves that the British buyers did not. They paid Hanson $200,000, retained him as manager, but ran into trouble, possibly as early as 1893. Based on Hanson's ten-year record of extracting ore that assayed well, the new owners supposed that plenty such material remained. They miscalculated, however, and exhausted the rich ore within a year or two, leaving low-grade material that resisted treatment in the mill. Despite Hanson's efforts, and possibly to his embarrassment, production declined, and he ran the mill only intermittently, while deciding how to remedy the problem.[222]

Ordinarily, Animas Forks could be expected to celebrate the sale of the Sunnyside Extension and the financial success of one its residents. Few people were present to do so, however. In 1891, a fire that started in the Kalamazoo House burned most of the business district, and most of the residents left. The population that stayed was tiny, no one replaced the lost buildings, and the town had almost no businesses. The Postal Service revoked the post office later that year.[223]

Even though the Sunnyside was going well and smaller operations were active in the area, the town of Eureka remained small and relatively quiet. The town contracted during the late 1880s recession and did not recover as well as could have been expected. Around 120 residents lived in and around the hamlet, and the business district featured only the Helmboldt meat market, a mercantile run by W.G. White, and a hotel operated by Esther Ekkard.[224]

Elsewhere in the Eureka district, a few other mines showed promise, if not regular production. On the northeast flank of appropriately named Galena Mountain, the Swartz brothers reopened the Hamlet, initially developed during the early 1880s. They drove several tunnels on the vein and shipped ore regularly for several years. The Tom Moore, between Eureka and Animas Forks, began production in 1893. The Green Mountain and Pride of the West were the principal operations in the district's southern portion and contributed to a growing energy in Cunningham Gulch. Joseph Williams, Morgan Jones, and partners took a lease on the Green Mountain in 1889 and struck an outstanding vein just in time for passage of the Sherman act the following year. They enjoyed the results for three years when Gustavus Stoiber and James Robin assumed the lease and increased the workforce. Christian Schoellkopf still owned the Pride of the West, which featured three tunnels that penetrated the vein at different elevations. He reopened the mine in 1890 and planned to undercut the vein with a tunnel driven from the floor

[221] *"Mining News,"* EMJ (7/19/90): 81.
[222] Jonathan Horn, *Gold Prince Mine, Mill, and Aerial Tramway National Register of Historic Places Registration Form* (Montrose: Alpine Archaeological Consultants, Inc., 2010) 3.
[223] Bauer, et al, 1990: 12; Jonathan Horn, *Animas Forks National Register of Historic Places Registration Form* (Montrose, Alpine Archaeological Consultants, Inc., 2010) 11.
[224] *Colorado Business Directory*, 1891: 394; Schulze, 1977: 1890-7.

of Cunningham Gulch. To expedite the project, Schoellkopf installed a compressor and rock drills, a considerable investment.[225]

Cement Creek Subdistrict

The increase in the value of silver revived an interest in Cement Creek, quiet since the mid-1880s. Nearly all the properties there were dormant and had seen little work except for prospecting, and so appeared to offer more potential than those in the county's other districts. Most of the activity materialized around Gladstone, abandoned since 1887. Paul McCann was the first investor of note to arrive, examining the idle Sampson Mine for its gold potential as early as 1889. McCann had extensive experience with mining and milling ventures in Clear Creek County and qualified to render objective judgment on the property. He felt that it could be made to pay if the mill was equipped appropriately, so he purchased the mine in 1890 and put a crew to work installing new machinery.[226]

Willis Z. Kinney represented Henry Soule and Cyrus Davis, wealthy eastern investors. They reopened the Harrison Mine, a short distance south of Gladstone, and appointed Kinney as manager by 1890. The mine appeared to offer enough ore to justify a mill, which Perry Fisher erected in 1890. While the operation was not a huge success, it kept the Fisher Mill busy at least on a seasonal basis. The company workers lived in Gladstone and were the first inhabitants to occupy the town since around 1887. A small crew of miners employed by John M. May joined Kinney's workers in town, from whence they commuted up the South Fork of Cement Creek to the Big Colorado. May felt that conditions were right to begin developing the upper portions of a vein on that property, and when his miners proved ore, he commissioned a deep haulage tunnel from the valley floor in 1893.[227]

Kinney and the Fisher Mill figured prominently in development of the Gold King. Olaf A. Nelson worked as a miner in the Sampson and became familiar with the local geology and the trend of the main gold-bearing vein. Nelson felt that the Sampson company was working the wrong portion of the vein and that he could locate a richer segment. Nelson spent time searching the area downslope from the Sampson property for traces of the vein, found promising ground, and staked the Gold King claim around 1887. During the next several years Nelson devoted time to exploring the claim at depth and struck the Gold King Vein. Nelson subsequently followed the course taken by many prospectors. He sought financial assistance and approached Kinney around 1892. The following year, Kinney sent several of the Harrison miners to conduct further exploration; they brought around forty-five tons of ore to the Fisher Mill for testing. Like the rest of the Sampson Vein, the ore proved complex but rich, and Kinney's enthusiasm convinced Davis and Soule that they probably had a bonanza worth pursuing. They leased the claim from Nelson and began developing the Gold King Mine, which became one of the county's best

[225] *Silverton Standard* (11/23/89): 2; *Silverton Standard* (5/10/90): 1; *Silverton Standard* (5/23/91): 2; *Silverton Standard* (5/20/93): 2; *Silverton Standard* (12/9/93): 3.
[226] *"Mining News," EMJ* (5/25/89): 485; *Silverton Standard* (8/8/91): 2.
[227] Brown, 1984: 71; *Silverton Standard* (10/4/90): 2; *Silverton Standard* (8/8/91): 2; *Silverton Standard* (12/26/91): 2; *Silverton Standard* (6/9/93): 3.

producers. But before Kinney could make much headway with the Gold King, San Juan County faced one of the worst economic disasters in the history of the mining industry.[228]

The Silver Crash, 1894 – 1897

Almost immediately after the Sherman Silver Purchase Act was signed into law, reformers rebelled against what they perceived to be a massive government subsidy for mining and profiteering among powerful capitalists, and they clamored for repeal. At the same time, a national economic crisis loomed, creating political instability and factions in both the federal government and Great Britain, one of the main consumers of American silver. Repeating the cycle of the mid-1880s, the increasingly dour climate contaminated investment in silver and the industries that depended on it, causing the metal's value to slip. The price of silver eroded from a high of $1.09 in 1891 to $.99 and kept going down to $.78 by mid-1893, an all-time low that forced mining companies in San Juan County to assess the viability of their operations. As with the 1886 cycle, some of the small mines closed, but many companies were able to get by because they were more efficient than before and the smelters in Durango improved their operations.[229]

Then, in 1893, the political factors noted above came together to bring the ruin of the western mining industry, followed by a nationwide depression. President Grover Cleveland called a special session of congress to repeal the Sherman Silver Purchase Act, effective November 1893, hoping to prevent an economic crash. At the same time, Britain adopted a gold standard and abolished silver, as well as ceasing minting of Indian rupees. The market for silver promptly evaporated and the metal's value plummeted to $.64 by March 1894. The result was cataclysmic. Mines across the west suspended operations and thousands of workers suddenly found themselves jobless. A financial panic swept the west and rippled out to the rest of the nation, ushering in a depression that lasted through much of the 1890s.[230]

Like the rest of Colorado, the San Juan region, which relied to a great degree on silver, was devastated. All the mining companies in San Juan County that depended on the high price of silver closed, and the rest faired little better. Some estimates suggest that as many as 1,000 workers in the county lost their jobs, from a total population in the county of 1,600 in 1890. Residents with enough security to stay witnessed a mass exodus. With little ore coming down from the mountains, the San Juan Smelting & Mining Company and Otto Mears shuttered their smelters in Durango, and Mears and the Denver & Rio Grande reduced service on their railroads.[231]

A review of the county finds that while nearly all the medium-size and small mines suspended work, each district featured a handful of companies that appeared to be surviving and even thriving in some cases. As the depression dragged on through 1896, the impossible happened. A number of mines reopened, and the county's production figures increased to record

[228] W.Z. Kinney, *Correspondence: Exhibit A, 1932*; Nossaman, 1998: 313; Wolle, 1995: 418.

[229] Henderson, 1926: 216; *Report of the Director of the Mint*, 1894: 20; Saxon, 1959: 7, 8, 14, 16.

[230] Brown, 1984: 194; *Report of the Director of the Mint*, 1894: 26, 30; Saxon, 1959: 7, 8, 14, 16; Smith, 1982: 92; Smith, 1994: 184, 187; Stone, 1918, V.1: 437.

[231] Schulze, 1977: 1890-7; Smith, 1992: 68.

levels. Between 1894 and 1897, the county featured twenty small mines, eleven medium-sized operations, and two large mines. In terms of production, 1894 was a poor year and the county's mines generated $221,000 worth of silver, $340,000 in gold, and $132,000 in lead. By 1896, these figures climbed to $1,515,000 worth of silver, $909,000 in gold, and $169,000 in lead. This railed against the downward trend in the rest of the state. Four principal reasons explain why the mining industry survived and kept the county from collapsing.[232]

Even though the Standard and San Juan Smelting & Mining Company smelters in Durango suspended during 1894, mining companies still had several outlets for their ore. The Sweet Sampler was purchased in 1892 and renamed the Keith Sampler, and Gustavus Stoiber sold his sampler in 1894 to partners that reorganized it as the Silverton Public Sampler. These two facilities received enough business to prevent them from closing and were able to ship their concentrates and matte by rail to smelters on the plains In 1894, Thomas F. Walsh initiated one of the most important ore buying firms and built the first new smelter at Silverton in nearly a decade. Walsh's motives were twofold. On one hand, he felt that if he provided relatively low cost ore treatment, companies in the county and Red Mountain district would generate enough payrock to keep the facility afloat until better times returned. On the other hand, Walsh needed a smelter to process the ore from his own mines, the Mountain Queen and others leased in the Eureka district. Walsh, Charles J. Hughes, and Albert Smith incorporated the Silverton Smelting & Mining Company and purchased the abandoned Martha Rose Smelter because it featured the building and original infrastructure, which saved them capital. During the winter, workers repaired the facility and installed new equipment, and by spring, Walsh had the facility operating. After several weeks of operation, the smelter appeared to be a success. Walsh became a local hero for delivering a functional smelter to the county in its darkest hour of need.[233]

The Omaha & Grant Smelting & Refining Company, one of the most powerful smelting firms in the Rocky Mountain West, saw the void left by the closure of the Durango Smelter. With aspirations of a monopoly, Omaha & Grant leased the Durango Smelter from the San Juan Smelting & Mining Company in 1895. During 1896, the directors realized that production in San Juan County started to recover while the rest of the state suffered and interpreted this trend as a harbinger of an enormous revival. The firm strategically used the poor economic climate to convince San Juan Smelting & Mining to sell the Durango Smelter.[234]

Another reason why the county's mining industry seemed to weather the depression lay in the ore that the solvent companies produced. Their payrock contained a higher proportion of gold than most of the ore bodies in the region, and the value of this precious metal held a constant value of around $20.70 per ounce. Because the ore featured a combination of gold and silver, as the mining companies produced more gold, they generated more silver in parallel. Nearly all the mines that continued operations from the early 1890s into the depression were proven gold producers, including the Green Mountain, Iowa, Mastodon, Silver Lake, and

[232] Henderson, 1926: 216 for production figures. The estimate for active mines was derived from a survey of *EMJ* and *Silverton Standard*.
[233] Thomas A. Rickard, *"Across the San Juan Mountains,"* *EMJ* (July, 1903); Sloan and Skowonski, 1975: 51, 121; Wolle, 1995: 431.
[234] Ransome, 1901: 23; Smith, 1982: 101; Smith, 1992: 77.

Sunnyside. In a few cases, mine owners reassessed their idle properties for gold ore and reopened them if warranted.[235]

Perhaps the most important factor of why the county overcame the depression and dismal value of silver was a dramatic change in attitude toward ore production and the required investment. A handful of mine owners responded to the Silver Crash not by curtailing operations but by taking the opposite approach. They expanded operations and poured capital into underground development, mechanization, and mill improvements on a proportion that the county had not yet seen. The purpose was to produce and concentrate ore in economies of scale that were great enough to dramatically reduce the cost per ton. The owners calculated that this offered the double benefit of not only offsetting silver's low value, but also rendering low-grade ore profitable to produce, a key factor since the principal mining districts were awash with the material.

The strategy of economies of scale was an excellent model for companies with large ore reserves, but it required one resource difficult to secure during the mid-1890s depression, capital. Only four or five mining companies in the county were able to implement the strategy, and they were so successful, their enormous yield skewed the county's production figures and made the overall mining industry appear to be in a better state than it actually was. Most of the small and medium-sized operations were either closed or not doing well. Some mining experts credited Edward Stoiber and John Terry with pioneering the economies-of-scale practice, and Frederick Leslie Ransome observed:

> The success of Messrs. Stoiber and Terry in handling low-grade ores has demonstrated that when wasteful and inadequate methods are replaced by modern appliances and shrewd management, mines carrying abundant low-grade ore may be made profitable, even with the present low price of silver.[236]

The *Silverton Standard* offered a more detailed explanation:

> In 1893, when the price of silver was cut in two, or reduced nearly one-half, many of the low-grade producers were closed, but about all of these have resumed operation, and many more new producers of like character have been added to the list. At the time the operators of the silver mines were confronted with a situation which seemed to preclude further effort. Edward G. Stoiber, then proprietor of the Silver Lake plunged into problem with more than a million to lose if he failed, but emerged successfully, after employing every close value-saving appliance which the character of his low-grade lead-silver ores suggested. He saved the values so well that his concentrates of $7 ores enabled him to continue mining profitably. When this had been done the other owners of low-grade mines proceeded to the building or alteration of mills which enable them to operate, and all along the line, throughout the entire San Juan region, there has been a marked advancement in the economy and better value saving of mill enterprises.[237]

[235] Saxon, 1959: 78, 14, 16.
[236] Ransome, 1901: 23.
[237] *Silverton Standard* (1/11/02).

Out of self-interest as well as a desire to support the central San Juans, Otto Mears also made major contributions that helped the region weather the depression. He understood that the mining industry relied on his roads, railroads, ore production, and financing. To prevent a complete shutdown of the Red Mountain district, he maintained service on the Silverton Railroad even though it meant no profits. On his roads, Mears softened his tolls and even suspended them at times, and he continued production at his mines to keep ore going through Silverton. Mears' greatest contribution, however, was the construction of another railroad, even though the project over-extended his finances. In 1895, he and other Colorado capitalists incorporated the Silverton Northern Railroad to build a line up the Animas River from Silverton to Animas Forks. Because Edward Stoiber would see direct service to his terminal and the railroad would carry John Porter's coal, both men were heavy investors. Further, Stoiber promised Mears all the ore traffic that he could generate, and in return Mears assured him a half rate. The railroad company purchased Mears' Animas Forks Toll Road as the rail bed and began construction in fall 1895. With the region in depression, the project created quite a stir, and the county was elated at the prospect of direct rail access for its principal centers of mining. Track gangs labored between snowstorms throughout the winter until they finished the line to Howardsville by May 1896. The following month saw the crew move camp to Eureka, where Mears stopped work due to the financial burden. Despite its short length, the Silverton Northern would prove to be Mears' most profitable railroad because it served one of the richest portions of the San Juans.[238]

Bear Creek Mining District

The constant value of gold was the force that drew prospectors into the southeastern reaches of San Juan County while silver values declined. In the spring of 1893, E.L. Roberts of Silverton and D. Preston Bell of Durango prospected Bear Creek, the first principal drainage south of the Las Animas district, and they found ore at the drainage head. With interest in silver already waning and mines closing, prospectors were eager for a gold discovery. When word of the Bear Creek strike began circulating, around 500 wealth-seekers eagerly hastened to the site, began staking claims, and organized the Bear Creek Mining District. Among the new properties were the Bonita and Sylvanite, named after a type of telluride gold ore, and both seemed to offer excellent potential. By June, community organizers attempted to formalize the collection of prospectors' tents on the valley floor as a camp. Within a short time, someone secured a post office under the name of Sylvanite, although the settlement was popularly known as Bear Creek. R.W. Bastin & Company began carrying in supplies via pack train, and a few local investors perused the claims in hopes of securing the best ones while the prices were low. Among these were Ira Scott, his wife, and Judge E.T. Wells, and they bought the Sylvanite and immediately put five men to work on development. When winter arrived, everyone left the remote region, and

[238] Henn, 1999: 134; Michael D. Kaplan, *"The Toll Road Building Career of Otto Mears, 1881-1887,"* The Colorado Magazine, Vol. L2, No.2 (1975): 168; Sloan and Skowonski, 1975: 34, 127, 150; Tucker, 2003: 91, 104.

as they waited to return the next year, the economy collapsed and set the stage for a full rush during 1894.[239]

When the spring arrived, many of the original prospectors returned, followed by a large number of others. Sylvanite grew in size and may have attracted a few of the businesses expected in a prospecting camp, such as a mercantile and saloon. Lute Johnson, publisher of the Creede *Candle*, thought enough of the settlement to haul in a press and began printing a newspaper. Johnson had an easier time packing the press from Creede than prospectors experienced with their goods from Silverton. While Silverton was only eighteen miles away and Creede fifty, the glaciated peaks of the Las Animas district presented a major obstacle. Bear Creek, on the other hand, drained east into the Rio Grande River valley, a direct and gentle route to Creede. Thus, Creede became the district's principal point of entry.[240]

The Bear Creek excitement followed the course typical of short-lived rushes. During 1894, fortunate prospectors identified and claimed the few obvious veins, while others left. Because of the decrease in population and the seasonality of Sylvanite, the Postal Service revoked the post office at the end of the year. Regardless, some prospecting continued, and the most promising claims demonstrated ore below the surface. The Sylvanite and Bonita yielded several tons of payrock for testing, and gold was proven on the Elk Horn, Gold Bug, Good Hope, and Kankakee. With the above claims proven, investors had enough confidence by 1895 to purchase them and begin development. Scott and Wells used some of the profits from their Sylvanite Mine to buy the Good Hope. A.L. Emigh, Freeman Thomen, and others organized the Golden Shear Mining Company and bought the Bonita. Thomen came from Creede and discovered the Sunnyside, the first vein developed in that area. F. Nathan & Company of Kansas City bought the Gold Bug for $25,000, established the Gold Syndicate Mining Company, and planned an 800-foot tunnel to undercut the vein.[241]

Isolation was an impediment and kept the new operations small and seasonal. By 1896, two years after the initial rush, Sylvanite had seen much speculation but relatively little work at depth. All the productive mines were shallow, poorly equipped, and the extent of their ore reserves unknown. Unlike the rest of San Juan County, nearly all the work was by hand, and not until 1896 did Bear Creek begin receiving even small pieces of machinery. Scott and Wells installed a hoist and compressor at the Good Hope, likely the first apparatuses of their kind in the area. Most of the mining outfits did not follow this example. They had little need, because by the end of the season, they reached the end of their profitable ore and abandoned further efforts.[242]

When the spring thaw of 1897 granted a return to the Bear Creek district, only the Bonita, Gold Bug, Good Hope, and Sylvanite mines reopened. The Golden Shear company produced small batches of ore in the Bonita, the Calaverite Mining Company employed nine miners at the Sylvanite, and the Wonder Leasing Company did well with the Good Hope. The Gold Syndicate company was the largest operation and kept several miners driving the main tunnel toward the

[239] Bauer, 1990: 138; *"Mining News,"* *EMJ* (9/30/93): 351; *"Mining News,"* *EMJ* (2/9/95): 133; *Silverton Standard* (5/13/93): 3; *Silverton Standard* (6/17/93): 2.
[240] *Silverton Standard* (5/25/95): 3; *Silverton Standard* (8/26/99): 1.
[241] Bauer, et al., 1990: 138; *"Mining News,"* *EMJ* (2/9/95): 133; *"Mining News,"* *EMJ* (10/24/96): 397.
[242] *Silverton Standard* (6/6/96): 5.

Gold Bug and around fourteen others producing ore. Finally, miners struck the vein at depth, but the company kept the findings a secret, which raised suspicions that the vein was bereft of ore. This proved false, and the vein offered enough payrock to allow the company to outlast most of the others that remained in the district.[243]

Las Animas Mining District

When Edward Stoiber began implementing the economies-of-scale concept during the early 1890s, he did so with a huge mill, an army of workers, and electricity. Stoiber understood that more improvements were necessary for the strategy to fully reach its potential. He revisited the mill, his power sources, and transportation system for ways to increase production and reduce costs. Because the mill already had a high treatment capacity and was relatively efficient, it needed no major changes. Instead, Stoiber and the expert metallurgist Robert J. McCartney tinkered with improvements to some of the concentration equipment. They invented one of the best vibrating tables for concentrating San Juan ores, the so-called Stoiber-McCartney table.[244]

A small power plant wired electricity up to the mine, where it was used primarily for lighting and secondarily to run simple appliances. Because motor technology was nascent, steam powered the energy-intensive machinery, which kept a herd of mules busy packing the fuel coal required. To reduce the expense of both the coal and packing, Stoiber installed more motors at mine and mill in 1894 and built a second power plant on the Animas River, which also provided some current to his brother's Iowa Mine. He chose a site on the south side between Arrastra Gulch and Silverton for the plant, which had a generator house, boiler house, a set of massive coal bins, and direct rail service. Several years after construction, newspapers claimed that the power plant was the most complete privately owned AC facility in the nation and saved Edward $15,000 in coal per year, or $330,096 today. Along with the power plant buildings, in 1895 masons also erected what was the largest and best appointed residences in the San Juans with hot and cold water, sinks, bathtubs, toilets, and steam heat. Edward and Lena named the power plant and mansion complex Waldheim, German for forest home.[245]

Stoiber realized that his transportation system was an outstanding resource to look for savings. Nearly everything hauled up to the mine and all the concentrates sent down from the mill moved by mule train, at a cost of around $4.00 per ton. While mules were well-suited for the trip to Silver Lake Basin, they were slow and cumbersome. Of greater importance, mules were costly to purchase and maintain and requiring the constant supervision of mule skinners. His master plan called for replacing the mules with a tramway, and Stoiber's desire for savings forced the issue in 1895. Like Terry, Stoiber wanted to minimize his debt. Given this, he designed the system in two segments that linked the mill with the shipping terminal on the Animas River. Stoiber contracted with William M. Frey, tramway expert from Leadville, to build

[243] *Colorado Mining Directory*, 1898: 295; *"Mining News" EMJ* (8/28/97): 255; *"Mining News," EMJ* (11/13/97): 586; *Silverton Standard* (9/11/97): 2; *Silverton Standard* (10/23/97): 8.
[244] *"Mining News," EMJ* (8/20/98): 226; *"Obituary," Mining Reporter* (2/18/04): 173; *Silverton Standard* (12/3/98).
[245] *"Colorado's Wealth in Water Power," Denver Times* (12/31/98): 10; Rickard, 1903: 60, 68; *Silverton Standard* (6/30/94); Wyman, 1993: 3-4.

the first, 8,700 feet in length. By November, Frey completed construction and watched with the press as the system started without incident.[246]

Gustavus Stoiber and James Robin were also busy improving the Iowa Mine. Through the Iowa Mining & Milling Company, they made the Iowa second only to the Silver Lake in terms of implementing economies of scale. Following Edward's example, they focused on large-scale production and savings, including improvements at the mine, widespread adoption of mechanization, a mill, and a tramway. Like Edward, they insisted on enacting the plan in manageable steps. The first was the construction of a large concentration mill to separate out the waste and retain a portion of the treatment fees paid to smelters. Unlike Edward, Gustavus and Robin sited their mill not at the mine but instead on the floor of Arrastra Gulch, almost directly over the obsolete Little Giant arrastra. This location was inefficient in the beginning because it required mule trains to carry down the crude ore, but the location made shipping out the concentrates easier. Workers broke ground for the mill early in 1895 and built a highly functional facility capable of concentrating 150 tons of ore per day.[247]

A tramway was the next logical step. Stoiber and Robin contracted with the Trenton Iron Works of New Jersey for a Bleichert system in 1896 and then directed their attention to mining operations and claim development. They hired more miners to drive two tunnels into the vein system to work it simultaneously at different elevations. In keeping with proper mining engineering, Gustavus planned a third tunnel from the lowest elevation possible to serve as a haulageway for the ore produced in the upper levels. Vertical raises linked the lower and upper tunnels and served as conduits for ore. Miners in the upper workings dumped ore into the raises, which rolled down and collected in bins over the haulage tunnel, where other miners sent it out directly to the tramway. While this extensive vertical development was costly and ambitious, it ultimately lowered production costs and created a lasting underground infrastructure. At the same time, external infrastructure in the form of a surface plant was necessary to support the work underground. The new tunnels and facilities initially taxed the company's coffers but paid off in the long run.[248]

In 1896, Gustavus, Robin, and the other Iowa investors were well on their way to building an empire as large as Edward's Silver Lake. The party gained advantage when they purchased the Tiger Mining & Milling Company, which just began work on the Royal Tiger Mine directly across Silver Lake from the Iowa. The outfit had done little with the property and was eager to sell because it could not bear the costs of development. Once Gustavus and Robin erected a surface plant, they invested in underground development and brought the mine into production.[249]

In the climate of the mid-1890s depression, the success of the Stoiber brothers was impressive and railed against the statewide trend. When Edward built the Waldheim power plant,

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[246] Silverton Standard (11/9/95); Silverton Standard (1/28/98).

[247] Iowa Gold Mining & Milling Company, 1896; *"The Silvery San Juan Has Enjoyed a Year of Unparalleled Prosperity in all Lines of Industry"*; Silverton Standard (11/9/95).

[248] *"Mining News,"* EMJ (12/19/96): 589; Iowa Gold Mining & Milling Company, 1896; Silverton Standard (4/25/96).

[249] *"Mining News,"* MSP (12/12/96): 487; Walter H. Weed, The Mines Handbook: A Manual of the Mining Industry of North America (New York: Stevens Copper Handbook, 1925) 730.

he intended to provide electricity to both his and the Iowa Mine. At the same time, Gustavus installed one of the largest compressed air systems in the county at the Iowa and provided air for drilling in Iowa and also the Silver Lake. Gustavus convinced the Postal Service to locate the misspelled post office of Arastra at the Iowa in 1895, while Edward housed most of the combined workforce at the Silver Lake. In addition, Gustavus, Robin, Joseph Bordeleau, Frank B. Brown, and R.S. Courtney organized the Silverton Deep Mining & Tunnel Company to drive an ambitious haulage tunnel from Arrastra Gulch to undercut the Silver Lake, Iowa, and Titusville mines. They fully expected to encounter Edward's Silver Lake first and the Iowa second. In the spring, miners began the tunnel high up on the west side of Arrastra Gulch and worked into the fall.[250]

Eureka Mining District

While sources claim that John Terry was instrumental in developing the strategy of economy of scale at the Sunnyside, his participation was, at first, somewhat accidental. Like the Stoibers, Terry had a master plan for the Sunnyside that included extensive underground workings, an advanced surface plant at the mine, and a tramway that delivered ore to a large mill. He completed several of the most expensive pieces, and then the Silver Crash forced him to put the plan on hold. Even though Terry reinvested his profits to minimize his debt, he still financed some of the improvements with credit, problematic when his funds ran short in 1894. To make matters worse, the vein pinched out and required Terry to pay for a costly exploration campaign. When the economy soured, creditors demanded payment on Terry's debt, which he was unable to pay. They threatened foreclosure, and Terry held them at bay with a clever argument. He explained to the creditors that if they seized the property now, it would sell for a fraction of its worth given the poor economic climate and they would recover only a portion of the outstanding debt. Instead, if they waited, it was only a matter of time before Terry found a continuation of the vein. The creditors agreed, and in 1895, Terry vindicated himself by contacting the rich elusive vein. He paid off all his debts, began buying out other investors for sole ownership, and saved for further improvements.[251]

By 1896, Terry felt financially secure enough to construct the next phase of his plan. Like the Stoibers, he replaced costly mule trains with a tramway from the mine to the Midway Mill. Next, Terry installed vibrating tables in the mill. The improvements had the desired effect of lowering some costs, increasing the tonnage of ore sent to the mill, and recovering a higher proportion of the metals content.[252] Terry also entertained the long-term goal of building a third, larger mill at Eureka and extending the tramway. The fact that the vein proved to be inconsistent, however, eroded his confidence in the financing. A group of New York investors took an interest in the Sunnyside and made Terry an offer of $450,000 over time with a $100,000 advance as earnest money. Terry accepted. The investors hired mining engineer Thomas A. Rickard as

[250] *"Mining News,"* EMJ (7/27/95): 86; *"Mining News,"* EMJ (8/31/95): 206; Prosser, 1914; *Silverton Standard* (5/4/95).
[251] Marshall and Zanoni, 1998: 120.
[252] Burbank and Luedke, 1969: 56; Ransome, 1901: 176.

manager. The Sunnyside was not Rickard's only charge, however, as he oversaw other large mines through his Denver consulting practice. From the comfort of Denver, Rickard reviewed Terry's plans and supported the idea of a third mill in Eureka. Rickard dispatched a subordinate to the Sunnyside as acting manager to begin preparations for the new mill and tramway.[253]

After spending a considerable amount of capital on the new mill, overhauling the Midway Mill, and other improvements, investors were horrified when miners lost the vein again. Rickard recommended an exploration campaign, but the investors did not want to risk further loss. After a half-hearted attempt to find the vein, they allowed the property to revert to Terry, who now had $100,000 to invest. Between 1896 and 1897, his miners struck the vein and produced so much ore that Terry ran both the Midway Mill and the old facility on Lake Emma. He resumed construction on what became known as the Eureka or Terry mill, its tramway, and a power plant.[254]

Mineral Creek Mining District

The other two mines that explored economy of scale were the Victoria and North Star on Sultan Mountain in the Mineral Creek district. Physically, both operations conformed to the same template as the Silver Lake and Iowa and were ready to produce. They featured several tunnels on a shared vein system, extensive workings, fully equipped surface plants, and mills at their lower tunnels. The Victoria also had an aerial tramway linking its upper tunnels with the mill. The character of the ore and the efficiency of the mills, however, differed from the Silver Lake and Iowa. The ore was a complex compound of silver and industrial metals, which had plagued the expert mill men for four years. The Silverton Mining Company refitted the North Star Mill in 1890 and again in 1894. The Victoria company changed its mill in 1893 and 1894. However, the Silverton company principals gave up on the mill and compensated by focusing on the highest grades of ore and leasing sections of the vein to independent partnerships for added income. More than forty miners shipped high volumes of ore to the Durango Smelter until 1897, when they exhausted the profitable material. Plenty of low-grade ore remained, but because the investors were unwilling to refit the mill again, the company closed the mine.[255]

The Victoria company, on the other hand, triumphed and its mill proved effective, rendering the low-grade ore in the mine profitable to produce. It seems curious that the Victoria Mill was effective while the North Star Mill was not because both companies were adjacent and worked the same vein system. In 1895, the Victoria hired Thomas Kane as manager, formerly superintendent of Colorado Mining & Land Company at Mineral Point. Kane ran a workforce at least as large as that of North Star and produced and milled around forty tons per day through 1896. However, during 1897, the ore changed in character again and the Victoria company

[253] Henn, 1999: 34; *"Mining News,"* *EMJ* (4/25/96): 406; *Silverton Standard* (4/18/96): 1.
[254] Henn, 1999: 34; *"Mining News,"* *EMJ* (10/9/97): 435; *"Mining News,"* *EMJ* (4/30/98): 531; *Silverton Standard* (10/2/97): 1.
[255] *"Mining News,"* *EMJ* (3/30/95): 301; Ransome, 1901: 23; *Silverton Standard* (6/9/94): 3; *Silverton Standard* (6/23/94): 3.

scaled back operations, reverted to the small amount of high-grade ore that was left, and then suspended.[256]

One last factor contributed to sound production in the county during the post-Silver Crash depression. Some mine owners attempted to realize at least some income from their properties rather than let them remain idle. At the same time, investors saw the dismal conditions as an opportunity to snatch up otherwise productive mines at reduced prices. Both groups then tried to mechanize operations to the extent their capital allowed to reduce operating costs. Nearly all the county's districts saw at least several such ventures.

The Mastodon Mine in the Eureka district was well-positioned to be reopened. The mine was quiet during the early 1890s because its richest ore was exhausted. Rasmus Hanson was familiar with the property because it was connected with the Sunnyside Extension, which he sold in 1892. Hanson managed the Sunnyside Extension for the new owners, and the operation was failing because, like the Mastodon, the rich and easily milled ore had been exhausted. He leased the Mastodon in 1894 or 1895, developed the vein, and began treating the ore with limited success in the Hanson Mill. Between this and shipping the ore to Silverton, Hanson demonstrated to the Sunnyside Extension owners that the Mastodon was worth their attention, and since it was adjacent, could be worked in tandem. They agreed and either leased or purchased the property, which provided enough ore to postpone the inevitable failure of the entire operation.[257]

A.L. Jones, an investor in Denver, was convinced that the Silver Wing Mine offered great potential because it possessed plenty of low-grade ore although closed since the early 1880s. Jones envisioned a large operation similar to the North Star or Victoria, with multiple tunnels, a mechanized surface plant, and a large mill at the lower tunnel. He enlisted Chicago capitalist E.W. Morrison, and together they bought machinery, water rights, timber rights, and numerous claims on the Tom Moore Vein. Not only was the operation similar to the North Star, it suffered a similar fate. In 1895, Jones hired a large workforce of forty-five to install the machinery, develop the upper workings, drive the lower tunnel, and prepare a site for a new mill. The following year, while the mill was still under construction, Jones shipped high tonnages of ore to the Durango Smelter.[258] After the mill was finished, the company found that the payrock was too complex for the new facility and reverted to shipping the ore to the Durango Smelter. Of the failure, the *Silverton Standard* stated: "A magnificent mill is connected with the property which has thus far been unused. We are informed that the ores of the Wing are better adapted to smelting than milling."[259] In response, Jones hired more miners and improved efficiency, without running the mill.

Cement Creek Subdistrict

[256] *"Mining News,"* *EMJ* (9/14/95): 258; *Silverton Standard* (7/27/95): 4.
[257] *Silverton Standard* (8/10/95): 2; *Silverton Standard* (2/29/96): 8.
[258] *"Mining News"* *EMJ* (9/14/95): 258; *Silverton Standard* (5/1/8/95): 3; *Silverton Standard* (8/10/95): 1.
[259] *Silverton Standard* (12/25/97): 1.

In the Cement Creek drainage, Willis Kinney continued work on the Gold King, which he and backers Cyrus Davis and Henry Soule purchased. In 1895, they formed the Gold King Mining & Milling Company to allocate capital and pursue the rich gold vein that awaited underground. The following year, Kinney had enough funds to commission Tunnel No.1 high up on the mountainside in the vicinity of the original discovery. Before reaching the target ground, the miners struck an unexpected vein that they termed the Davis. Around 200 feet of exploratory drifting proved that the vein was nothing less than a bonanza. After striking the Davis Vein, miners then encountered the Gold King Vein, as expected. With miners extracting payrock from not one but now two fabulous veins, Kinney immediately planned the facilities to produce in economies of scale. To minimize debt, he built the facilities incrementally. He started with a ten-stamp mill on the east edge of Gladstone in 1896 and enlarged it fourfold the following year. He also erected an aerial tramway to deliver the ore from the mine. In a few years, the Gold King produced enough ore to contribute materially to the county's production figures, and this trend would only intensify.[260]

Mineral Point Mining District

The Mineral Point district had no massive mines to sustain activity during the Silver Crash, and its small operations wilted in the poor economic climate. The town of Mineral Point was nearly abandoned. The nearby San Juan Chief Mine was the only center of noteworthy activity. Ed M. Brown tinkered with the property during the early 1890s and even built a mill in preparation for production, but the Silver Crash brought this to an end. In 1895, owner George S. Orth & Company of Pennsylvania tried to get things moving again by conducting underground development and enticing Brown to return. He did, but because the ore was complex and the mill ineffective, he continued only limited development for several more years and waited for the value of silver to rise.[261]

Ice Lake Mining District

Ice Lake Basin, locked in the high peaks at the head of the South Fork of Mineral Creek, saw limited activity. In 1890, William Sullivan began work on the Bandora Mine, proved rich silver ore, and sold it to Colorado Springs investors the following year. They organized the Bandora Mining & Milling Company but did little with the property until 1893, and nothing after the Silver Crash. Unwilling to wait for the price of silver to be restored, they reopened the mine in 1896 under superintendent James B. Snow and began production. Because the mine was far from Silverton, the cost of importing supplies and packing out the ore was too high to sustain the operation. Thus, the owners built a mill to separate out waste from the ore, and either they or the county commission contracted with Ben Harwood to improve the existing trail into a road. This

[260] Kinney, 1932; *"Mining News,"* *EMJ* (6/19/97): 639.
[261] *Silverton Standard* (7/27/95): 1.

had the added benefit of making the basin more accessible for other ventures. By 1897, the owners leased the Bandora to Patterson & Johnson, who enjoyed a sound yield.[262]

The Great Mining Revival, 1898 – 1910

As the decade of the 1890s waned, a variety of factors contributed to a revival of silver mining across the west and especially in Colorado. Even though the value of silver did not recover from the Silver Crash of 1893 and hovered at around $.60 per ounce, the residents of San Juan County saw their mining industry blossom. With the exception of isolated years, miners produced more gold, silver, and lead than any time in the past. Given the low value of silver, several factors help explain the trend.

First, the nation's economy recovered from the depression, and while the rebound started in the east, it reached the west by the late 1890s. As the economic climate stabilized, investors felt secure enough to risk capital, and mining companies were able to find financing such as loans and credit for their projects. Second, transportation improved, railroad traffic increased, and goods and services were readily available again. Third, mine and mill owners, tired of bearing the costs of idle, profitless properties, were more than willing to extend themselves to bring their operations back into production or sell or lease them to investors who would. Fourth, the demand for industrial metals such as copper, lead, and zinc greatly increased due to the revival of industry. Fifth, advances in mining technology and engineering decreased the costs of ore production, and improved milling methods recovered even more of the metalliferous content than ever. Some of these were developed in response to the Silver Crash.

The last and sixth factor was the production and concentration of low-grade ores in economies of scale through massive investment and mechanization. As noted above, John Terry and the Stoiber brothers pioneered this practice. When capital and credit became available again by the late 1890s, other large mining companies in the county and throughout Colorado imitated them and profited from the abundance of low-grade ore. While the movement gave rise to gigantic operations, smaller outfits were also able to profit when they supplanted labor with machinery and ensured the production of high volumes of ore per shift.

The revival was dramatic in San Juan County at all levels. By 1900, the county population rose 2,300, 700 more than the last peak of 1890. The number of mines nearly tripled from those that were active the depression. In 1898 and 1899, the county featured approximately seventy-five small outfits, twenty-five medium-sized operations, and five large producers. These figures shifted as companies expanded their operations, and the numbers of medium-sized and large mines increased. Between 1900 and 1905, there were fewer small outfits, but the medium-sized mines rose to thirty-three and the large producers jumped to fourteen. The buoyant conditions stimulated a wave of prospecting in turn. In 1898 and 1899, prospectors developed around 25 new properties, and by the early 1900s, they worked at least 100. The production of metals fluctuated during the revival but changed little on average. Yields of approximately $1

[262] *"Mining News,"* *EMJ* (10/3/91): 393; *Silverton Standard* (6/6/96): 5; *Silverton Standard* (8/1/96): 3.

million in gold, $400,000 to $500,000 in silver, $300,000 to $400,000 in copper, and as much in lead per year were the norm.[263]

If the number of mines increased, then production should have risen in concert, and yet it remained static through the revival. What accounted for this trend? First, many of the new mines were failures and produced little ore. Second, the quality of ore decreased and offered a smaller metals content, which was troublesome because the material was already low in grade. Third, some large companies exhausted their ore reserves, and even though the mines were physically substantial, their production was not as high as might be expected.

While the revival brought San Juan County out of the post-Silver Crash depression, it changed the corporate landscape of the mining industry. The massive amounts of capital required to mine and mill economies of scale, and the proportional profits to be made, attracted companies that were larger, and capitalists who had more power than in years past. Most of the substantial companies consisted of groups of wealthy investors with interests in other mining regions and even separate industries. These companies had plenty of capital, developed individual mines into major operations, and were satisfied with regular ore production. Some of the companies owned proven mines and mills throughout the San Juans and considered their overall profitability most important, even if a few of the individual operations failed. Companies sought domination within the industry, speculated with prominent mines as if they were no more than prospects, and worked through subsidiaries. These entities contributed to an atmosphere of corporate mining in the county, although a high number of modestly sized operations maintained a strong local presence.

The American Smelting & Refining Company (ASARCo) was among the first of the massive corporate entities to affect San Juan County. The company was organized in 1899 by some of Colorado's and the nation's most powerful smelter men. They were bent on nothing less than national domination of the smelting industry, which they hoped to achieve through the business trust of ASARCo. James B. Grant of the Omaha & Grant Smelting & Refining Company was among the organizers, and he included the Durango Smelter in the new trust. In the same year, ASARCo acquired Otto Mears' Standard Smelter, and in so doing, controlled a significant share of the smelting capacity that served the San Juans.[264]

The company was adamantly antilabor and had the support of Frank Guiterman, manager of the Durango Smelter. Guiterman detested organized labor from personal experience quashing strikes at Telluride, and he carried his policies over to the Durango Smelter. In 1899, the State of Colorado mandated the eight-hour law for mill workers, and clever Guiterman told his workers that he would uphold the law but pay them for only eight hours instead of the usual ten-hour shift. Guiterman underestimated the power and unity of the workers, who belonged to the Mill and Smelterworkers' Union, and they struck and literally shut down both plants. Chapters in

[263] Henderson, 1926: 216; Schulze, 1977: 1890-7; Schulze, 1977: 1900-10. The number of active mines was derived from a survey of *Colorado Mining Directory*, *EMJ*, and *Silverton Standard*.

[264] James E. Fell, Jr., *Ores to Metals: The Rocky Mountain Smelting Industry* (Lincoln, NE: University of Nebraska Press, 1979) 223, Ransome, 1901: 23; Smith, 1982: 101; Smith, 1992: 78.

Pueblo, Denver, and other smelting centers in Colorado followed in sympathy, and the Western Federation of Miners threatened similar action at many mines in Colorado.[265]

The result of the massive strike was profound. At first it paralyzed Colorado's mining industry, and as mines began to close, the demand for coal slackened and railroads curtailed traffic. Some of the mining districts in the San Juans were definitely in trouble, although Silverton offered enough ore treatment to soften the blow in the Animas River drainage. The mining industry became polarized as prolabor individuals sided with the strikers and antilabor forces, mostly mine owners, argued that the action was to everyone's ruin. In heavily unionized San Juan County, mine owners felt threatened by the potential for sympathy strikes. Newspapers fed the fires of tension and harped on the fact that if the strike in Durango forced the closure of mines, 500 workers in Silver Lake Basin and Arrastra Gulch alone would be jobless. After several weeks, the Colorado Supreme Court declared the eight-hour day unconstitutional, the wages and shift issue was back to where it started, and the strike collapsed. Everyone breathed a sign of relief as mining returned to normal in the Las Animas district.[266]

Despite the near monopoly that ASARCo held over the smelting industry, mining companies in the Animas River drainage generated enough ore to support at least one niche smelter. Unable to compete with the Durango plant, Thomas Walsh closed his Silverton Smelter in 1898 or 1899. The San Juan Smelting & Refining Company filled the void with the Kendrick-Gelder Smelter, built at mouth of Cement Creek in 1900. Like Walsh's facility, the Kendrick-Gelder Smelter specialized in treating ores rich in pyrite and copper, which attracted mining companies in the Red Mountain district. Because some of the operations in the Las Animas district had similar payrock, they found the smelter to be of benefit.[267]

In 1907, the vagaries of economic cycles again impacted San Juan County. This time, a national recession struck, and it nudged San Juan County into decline. The year began like many others during the revival. Mining companies generated almost $1 million in gold and $105,000 in zinc, then being recovered as an important industrial metal. Miners also produced $776,000 in silver and $662,000 in lead, both in greater quantities than previous years. The county was so productive that it ranked second only to Leadville in terms of lead and copper in Colorado. As the recession set in, prices ebbed until silver averaged a lowly $.56 per ounce and copper dropped from $.17 to $.13 per pound. At the same time, many mining companies were experiencing only low-grade deposits. The large companies with concentration mills were able to subsist on ore valued at $6 to $12 per ton, but the value had to be double for those companies without. Many small outfits simply lacked such payrock and were forced to close. Production in the county declined after 1907, peaked briefly in 1910, and then abruptly dropped off. The number of active mines fell from the heights of the early 1900s to around ten small outfits, fifteen medium-sized operations, and five large producers. Mining in the county contracted

[265] Fell, 1979: 227; Smith, 1992: 78-9.

[266] *Denver Times* (6/7/99): 2; Fell, 1979: 230; Smith, 1982: 128.

[267] *"Mining News," EMJ* (7/14/00): 48; *"Mining News," EMJ* (5/15/09): 1019; *"Mining News," EMJ* (1/26/01): 28; *"Mining News," MSP* (5/22/09): 708; *Silverton Standard* (1/8/10); Sloan and Skowonski, 1975: 121, 142.

around those large companies that were savvy and wealthy enough to profit from their low-grade ore reserves.[268]

In the face of low metals prices and poor economic conditions, some of the large mining companies again made a concerted effort to cut their operating costs. Management closely examined budgets, and, in what was becoming a wearisome pattern, identified labor as a place to seek savings. The companies tried to get more out of their workers for less money by either increasing hours or reducing pay, which set the stage for inevitable conflict. Both labor and the companies were well prepared. Willis Kinney and Franklin L. Ross represented the San Juan Mine Owners' Association, and the Silverton Chapter of the Western Federation of Miners was a shield for the miners. Ross was related to J.B. Ross and a partner in the Ross Mining & Milling Company. Kinney himself rose from humble working-class roots, as the son of a leather merchant. In search of opportunity, he journeyed to Pueblo in 1880 and worked in a smelter then as a miner in Silver Cliff, before moving to the San Juans in 1883. Prior to his success with the Gold King, Kinney managed the Harrison Mine.[269]

In response to the mining companies' desire to either extend the miner's work day or reduce pay, the miners' union demanded a wage of $3 per eight-hour shift, which the mine owners' association vehemently protested. As tensions rose in 1907 and a strike seemed imminent, the Deputy State Labor Commissioner made a trip to Silverton to mediate. The miners' union and more than one thousand members proved to be a resolute opponent. To avoid a shutdown of the mining industry, risky in the poor climate of the recession, Kinney and Ross acceded to the miners' demands.[270]

The economic climate was especially unkind to the county's milling industry. Collectively, the small mining companies constituted the principal customer base for the independent mills. The small outfits were unable to afford their own concentration mills and had to send their ore to these facilities, which either purchased the material or treated it for a fee. Most of the large mining companies, in contrast, did little business with the independent mills because they concentrated their own ores in-house. Some companies, such as at the North Star, even accepted custom business to offset the waning production from their own mines. When the small outfits began to run out of ore valued above the $12 to $24 per ton threshold, they sent less to the independent mills. As a result, the demand for custom treatment slumped, which caused the independent milling business to collapse. Only the Silverton Public Sampler, Silver Lake Mill, and Kendrick-Gelder Smelter accepted custom business after 1907.[271]

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[268] George E. Collins, *"Mining in the United States During 1908: Colorado,"* *EMJ* (1/9/09): 104-5; George E. Collins, *"Mining in the United States During 1909: Colorado,"* *Engineering & Mining Journal* (1/8/10): 97-8; Howe Cross, 1905: 26; *Mineral Resources*, 1908: 395; Saxon, 1959: 7, 8, 14, 16; Henderson, 1926: 216 for production figures. *EMJ* and *Silverton Standard* for number of active mines.

[269] Brown, 1984: 71; Kinney, 1932; *"Mines of Cement Creek: Wonderful Progress made during the past Seven Years and a Great Future planned by People of Enterprise,"* *Silverton Standard* (10/19/01); Sloan and Skowronski, 1975: 49.

[270] *"Special Correspondence from Mining Centers,"* *EMJ* (7/20/07): 133; *"Special Correspondence from Mining Centers,"* *EMJ* (7/27/07): 180.

[271] *"Mining News,"* *EMJ* 4/18/08): 832.

The reason why the Kendrick-Gelder Smelter survived was because it was a niche facility that processed ores primarily with a high copper and pyrite content. The Durango Smelter, and the independent mills that did business with Durango, shunned such ores because they were incompatible to process alongside the region's lead-zinc material. In 1905, J.B. Ross purchased the smelter from the San Juan Smelting & Refining Company, which was in trouble, to treat pyretic ore from his mines in the Red Mountain district. His Ross Mining & Milling Company owned the Congress on Red Mountain Pass, the Galty Boy in Cement Creek and the Champion, all of which yielded pyretic ore. Ross also operated the Silver Wing, Bandora, and other lead-rich mines at times to fuel the smelter with fluxing-grade ore. The firm also hoped to attract custom ores from independent mines in the Red Mountain district. The Ross brothers did well with the mining business but not with the smelter. Their mines provided enough ore to pay most of the operating costs, but little custom ore came down from Red Mountain. Thus, the Ross brothers shut down the smelter in 1908 and sold the facility to wealthy New York investor W.B. Lowe a year later. Lowe attempted to modify the furnaces to treat lead-zinc ores typical of San Juan County in hopes of securing local business. The facility proved unable to economize production sufficiently, and in 1910, Lowe closed Silverton's last independent smelter.[272]

Las Animas Mining District

The Las Animas district featured several of the county's most significant companies during the late 1890s revival, and although they were among the largest in the county, the companies were local entities because their directors began in Silverton. These included Edward Stoiber's Silver Lake Mines Company and Gustavus Stoiber and James Robin's Iowa Mining & Milling Company. At Silver Lake, Edward continued to reinvest capital. As aforementioned, Edward planned a tramway from the mine down to an ore storage terminal, with the first 8,700-foot long segment, built to a short distance above the Iowa Mill. In 1898, he finished the system. He contracted again with William Frey who began construction on the tramway's second segment and on a massive terminal that replaced the original. In addition to receiving ore, the terminal served as a base station for the mine and included assay, machine, and carpentry shops. In total, the ore bins had the capacity for 16,000 tons of material, and the two tramway segments totaled almost 15,000 feet, making it one of the longest systems in the state.[273]

The underground workings in Silver Lake Basin took the form of an ore factory with more than a dozen miles of passages and levels linked by a central internal shaft. An electric hoist raised a cage in the shaft, and miners pushed loaded cars off the cage and across a long set of ore bins directly over the Stoiber Tunnel. Mules pulled trains of cars under the bins, workers filled them, and they continued out to the mill. To expedite the blasting process required to break the ore loose, Edward employed compressed air rock drills. When he wanted to increase the number of machines, he realized that a new compressor would have to be hauled up to the mine

[272] *"Mining News,"* EMJ (5/15/09): 1019; *"Mining News,"* MSP (5/22/09): 708.

[273] *"Mining News,"* EMJ (8/20/98): 225; *"Mining News,"* EMJ (8/27/98): 256; Prosser, 1914; Ransome, 1901: 156; *"The Silvery San Juan Has Enjoyed a Year of Unparalleled Prosperity in all Lines of Industry"*.

and sought an alternative. In keeping with his progressive attitude, Edward decided to experiment with revolutionary electric models, since the mine already had an electrical infrastructure. By January 1899, miners were using the drills with success, drawing the attention of mining experts.[274]

In 1900, ten years after Edward began at the Silver Lake, he finally accomplished his vision. When the *Silverton Standard* received the news of the tram terminal under construction in 1898, the editors postulated that Edward would eventually build a mill on the site. Fulfilling the predictions, Edward did just that in 1900. With McCartney's assistance, Edward personally designed the new mill and selected the equipment, and then pushed its construction around the clock throughout the year. The mill and associated facilities were among the largest and most advanced ore treatment complexes in the San Juans, if not Colorado. The main building alone covered two acres, and the ore delivery structure and terminal built in 1898 occupied additional ground. With an array of advanced equipment, the mill was able to treat an astounding 1,000 tons of ore every 24 hours, more ore than many mines generated in a month. In general arrangement, the Silver Lake was now like Terry's Sunnyside, only the facilities were at least twice the size.[275]

While the Iowa Mine was not quite as extravagant as the Silver Lake, Gustavus Stoiber and James Robin were almost matching Edward's improvements one-for-one. They already owned the Royal Tiger Mine, across Silver Lake from the Iowa, and incorporated this sound producer into the Iowa operation. In 1898, Stoiber and Robin organized the Tiger Mining & Milling Company to finance an aerial tramway to the Iowa, a compressed air line from the Iowa, and additional surface facilities. The double-rope tramway allowed miners at the Royal Tiger to send ore over the lake and into the Iowa terminal, where workers coupled the buckets onto the main line. The buckets then coasted down to the Iowa Mill, emptied by workers, and sent back up to the Royal Tiger for filling. To power a number of new drills at the Royal Tiger, Stoiber and Robin increased the capacity of the compressed air system at the Iowa.[276]

Imitating Edward, Gustavus and Robin decided to build a storage terminal on the Animas River for concentrates from their Iowa Mill and smelting-grade ore from the mine. Gustavus chose a site on the north side of the river slightly east of Arrastra Gulch. Crews then erected the facility in 1899, completed a tramway to the mill, and secured direct freight service from the Silverton Northern Railroad.[277]

In addition to aggressively pursuing improvements at the Silver Lake and Iowa, Edward and Gustavus continued to fiddle around with their joint tunnel project, originally known as the Silverton Deep. The idea behind the tunnel was to undercut the ore systems of both mines at great depth, provide a platform for miners to stope the veins 700 feet upward to the existing workings, and serve as a central artery through which the deep ore could be hauled out. Such a project would be an engineering feat on par with similar tunnels in Creede, Idaho Springs, and

[274] Arthur Lakes, *"The Silver Lake Mine,"* *Mines and Minerals* (Apr 1903): 389; Ransome, 1901: 156.

[275] Bureau of Mines, *Manuscripts MSS 640 V.27*: 19; *"Mining News,"* *EMJ* (12/1/1900): 648; *"Mining News,"* *EMJ* (5/11/01): 600; *"Mining News,"* *Mining Reporter* (12/4/00): 361; Ransome, 1901: 156.

[276] *Colorado Mining Directory*, 1898; *"Mining News,"* *EMJ* (8/27/98): 256; *"Mining News,"* *MSP* (5/14/98): 519.

[277] *"Mining News,"* *EMJ* (7/14/00): 48; *"Mining News,"* *Mining Reporter* (1/25/00): 52; *Silverton Standard* (1/26/00).

other important Colorado mining districts. The Stoibers started the tunnel in 1895 but put the project on hold. With both mines highly productive by 1897, they renewed their interest in the tunnel and renamed it the Unity, probably to reflect their fraternal cooperation. Teams of expert miners resumed work on the tunnel, and around 1898, Edward installed a mechanized surface plant that included an aerial tramway tied into the Silver Lake system. Edward provided the Unity crew with plumbing, steam heat, and electric lighting. In 1901, miners made the connection with the deepest workings in the Silver Lake Mine, around 3,000 feet to the south.[278]

During the early 1900s, large corporate entities from outside the county targeted well-developed properties in the Las Animas district for acquisition. The North Star Mine was one of the first to draw interest. After operating the property for more than twenty-five years, the Crookes decided to sell after realizing around $2.5 million in ore. In 1900, they were approached by wealthy and experienced investors with the Smuggler-Union Mining Company. This outfit was one of the largest in Telluride and held the Contention Mining Company as a subsidiary. Some of the investors were from Boston, others associated with the powerful Calumet & Hecla Mining Company in Michigan, and the rest were local to the San Juans. The Contention directors offered the Crookes a fair price, and they accepted.[279]

Like the Stoibers, the Contention company intended to build a mill on the Animas River, secure a siding from the Silverton Northern Railroad, and send the ore down through Little Giant Basin via tramway. The Contention company wasted no time in pursuing its production scheme, but there was one important impediment to the plan. The summit of North Star Peak lay between the mine's surface plant and Little Giant Basin, the tramway route to the mill. Further, the route itself was not straight and featured a crook like Stoiber's Silver Lake system. After considering these factors, the engineer bored a tunnel from the North Star workings through the peak and blasted a room out of the north cliff. In the room, workers erected a terminal for a double-rope reversible tramway, which descended to the abandoned North Star Mill in Little Giant Basin. They converted the mill building into a midway station, and a Bleichert system continued down to the Contention Mill on the Animas River. The tramway was unique because of the refitted mill and two different legs.[280]

Once the mill and tramway were finished, the company increased the workforce to 100. Miners engaged in development and ore production, and others started up the Contention Mill on the river. After only a year, however, the entire operation collapsed. Bulkley Wells, the colorful manager of Smuggler-Union, had neglected to adequately develop the ore veins in the North Star and did not ensure that the concentration process in the mill was truly effective. During the winter of 1902, Wells closed the mine and mill as a monumental failure, and the company looked to its other mines to recover the loss.[281]

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[278] Lakes, 1903; *"Mining News,"* EMJ (12/8/00): 677.

[279] Bureau of Mines, *Manuscripts MSS 640 V.27*: 16, 18, 27, 59; *"Mining News,"* EMJ (7/20/01): 77; *"Mining News,"* Mining Reporter (1/9/02): 30; *"Mining News"* Mining Reporter (1/30/02): 146.

[280] Bureau of Mines, *Manuscripts MSS 640 V.27*:59; *"Mining News,"* Mining Reporter (11/7/01): 369; *"North Star Group,"* Mining Reporter (10/2/02): 270; Prosser, 1914.

[281] Colorado Mine Engineers' Reports: Shenandoah-Dives; Prosser, 1914; *Silverton Standard* (1/2/04).

In 1901, Edward Stoiber's Silver Lake empire was the subject of the second acquisition in the Las Animas district by a major corporate entity. The Guggenheims, empire builders on a national scale, offered Edward a stunning $2.5 million for the Silver Lake collection, or $54 million today. Some sources claim that Edward accepted around $1.3 million in cash and the rest in stock. The only stipulation that Edward had was that he be retained as a consultant until the mill was finished and treating ore successfully, which was proven in May. Satisfied that his legacy was fully functional, Edward and Lena retired to Denver and traveled Europe.[282]

The Guggenheims continued Edward's operation. They purchased the Titusville for $500,000 and the Scranton City because these mines lay long the same geological features as the Silver Lake workings. Immediately after the transactions, Samuel I. Hallett, a talented mining engineer and metallurgist, arrived from Aspen to replace Robert McCartney as manager. Hallett maintained the Silver Lake Mines Company structure, kept the employees, and hired McCartney as a consultant. McCartney attended to other operations as well, including the North Star Mill on Sultan Mountain. Amusingly, one of the first changes that Hallett instituted was the replacement of some of the concentration machinery in the mill with Hallett tables, apparatuses of his own design.[283] The Guggenheims did not have the personal interest that possessed Stoiber, and problems soon developed. The first drew Stoiber's honesty into question. Within three months of the sale, the principal ore vein pinched out, leaving the costly operation with much less payrock than had been supposed. Possibly at Stoiber's recommendation, Hallett directed nearly all the miners to extract the existing ore and drive exploratory workings in search of the lost vein and others. The miners triumphed, Hallett was relieved, and Stoiber exonerated.

Although Hallett was not as intimate with the mine as Stoiber, he was an effective manager. The workforce produced 260 tons of ore per day, and although this was only one-quarter of the new mill's capacity, it still was more than any other mine in the county. Around 30 percent of the ore flowed out of the Unity Tunnel, which was now a haulageway for the Silver Lake's lower workings, and the remainder came from Silver Lake Basin. The figure was honorable, especially given that the mill reduced the ore to 60 tons of concentrates, which required daily rail service to remove. With all the ore descending to the Silver Lake Mill, Hallett mothballed the old facility in Silver Lake Basin. Shortly after, the Guggenheims dispatched Hallett to Mexico to examine several promising mines there.[284]

In 1903, the Guggenheims merged with smelting giant ASARCo, which controlled the Silver Lake empire both for the mine's profitability and as a source of ore for the Durango Smelter. Under ASARCo, problems with the Silver Lake continued and consumed profits almost as quickly as they were generated. In October 1904, workers in the tramway's turning station above the Iowa Mill stoked their stove a little too high, and the wind blew sparks out of the

[282] Colorado Historical Society *Manuscripts MSS 640, V.27*: 20; Denver Times (5/2/01): 4; Denver Times (12/29/01): 6; *"Mining News,"* EMJ (5/11/01): 600; *"Mining News,"* EMJ (8/27 01): 539; *"Mining News,"* Mining Reporter (1/9/02): 30; Prosser, 1914; Silverton Standard (6/7/02); Wolle, 1991: 428.

[283] *"Mining News,"* EMJ (10/11/02): 494; *"Mining News,"* Mining Reporter (9/25/02): 258; *"Mining News,"* Mining Reporter (10/30/02): 363.

[284] Denver Times (11/23/01): 9; *"Mining News,"* EMJ (3/14/03): 423; *"Mining News,"* EMJ (6/20/03): 945; *"Mining News,"* Mining Reporter (5/1/02): 437; *"Mining News,"* Mining Reporter (6/11/03): 549; Prosser, 1914.

stovepipe onto the building, which caught fire and burned to the ground. The cables on both tram segments released, which dropped the tram buckets and pulled over a number of towers. The system was a total wreck and the conflagration suspended the entire mining operation. The Silver Lake Mill was shut down until the tram system could be repaired, and instead of bringing the original mill in Silver Lake Basin back into operation, the manager laid off half the workforce and curtailed activity at the mine.[285]

After the tramway had been repaired, another catastrophe struck. In 1906, workers at the Silver Lake Mill noticed that a fire had been deliberately started in the office and sounded the alarm. They frantically rushed to the hydrants only to find that someone had cut the hoses. With no way to control the fire, the blaze enveloped the entire building, ancillary structures, and the lower terminal for tramway, which suffered another massive release. The devastation was not total because the ore elevators, powerhouse, shops, and boardinghouse remained intact. Without a mill, ASARCo suspended operations yet again and considered whether the Silver Lake was worth the trouble. The disaster caused a distinct dip in the county production figures for 1906.[286]

ASARCo decided to invest in the Silver Lake one more time and likely consulted with the manager. Guess to revise the original operating strategy. ASARCo floated the idea of reopening the long-quiet Aspen Tunnel, which still offered low-grade ore with a high zinc content. A single mill, however, would not be very efficient for the ore from both mines since it differed greatly, and in response, Guess planned a mill with two separate flow paths. One path would be tailored to ore from the Silver Lake and the other could treat not only high zinc payrock from the Aspen, but also custom orders. By April 1907, the reincarnated Silver Lake Mill was finished and featured split flow paths as planned. The path for Silver Lake ore could treat 200 tons per day and the other path half that, a large downgrade from Stoiber's original design of 1,000 tons per day.

The Iowa Gold Mining & Milling Company, second largest outfit in the Las Animas district and one of the county's most profitable, experienced problems during the early 1900s even worse than the Silver Lake. Gustavus Stoiber and James Robin discovered that the main problem with producing ore in economies of scale was that a mine's life was relatively short when the ore reserves were limited. By 1901, the Iowa showed signs of exhaustion after only six years of intensive mining, and, in response, Gustavus and Robin pursued an aggressive exploration and development campaign to prolong operations. When this failed, they curtailed operations, let go more than half of the workforce, and suspended the mill and tramway. Gustavus and Robin then took the option that companies reserved for times of trouble and leased both the Iowa and Royal Tiger properties while seeking a buyer. In 1902, around forty workers sought ore in both mines, and Al Kunkle struck a fabulous vein in his Royal Tiger lease, but it lasted for only one year. Because of the meager production from both properties, no one

[285] *"Mining News,"* *MSP* (2/4/05): 77; *Silverton Standard* (10/24/04); *Silverton Standard* (12/17/04).

[286] *Mineral Resources of the United States* (Washington, D.C.: U.S. Geological Survey, Government Printing Office, 1906) 232; *"Mining News,"* *MSP* (5/5/06): 301.

seriously considered purchasing the complex, including the Guggenheims, who owned the Silver Lake on one side of the Iowa and the Titusville on the other.[287]

The stress of the rapid Iowa's failure proved to be too much for Stoiber and Robin. Depressed and despondent, Robin shot himself in 1903. In 1905, an avalanche wrecked a significant portion of the Iowa Mill. Gustavus died of a massive stroke on the train from the Red Mountain district down to Silverton soon after.[288]

During the late 1890s and early 1900s, the revival in the Las Animas district was by no means limited to large companies. Investors with moderate resources, who greatly outnumbered the Stoibers, Robins, and Guggenheims of the industry, financed and even personally worked a number of small to medium-sized operations. Some of these were continuations from the mid-1890s while a substantial proportion of them were new. Significant fortunes were not won or lost on these mines, by they were an important part of the revival on a cumulative basis.

While most of the companies organized during the late 1890s boom were there to mine, a few sought riches by exploiting investors. For much of its history, San Juan County saw little obvious fraud, but free-flowing capital of the revival proved to be a sound financial resource for a few highly dubious schemes. In 1897, B.F. Kelly and W.H. Bush organized a project so preposterous that only investors as out of touch with reality as Edward Innis could possibly see its merit. Kelly and Bush established the Gold Tunnel & Railway Company to drive the Oro Tunnel no less than 20,000 feet from the Animas River east under Deer Park and Silver Lake Basin, terminating at the Highland Mary Mine. Not only was the tunnel supposed to pierce known veins, but, as with the Mineral Point Tunnel, it in theory was going to discover new formations and repay investors many times over. In 1898, Kelly and Bush collected enough money to secure the Highland Mary and a site on the Animas River, and began work.[289] Silvertonians, well versed in mining, frowned on the project, as the *Silverton Standard* stated: "B.F. Kelly, better known as 'Tunnel Kelly,' if he never was thought of before as being a rustler and 'smart' man, will be now since he and W.H. Bush, the promulgators of the famous Oro Tunnel scheme, have realized out of their enterprise $400,000."[290] The project was a clear sign to the Las Animas district that investors in fact had plenty of capital and were eager to spend it during the late 1890s. The Oro was not Kelly's only venture, and he engaged in similar projects in Clear Creek County. As preposterous as the Oro was, it led to one of the most important operations to develop in the Las Animas district during the revival.

The operation involved the Highland Mary, which Innis left as a ready-made mine when he went bankrupt in 1885. When miners originally drove the Innis tunnel, they pierced several major silver veins but did little with them because Innis was bent on finding the lake of gold. Kelly and Bush also neglected the veins probably because they were focused on their financial scheme and took little interest in what the Highland Mary had to offer. Kelly and Bush were

[287] *Silverton Standard* (1/18/02); *Silverton Standard* (2/22/02).
[288] *"Mining News," MSP* (8/12/05): 116; *"Obituary," Mining Reporter* (1/13/03): 61; Sloan and Skowonski, 1975: 163.
[289] *"Mining News," EMJ* (7/3/97): 16.
[290] *Silverton Standard* (10/8/98).

ousted from the Gold Tunnel & Railway Company in 1900, and Mary B. Murrell of Denver, Toledo investor C.W. Everett, and New York City capitalist John R. Wyatt assumed control. Murrell was probably the first of the partners to realize that at least several silver veins lay undeveloped in the Highland Mary and convinced Everett and Wyatt to organize the Highland Mary Gold Mining & Railway Company to bring them into production.[291]

Because knowledgeable about mining, Murrell assumed the position of manager, extremely rare in the mining industry. In 1902, she hired fifteen miners who repaired the surface plant and began rehabilitating the 6,500 tortuous feet of the winding Innis Tunnel. At the same time, Murrell secured J.A. Snedaker to build the mill originally planned for the Oro Tunnel, but adjacent to the Innis Tunnel where it was actually needed. Snedaker designed an excellent facility that not only effectively concentrated ore, but also included a small hydropower generator for electricity. The mine, however, was a long way from being truly profitable because the underground workings were so disorganized that they interfered with the movement of ore to mill. Under superintendent W.E. Wilson, miners split their duties between ore production and trying to link the disparate levels together through vertical workings. By 1904, he was satisfied with the development and directed the crew to send a steady stream of ore into the mill. The operation enjoyed such a high level of profitability through 1906 that the Silverton Northern Railroad considered grading a line up Cunningham Gulch to the mine.

On the other side of North Star Mountain, the Black Prince had the signs of becoming a major operation. In 1902, W.B. Severn, L.H. Chadwick, and other investors from Chicago and Michigan organized the Black Prince Gold Mining Company with the intent of developing the forgotten Black Prince vein. Severn and partners found that, with Contention's mill and tramway, the Black Prince was almost a ready-made mine. Eager to be done with the North Star debacle, the Contention company was more than willing to sell the Black Prince claims, the tramway, and the mill to Severn and partners.[292]

During the fall, the company put a large crew to work driving the main tunnel toward the vein and erecting a well-appointed surface plant. The conservative *Engineering & Mining Journal* noted: "Black Prince. This company has purchased the possessions of the Contention Mining Company on King Solomon Mtn, near Silverton, and is making many improvements. The old Contention tram is also being extended to the Black Prince lode." The tramway was not exactly "extended" and was, in reality, shortened. Workers erected a new terminal directly under the original Contention system and linked it to the Black Prince with a rail line. When the adjustments were finished, the Black Prince company operated the mine and mill with success at first. However, repeating the same pattern of the preceding twenty-five years, the ore increased in complexity with depth, the mill recovered only a fraction of the metals content, and the mine proved very expensive to operate. Had the investors looked into the histories of the operations that surrounded the Black Prince, they may have been more thorough in their planning. By 1904,

[291] *"Mining News,"* EMJ (2/23/01): 253; *"Mining News,"* Mining Reporter (7/11/01): 29; Silverton Standard (10/26/01).
[292] Colorado Mine Engineers' Reports: Shenandoah-Dives Group; *"Mining News"* Mining Reporter (11/20/02).

the company closed the mine but continued to run the mill as a custom facility on ore from other mines in the area.[293]

The Lackawanna Mine, on the north flank of Kendall Mountain above Silverton, was promising enough to draw significant investment. In 1898, George Whitelaw and John Norton, principals with the Four Metals Mining Company in Pueblo, added the property to its growing roster of mines in the San Juans. By driving exploratory passages on several veins, miners found enough ore to sustain a constant but limited production, which encouraged the company to invest in surface improvements. A system for shipping and storing ore was among the new facilities, and it consisted of a double-rope reversible tramway and set of ore bins on the Animas River. The Four Metals Mining Company enjoyed such success with the Lackawanna that one of the directors proposed a concentration mill at the base of the mountain. After several years of regular production, the rest of the directors felt confident enough to agree and financed a modest facility. Workers finished the mill in 1903, which is when trouble began. Similar to the Black Prince, the ore was too complex for the mill and the veins featured less material than expected. By 1904, Whitelaw and partners found the operation became unprofitable and stopped work.[294]

The Las Animas district weathered the 1907 recession better than most, but was not immune to the widespread failure of many of the small and medium-sized mines caused by the poor economic conditions. Some of these, however, were replaced by new ventures of similar size and productivity. In addition, the Silver Lake and the Iowa maintained their status among county's most important operations.

Despite this status, the dismal economic climate and a host of problems gave ASARCo reason to doubt whether the Silver Lake had been worth buying from Stoiber. When the replacement Silver Lake Mill was finished in 1907, ASARCo planned to treat silver-lead ore from the Silver Lake Mine in one of the two flow paths and zinc-rich material from the Aspen Tunnel in the other circuit. The Garfield Smelting Company, a subsidiary of ASARCo, reopened the Aspen, a short distance west of the mill, and was confident enough in the operation to build a new tramway. The arrangement, however, was short-lived. Neither treatment path in the new mill recovered a sufficient percentage of the metals content. ASARCo found that the facility was simply not profitable and suspended operations. ASARCo cancelled production at the Silver Lake and leased out blocks of ground instead of working the mine itself. Garfield decided to continue with its Aspen project and erected its own mill at the tunnel. Garfield's metallurgist had no better luck with the zinc-rich ore, however, and after spending a small fortune on a brand new mill, Garfield suspended work at the Aspen as well.

With an enormous amount of capital invested in both the Silver Lake mine and mill, ASARCo was unwilling to concede defeat. The managers agreed that the split treatment concept in the Silver Lake Mill held great potential, so they went back to the drawing board to refit the

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293 *"Mining News,"* EMJ (12/13/02): 795.

294 Bureau of Mines, *Manuscripts MSS 640 V.27*:98; *"Mining News,"* EMJ (2/8/02): 223; *"Mining News,"* EMJ (7/19/02): 93; *"Mining News,"* Mining Reporter (3/12/03): 249; Silverton Standard (1/25/02).

facility. The task likely fell to Louis O. Bastian, a milling expert who served as one of the superintendents for much of the decade and had experience with the facility. By late winter of 1909, ASARCo was ready to try again, brought ore down from the Silver Lake and over from the Aspen, and ran the first tests. To the relief of all, the mill ran as expected, after two years of delays. Management prepared to resume normal operations at the Silver Lake Mine, but before they made headway, the tramway's turning station burned. Yet another disaster struck when a series of avalanches let go following a powerful spring storm in 1911. One slide took out towers for both the Silver Lake and Iowa tramways and laid power lines on the ground, which shorted and started a fire at a transformer station. ASARCo fixed the tramway relatively quickly.[295]

In June, ASARCo sent a crew of eighteen miners to join the lessees at the Silver Lake and they naturally took up residence in one of the boardinghouses. While the massive residential complex was not filled to capacity, Silver Lake lessees and a considerable crew of miners employed at the Iowa made for a population of several hundred. The population, however, was too transitory for the Postal Service to justify maintaining the Arastra office, which was revoked in 1910. By July, the ASARCo miners began production, and as the demand for lead-rich ore increased at the Durango Smelter, ASARCo sent up additional teams until the workforce was around one hundred by the fall. The atmosphere of Silver Lake Basin approached the heyday years under Stoiber and the tramway carried as much as 100 tons of ore per day down to the mill.[296]

The last and final disaster for ASARCo struck in the summer of 1912. Leaving out the intense drama and excitement, the *Mining & Scientific Press* dryly reported that: "A fire occurred on June 30 at the Silver Lake Mine, near Silverton, owned by the American S.&R. Co. Practically all the mine buildings were destroyed, except the boardinghouse, which was saved by dynamiting smaller buildings between it and the blacksmith shop, where the fire started. The upper terminal of the tramway was destroyed, necessitating the closing of the mill."[297] With that, the company finally gave up on the mine, leased out blocks of ground to small parties.

Ironically, the Silver Lake and Iowa mines literally traded roles after the 1907 recession. Whereas the Silver Lake produced heavily and the Iowa was failing before the recession, the Iowa resumed its status as a major operation and the Silver Lake declined. The poor economic conditions facilitated the juxtaposed relationship, but the greatest factor was the difference of management strategy between the conservative ASARCo at the Silver Lake and a new organization that operated the Iowa.

After Gustavus Stoiber and James Robin died, their heirs and the surviving Iowa Tiger Consolidated Mining & Milling Company directors assumed that both the Royal Tiger and Iowa properties were bereft of profitable payrock. Otto Mears suspected otherwise and reasoned that if the Iowa and Silver Lake mines were neighbors on the same general ore system, there was no

[295] *"Mining News,"* EMJ (3/20/09): 625; *"Mining News,"* EMJ (4/4/11): 487; *"Mining News"* MSP (2/5/10): 239; Silverton Standard (2/13/09).
[296] Bauer, et al, 1990: 13; Mineral Resources, 1912: 694; *"Mining News,"* MSP (7/8/11): 59; *"Silverton, Colorado,"* MSP (1/20/12): 150; Silverton Standard (7/15/11).
[297] *"Mining News,"* MSP (7/27/12): 126.

logical reason why the Iowa should not match the Silver Lake's eighteen solid years of production. The ore, however, would require expertise to find and attentive management to produce. With this in mind, in 1908, Mears and Jack Slattery approached the Iowa owners with a proposal to lease the entire idle operation. The owners accepted, and Mears and Slattery organized both the Iowa-Tiger Leasing Company and the Mellville Leasing Company, the beginning of a long-lasting and highly lucrative leasing syndicate.[298]

Formally known as John H. Slattery, Jack was a staunch Silvertonian with experience in business and mining. Slattery worked as a civil and mining engineer in the Red Mountain district during the early 1890s left with the Silver Crash of 1893. The collapse of mining made engineering jobs difficult to find, so Slattery chose an industry always in demand. He moved down to Silverton and operated the Bucket of Blood Saloon, subsequently the Hub Saloon, and Grand Hotel. Slattery thus became a community figure, started a baseball club, and even served in the state legislature. Slattery's capital, popularity, business experience, and knowledge of mining made him an excellent leasing partner.[299]

Instead of viewing labor as a resource to be tolerated only by necessity, like Kinney and Ross, Mears and Slattery understood that their success hinged on their miners. Given this, the partners hired the best workforce that could be assembled and gave the miners incentive to find ore and produce it efficiently through a profit-sharing program. Up-front capital for repairs, improvements, equipment, and labor was in excess of what Mears and Slattery were comfortable providing, so they included around five other investors in their small but highly effective leasing syndicate.

Louis O. Bastian, formerly superintendent of the Silver Lake Mill, provided metallurgical expertise and some capital. When ASARCo ran into trouble with the mill, he went into semi-retirement and purchased the Corner Store mercantile in Silverton in 1909, but was easily drawn back into mining probably by Slattery. Matt Delsante was another Silverton resident and immigrant Italian miner familiar with the area's resources. King C. Gillette, of Beverly Hills, was a major contributor of capital. Frank Slattery, Jack's brother, provided management and administrative oversight. James R. Pitcher was Mears' right-hand man and son-in-law. Pitcher met Mears through the Mack Brothers Motor Car Company in New York City as a mutual investor, and they were convinced that the automobile was the wave of the future. Pitcher socialized with Mears and met Mears' daughter Cora, who he married in 1904. The following year Pitcher was appointed secretary and treasurer of the company, but sided with Mears during a stockholder disagreement in 1906 and walked out. Mears brought Pitcher west out of the comfort of New York City to gritty Silverton and offered him the position of manager over the Silverton Northern Railroad.[300]

As a syndicate, the team of seven worked together to lease some of the county's formerly most productive mines, with an emphasis on the Las Animas district. Various combinations of

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[298] *Mineral Resources*, 1908: 396; *"Mining News," MSP* (8/2/08); Sloan and Skowonski, 1975: 285; Tucker, 2003: 114; Weed, 1925: 730.

[299] Sloan and Skowronski, 1975: 285; *Silverton Standard* (4/29/99).

[300] James H. Baker, *History of Colorado* v. 5 (Denver: Linderman Co., Inc., 1927) 153; *Silverton Standard* (4/17/09); *Silverton Standard* (7/3/09); *Silverton Standard* (9/24/10); Sloan and Skowonski, 1975: 51, 242, 333; Tucker, 2003: 115.

two and three of the syndicate members claimed themselves as principals in any given lease while all seven usually contributed capital. As a result, when several names of the syndicate showed up on the paperwork for a lease, it was implied that all seven were actually involved.

During the summer, Mears and Slattery rehabilitated the surface plant and underground workings at both the Royal Tiger and Iowa, and then pursued an organized exploration program for ore. Contrary to the property owners' misconception, the miners found plenty of low-grade material available in the old stopes and began production. The workforce divided itself into six groups. The first two brought the existing ore out of the Iowa and Royal Tiger mines for shipment down to the Iowa Mill, which the third group repaired and operated. The fourth group outfitted the surface plants at both mines, while the last two groups carried out a planned and educated underground exploration campaign. One of these last groups realized that the original Iowa company paid little attention to the geology below the main tunnel level and assumed that ore surely lay deep in the ground. In 1909, miners sank a shaft and discovered an extension of the Melville Vein, which had been previously mined in the upper levels. While additional development demonstrated at least six months' worth of ore at the time, the Melville ultimately yielded for years. Elsewhere in the workings, another crew discovered an entire vein of ore valued at $1,200 per ton, around $40,000 today. In 1910, Louis Quanstrom, the metallurgist in the Iowa Mill, noticed that the proportion of gold recovered from Royal Tiger ore constantly increased and suspected that the miners must have been encountering gold stringers too fine to be obvious. Quanstrom relayed this to the Royal Tiger foreman, who tested the idea by blasting a chamber out of the vein's hanging wall. To everyone's surprise, the shot revealed a hidden, parallel gold vein.[301]

With all the new ore that the Iowa owners originally asserted did not exist, Mears and Slattery kept over one hundred employees busy through 1911 and 1912. The mill workers tried to keep up with the 100 tons of ore sent down to them every day, and the miners made several additional discoveries. Heavy production continued through 1913, and after five years of a continuous yield, Mears and Slattery finally saw operations at the Iowa and Royal Tiger slow.

The 1907 recession did little to stop Martin Houk at the Shenandoah and Trilby mines, in Dives Basin. By the spring of 1908, Houk's Trilby Tunnel was an impressive 2,000 feet long, and miners finally struck the sought-after vein. The findings were troubling, however, as Houk realized that the vein was not quite as rich as he expected. Hoping to find a better section of the Trilby vein, Houk devised a two-pronged approach, driving development workings along the vein from the Trilby Tunnel, and through the Shenandoah. Houk organized the Danville Leasing Company with investors from Danville, Illinois, and briefly brought ore out of both tunnels. When winter closed the pack trails, Houk ordered his miners into an exploration and development phase. Houk's plan paid off in 1909 when miners finally struck a rich copper vein at Shenandoah. However, the crew exhausted the payrock within several months, forcing Houk

[301] Colorado Mine Inspectors' Reports: Iowa; *"Editorial Correspondence: Denver,"* EMJ (7/30/10): 230; *"Mining News,"* EMJ (10/30/09): 893; *"Mining News,"* MSP (7/23/10): 130.

to return to his investors for more money. Although the ore in the Trilby proved unprofitable, Houk kept the Shenandoah in constant but limited production through 1912 when he moved on.

When the Shenandoah came available, Daniel McLean mobilized to lease the historic producer. McLean, who lived in Durango, leased the Dives several years earlier and felt that the basin still had much to offer if managed correctly. In 1913, McLean organized the Dives Leasing Company, sent a crew of miners up to the Shenandoah, and continued where Houk left off. McLean's miners had no trouble finding enough ore to assemble a shipment and sent 132 tons down on mules when the trails were free of snow.[302]

While some of the large operations were able to weather the 1907 recession, many of the small and medium-sized mines became scenes of great disappointment and lost capital. Such was the case with the Lackawanna Mine. A group of miners optimistically took a lease on the property early in 1907, but as the economic climate disintegrated and metals prices slipped, they were unable to find the capital necessary for exploration and suspended operations. At the same time, Henry Frecker, who purchased the Little Nation Mine above Howardsville in 1900, was finally ready for production. During the preceding seven years, he pushed the Tom Trippe Tunnel, the lowest of three entries, toward the Royal Charter Vein as capital came available. In 1907, he finally reached his destination and rounded up the capital for formal development and even a mill, which he planned at Howardsville.

Howardsville was thriving in 1907, although the town remained fairly static. Howardsville continued its role as a hub for Cunningham Gulch and supported a number of service businesses, a railroad station on the Silverton Northern, freight outfits, and slaughterhouses. The late 1890s boom had a limited impact and brought more people and Rickett's Mill, a concentration facility that failed within several years. By 1907, the population was mostly working class and numbered around 150 to 170.[303] As soon as the snow of 1908 melted, Frecker hired a construction gang to build the mill. By July, the facility was complete and featured a battery of ten stamps to crush ore and concentration machinery to separate out the metals. After a week of testing, the mill seemed to fulfill its promise and the *Mining & Scientific Press* hesitantly declared it a success, but in actuality the ore was too complex for the limited facility. The lack of further coverage suggests that Fecker had to close it sometime during the year.[304]

Cement Creek Subdistrict

The Cement Creek drainage saw a small explosion of activity due to the revival, a change from past trends. The drainage drew little interest during early 1880s boom or the late 1880s, and just as investors prepared to develop a few claims during the early 1890s, the Silver Crash wrecked the economy. By the late 1890s, the drainage was poised to boom because it seemed to be one of the last areas in the county where investors might still encounter fresh bonanzas.

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[302] *"Mining News,"* *MSP* (7/12/13): 72.

[303] Schulze, 1977: 1910-8; Sloan and Skowonski, 1975: 134.

[304] *"Mining News,"* *EMJ* (5/16/08): 1025; *"Mining News,"* *MSP* (5/2/08): 580; *"Mining News"* *MSP* (7/4/08): 6; *Silverton Standard* (4/18/08).

The Gold King Mining & Milling Company, organized by Willis Kinney, Cyrus Davis, and Henry Soule, was already in bonanza. In 1897, Kinney built a mill at Gladstone and a tramway up to Tunnel No.1, which allowed the mine to rank among the county's gold producers. Like many other managers of large mines, Kinney envisioned increasing production through more development and better surface facilities. Financing such a strategy, however, required an enormous capital investment. Funded by stock, creation of subsidiary companies, and debt, Kinney began a major improvement campaign in 1900. Kinney began two new tunnels to undercut the vein system and work it simultaneously from different levels. He organized the American Mine & Tunnel Company to drive the American Tunnel into the mountainside between Tunnel No.1 and Gladstone, and the Anglo Saxon Mining & Milling Company to drive the Gold King Tunnel from the mill at Gladstone (later renamed the American Tunnel). The American company then built a tramway down to the mill. Meanwhile, the Gold King company was entangled in a legal battle with the owners of the nearby Sampson Mine, who claimed that they owned the rights to the entire vein system. Both camps were unwilling to see their profits go to lawyers and came to terms in 1900. The Gold King directors suggested that the two parties merge and share profits, with the majority going to Kinney, Davis, and Soule. The Sampson owners accepted, and the directors reorganized the entire outfit, including the subsidiaries and several coal mines in Durango as the Gold King Consolidated Mines Company.[305]

It appears that the American Tunnel intersected the vein system during 1901, because production increased to the point where Kinney enlarged the mill a second time. The facility reduced around 200 tons of ore per day into forty of concentrates, which were enough to justify daily railroad service. Kinney continued his improvement campaign the following year and attempted to lower production costs and increase the mill's efficiency. Up to 1902, steam powered nearly the entire mining and milling operation, hence company interest in Durango coal mines. To reduce the costs of hauling coal, Kinney installed a powerhouse at the mill and electrified as much machinery as possible. To increase the mill's efficiency, he installed a number of new appliances, including a battery of vibrating tables that recovered gold from what had been discharged as tailings. It remains unknown how much the improvements cost, but they resulted in immediate short-term profits. In 1905 alone, the company realized $656,000. The mining industry recognized the Gold King as one of the county's most advanced operations.[306]

Gold King Mine lent legitimacy to the Cement Creek drainage and inspired investor confidence in other operations. As early as 1896, eastern investors organized the Red & Bonita Mining Company to develop a group of claims north up Cement Creek from the Gold King, but progressed slowly due to post Silver Crash depression. As the economy showed signs of recovery in 1897, they began driving two tunnels easterly into Bonita Mountain in hopes of striking an extension of the Sampson Vein. Confident, the directors financed a small mill at the lower tunnel and erected a surface plant. In 1898, miners reached the vein, found that it offered ore, and began production. Repeating the well-worn trend, however, the shallow ore was simple

[305] Kinney, 1932; *"Mines of Cement Creek."*

[306] *"Gold King and Gold Prince Properties of the San Juan,"* Mining Investor (7/25/04): 234; Mineral Resources, 1905: 209; *"Mining News,"* EMJ (9/21/01): 368; *"Mining News,"* EMJ (8/9/02): 195.

enough to be treated in the mill, but after two years of extraction gave way to complex material. As a result, the mill ran intermittently and ultimately suspended. The mill later played an important role in the Cement Creek drainage's second-largest mine, the Mogul.[307]

The Yukon Tunnel followed a trajectory that paralleled the Red & Bonita. The Yukon was among the first significant operations that the revival fostered in the Cement Creek drainage, and even though the tunnel was a financial failure, the associated mill became important to other mining outfits. A group of eastern investors looking for opportunities learned the Uncle Sam and Lamont mines, on the west flank of Storm Peak, featured a bold vein largely untapped. In 1897, Roswell F. Baker, Major M.W. Emery, and E.R. Perham organized Boston & Silverton Mining & Reduction Company, and purchased the Lamont and Uncle Sam. A.A. Lamont, former owner of the property, became manager. To provide immediate income, the company pulled ore from the two remote properties but planned to drive a haulage tunnel around 4,000 feet easterly from the floor of Cement Creek, undercut the main vein, and work it upward. Baker suggested that the tunnel would probably penetrate hidden veins on its way and could serve as a platform for mining interests on the east side of Storm Peak. Of the project, the *Silverton Standard* opined:

> It is destined one day to be one of the most important factors in the development of the mineral resources of San Juan County, being so situated that by a company-operative system the entire section lying between the Animas River and Cement Creek could be developed at great depth. It could be made to serve the same purposes for all of the producers and promising prospects in that great mineral belt. Already some fifteen veins have been intersected and every one of considerable value.[308]

Under Lamont, miners began driving the tunnel in 1897 but progressed slowly because they drilled largely by hand. To expedite the project, Lamont installed a compressor the following year so the miners could bore blast-holes with rock drills. The company directors understood that the tunnel would require several years to complete, but nevertheless grew impatient. They ordered a mill be built at the tunnel in 1899, which, upon completion the following year, stood idle. The mill was a typical concentration facility with a wide variety of appliances. Lamont finally had the opportunity to test the mill in 1901, when miners penetrated the first of several veins. Predictably, the ore at depth was too complex for the mill, which recovered only some of the metals during its first two years of irregular use. During the next four years, Lamont spurred his miners toward the principal vein, encountering several other ore bodies on the way. Lamont attempted production in 1906 and 1907, but found the mill to be ineffective. Without the mill, he was limited to producing only medium-grade ore, and the low-grade material, of which there was plenty, would have to wait.[309]

On the South Fork of Cement Creek, several miles south of Gladstone, Thomas J. Hurley followed a similar path with the Occidental and Natalie properties. He was convinced that the

[307] Henderson, 1926: 214; *"Mining News,"* EMJ (12/26/96): 613; *"Mining News,"* EMJ (10/23/97): 497.
[308] *"Possibilities of the Yukon Tunnel,"* Silverton Standard (11/28/03): 1.
[309] *"Mining News,"* EMJ (5/6/99): 539; *"Mining News,"* EMJ (3/16/01): 345; Ransome, 1901: 258; Silverton Standard (2/23/07): 1.

Occidental and Silver Ledge veins, high on the valley's east side, offered ore at depth and planned to develop them through several tunnels. Hurley organized the Occidental Mining Company in 1895 but was unable to secure funding because of the depression. He drew on his reputation and interested enough investors to begin work and acquire the adjoining Natalie group of claims in 1897. The amount of money was insufficient to support several tunnels, an advanced surface plant, and a mill, so Hurley organized a second company and issued more stock. In 1899, he conveyed the Natalie group to the new Natalie Mining & Milling Company and began building one of the most advanced operations on Cement Creek. He commissioned the Hurley Tunnel on the Natalie property and erected a large powerhouse that enclosed a steam-driven generator and a massive air compressor. A crew of around twenty pushed the tunnel, operated the costly machinery, and even produced a little ore in the Occidental workings. By 1903, Hurley reorganized the two companies into the Natalie-Occidental Mining Company to delay investors from demanding returns. This tactic bought Hurley only one year. In 1904 investors withdrew. In response, Hurley organized yet a third company, the Mines Securities Corporation, to complete the project. He began producing ore in the Occidental workings in 1905 but quickly went back to work on the Hurley Tunnel. By 1906, Hurley permanently suspended operations.[310]

The Henrietta was developed around the same time, but was truly a success. Elmer King worked the mine on a small scale in 1897 and 1898, revealing very rich pyrite-rich silver ore. Because the mine lay on the south flank of Red Mountain No.3, the ore was similar in character to material from the Red Mountain district. This interested the Kendrick Promotion Company because the firm was securing sources of ore in the Red Mountain area for a new pyretic smelter planned for the mouth of Cement Creek. In 1899, the company drove exploration workings, confirmed the richness of the ore body, and leased the property. The following year, the Kendrick investors reorganized their firm as the San Juan Smelting & Refining Company, built the Kendrick-Gelder Smelter, and bought the Henrietta.[311] In contrast to most mines in the drainage, the Henrietta was successful for several reasons. First, it was not overcapitalized, and second, its owners already had a process in place proven to be effective on the ore. During 1901, the company aggressively developed the property and hired fifty miners to send large volumes of ore to the smelter. A tramway down Prospect Gulch to the floor of Cement Creek in 1903 was the only capital-intensive facility. In 1905, the San Juan company found the smelter to be unprofitable and sold the plant to J.B. Ross, who bought it to treat ore from his mines in the Red Mountain district. The San Juan company, however, was unwilling to part with the Henrietta because of its richness and continued to send the ore to the Kendrick-Gelder Smelter through 1906.

The Grand Mogul, known simply as the Mogul, was part of a wave of new ventures in the Cement Creek drainage during 1901. F.M. Snowden and Theodore Dick located the vein in Ross Basin in 1881, produced a little ore, and then did little more for decades. In 1901, eastern investor Howell Hinds organized the Sioux Mining Company and purchased the property. The

[310] *"Mines of Cement Creek,"*; *"Mining New"* EMJ (3/16/01): 345; *"Natalie-Occidental,"* Mining Investor (7/25/04): 248; Silverton Standard (4/1/99): 1; Silverton Standard (12/23/99): 1; Silverton Standard (4/25/03); Silverton Standard (7/2/04): 1; Silverton Standard (4/1/05): 1.
[311] Henderson, 1926: 214; *"Mining News,"* EMJ (12/30/99): 797; *"Mining News,"* EMJ (5/15/09): 1019; *"Mining News,"* MSP (5/22/09): 708; Silverton Standard (1/8/10).

company hired C.E. Condit as manager, and he ordered miners to simultaneously extract ore from the old upper workings and drive a deep haulage tunnel from Cement Creek to undercut the vein, and Ross Basin, at depth. Condit sent the ore to the nearest mill, the Red & Bonita facility.[312]

Within the year, the Mogul Mining & Milling Company purchased the Mogul and continued the plan initiated by the Sioux company. The Mogul company, however, possessed greater financial resources because it installed machinery at the Mogul Tunnel and employed a crew of fifty. Those financial resources were judiciously meted out, as the *Silverton Standard* noted in 1902: "One entire working shift of 12 men quit at the Grand Mogul mine owing to the refusal of the company to furnish rubber goods for working in the wet drifts." In striking, the miners suspended operations for a considerable length of time.[313]

In 1902, the Mogul Tunnel reached the vein, and miners drove several raises to connect it with the upper workings. They still produced ore from those workings and sent the material to both the Red & Bonita and Fisher mills. Concurrently, Condit built his own concentration facility, heeding lessons imparted by the long history of mill failures. He extracted ore samples from depth, where it was most likely to be complex and tested them in the two mills, as well as others, to determine an effective treatment process. With this information, a metallurgist designed a massive facility specific to the Mogul Vein material. In 1905, the company allocated capital for a new mill, sited the plant on the north edge of Gladstone, and finished it the following year. After following what seemed like a sound policy, the company was disappointed when the costly mill was unable to recover enough of the ore's metal content to be profitable. The company immediately refitted the mill, met with the same result, and tried a last time in 1907. With the third failure, the directors gave the operation up as an expensive loss.[314]

The Big Colorado, just across the South Fork of Cement Creek from T.J. Hurley's Natalie, was among Cement Creek's 1901 ventures. John May began a deep tunnel during the early 1890s but stopped due to the post Silver Crash depression. Around 1900, C.W. Bloodgood and partners bought the property, organized the Big Colorado Mining & Milling Company, and resumed driving the tunnel. As at the Natalie and Yukon, Bloodgood realized that rock drills would expedite progress, but like Edward Stoiber, did not want the added expense of a compressed air system. Thus, he imitated Stoiber, introduced electric models, and contracted with the Natalie company for power. In 1903, miners struck the Paul B. Vein, which excited the investors who patiently waited for two years. The ore was not rich, but Bloodgood felt that it could be made to pay if concentrated on-site in a mill, so he built the mill and installed a generator for power. Like all the operations in Cement Creek to date except for the Gold King, however, the mill failed after several trial runs and eroded confidence among the investors. The Big Colorado went idle and was later dismantled.[315]

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[312] *Colorado Mining Directory*, 1901: 115; Henderson, 1926: 214; *"Mining News," EMJ* (9/14/01): 338; *Silverton Standard* (8/3/01): 1.
[313] *Silverton Standard* (2/8/02): 2.
[314] *Mineral Resources*, 1906: 232; *Silverton Standard* (6/17/05): 1; *Silverton Standard* (5/26/06): 1.
[315] *"Mining News," EMJ* (10/11/02): 494; *"Mining News," EMJ* (5/30/03): 833; *"Mining News," EMJ* (10/17/03): 597; *Silverton Standard* (11/23/01): 1.

In 1898, when the revival was just beginning, a few visionary entrepreneurs forecast that the Cement Creek drainage would boom because of the potential that its undeveloped mines offered. Kinney, King, and Soule were among these entrepreneurs, and they felt that the inevitable boom and steady stream of freight to and from their Gold King would almost certainly be able to support a short-line railroad. The first wave of mining ventures to spread through the drainage in 1899 confirmed the forecast for growth and spurred investors into action. During the year, they organized the Silverton, Gladstone & Northerly Railroad, immediately turning to Otto Mears because he already ran two of the county's three railroads. Still recovering from the mid-1890s depression, Mears declined, and so Kinney and partners obtained backing from eastern capitalists. With financing in place, Kinney hired construction crews, placed an order for rolling stock, and leased an engine from the Denver & Rio Grande. Workers tied one end of the line into the Silverton yards of Mears' railroads, established a terminal at the Gold King Mill, and crisscrossed Cement Creek numerous times. The railroad began service in 1900 and immediately captured most of the freight business in the drainage. Kinney and partners were pleasantly surprised as the railroad surpassed expectations. The railroad immediately began generating profits, and through reduced freight rates, offered Kinney cost savings for the Gold King and contributed to growth in the drainage.

The town of Gladstone was one of the principal beneficiaries because it was the contact point between the railroad and the upper portion of the drainage. In 1897, the Gold King Mine brought renewed life to the town in the form of the large workforce. The following year, J.C. Bowman opened a mercantile and secured a post office, and the wave of mining ventures that began in 1899 drew additional businesses. Joseph Landry opened a saloon and Fred C. Grebles established a busy lodging service. He operated an establishment that was a combination hotel and boardinghouse for the Gold King company, as well as two more boardinghouses for the Mogul and Natalie company workers. Around a dozen families moved to town, and the *Kibosh* newspaper began printing. Gladstone possessed an industrial ambiance, which increased over the years. In 1902, the Gold King company built three large bunkhouses at the east end of town, a school, and electric lighting. In 1905, the Mogul company erected its huge mill on the north edge of town. The town became bracketed with mills, in addition to the Gold King and Mogul facilities, Theodore Grabowski ran the Fisher Mill at the south end of town. Around 1905, the population was at 300. However, numerous mill failures and unforeseen economic troubles ultimately curtailed Gladstone's prosperity.[316]

In the Cement Creek drainage, the 1907 recession brought disaster and few of the well-capitalized, promising mines survived. Financial problems and ineffective mills ruined the Big Colorado, Mogul, Natalie, and Red & Bonita mines. The Gold King burned and went bankrupt because of its financial ties to the collapsed Gold Prince Mine (discussed below). In particular, the recession ruined Davis and Soule, and the collapse of their personal fortunes dragged down the Gold King and Gold Prince. The Gold King went idle and was placed in receivership. The court appointed D.M. Hayes as temporary manager over the Gold King; but he was ineffective at

[316] Bauer, et al., 1990: 62; *Colorado Business Directory*, 1905: 610; *"Mining News,"* *EMJ* (10/11/02): 494; *Silverton Standard* (10/19/01): 12.

maintaining production in the absence of the mill. Finally, the New Gold King Consolidated Mines Company bought the property, rebuilt the burned facilities, and tried running the operation. Another fire forced the company to suspend, and the directors leased it to the Mears and Slattery syndicate in 1910. They apparently employed the same progressive strategy at the Gold King as at the Iowa and their other highly successful leases, and restored the Gold King to its former status as one of the county's best producers.

When Hayes resumed activity at the Gold King in 1909, some life returned to Gladstone. The town was center to a population of Gold King workers who lived in boardinghouses and did business there. However, the Postal Service revoked the post office in 1912 because the population was too small, although the handful of businesses continued as before.[317]

The Yukon Tunnel was the only other substantial mine in the drainage to operate through the 1907 recession. The Boston & Silverton Mining & Reduction Company continued to drive the tunnel toward the Uncle Sam and Lamont veins during 1906 and penetrated several other ore formations. The company began production of medium-grade ore, shipped to Silverton. The low-grade ore was unprofitable to produce because the new mill was ineffective, but the investors were unwilling to pay the cost of refitting the facility. Manager Lamont left the low-grade material in the ground, pushed the tunnel, and sampled the veins, perhaps to impart an impression of progress. By 1909, investors ceased funding and put the property up for sale. W.B. Lowe bought it to provide ore for the Kendrick-Gelder Smelter, which he acquired from the Ross bothers around the same time. Lowe mistakenly thought that the accessible veins could feed his smelter. He shipped some ore but found that it resisted treatment. The ore was complex, and the smelter failed in 1910. Lowe closed both the smelter and the Yukon in 1910.[318]

Eureka Mining District

In the Eureka district, mining interests responded slowly to the great mining revival of the late 1890s. As elsewhere in the county, the revival started with a few substantial outfits that were already in production and grew into a major movement during the early 1900s. Well-financed companies, wealthy investors, and a few large corporations purchased the mines known for production and poured capital into development projects. The Sunnyside was among the major operations already in production when the revival began, and it helped to foster confidence in the central portion of the Eureka district. During 1898, John Terry used the $100,000 earnest money that investors left him when they forfeited the Sunnyside to finish his grand vision. He developed the Sunnyside Vein through several tunnels, provided the entries with surface plants, added surrounding claims, and was completing the last of a stairstep series of three concentration mills linked by an aerial tramway. Even though Terry was highly successful, he endured a procession of problems such as losing the vein several times and facing bankruptcy.

Unlike other mining companies, mill failures were not among his troubles. When Terry finally started the new Terry Mill at Eureka in 1899, it was a technical success, although a new

[317] Bauer, et al., 1990: 62; *Colorado Business Directory*, 1910: 742.
[318] *"Mining News," EMJ* (10/20/09): 1043; *Silverton Standard* (1/2/09): 1; *Silverton Standard* (1/1/10): 1.

set of problems prevented the facility from reaching its potential. Because the smelter strike of 1899 closed the Durango Smelter, Terry had nowhere to send the concentrates for refining, while a dry autumn reduced the water supply. Miners lost the vein again, which interrupted the flow of ore to the new mill. By 1901, Terry resolved these issues, refitted the mill at Lake Emma for custom business, and electrified the mine. From this point onward, he enjoyed continuous production and notoriety in the industry for building a model operation.

With emergencies abated, Terry directed his energy to address one of the fundamental reasons behind thirty years of mill failures in the county. Specifically, most ore throughout the county featured a high zinc content. The metal interfered with conventional concentration processes, rendered otherwise profitable ore worthless, and therefore ruined sound mining ventures. Had mining companies been able to remove the material, they would have ejected it with the mill tailings because little demand existed for the metal. During the early 1900s, industrial manufacturers finally began to consume zinc, however, and it became a commodity worth exploiting. With zinc now of some value, Terry and metallurgists sought a process to separate the metal and recover it for shipment as a special form of concentrate. In 1905, a year behind similar efforts at the Silver Ledge Mine, he devised the most efficient method in the county to date and received enough income from the concentrates to justify a large-scale application. In so doing, Terry made an important step in placing zinc among the county's portfolio of profitable metals.[319]

The Silver Queen Mine was another operation that helped to anchor the revival in the Eureka district. The Silver Queen Mining & Milling Company developed the property during the early 1890s and enjoyed sound production into 1896, when the post Silver Crash depression forced the company to suspend. In 1898, manager B.D. Smith reopened the mine, and like his colleagues, realized that the ore was too impoverished to ship to Silverton without concentration. In 1899, he convinced the company directors to lease the Mastodon Mill and refit it with a process specific to the Silver Queen ore. In contrast to the trend of mill failures, Smith initially realized success with the facility and ran it through 1901. Smith lost the lease on the mill the following year, and because investors were unwilling to finance a new facility, Smith reduced work to minor production and development. He tied to sell the property, grew tired of waiting for a buyer, and resumed production in 1905. Without a mill, the ore barely paid the operating costs, but he persevered into 1909 and joined forces with John Terry, who owned the nearby Sound Democrat. Terry offered the Sound Democrat Mill, Smith provided ore from the Silver Queen, and the partners divided the proceeds. The underground development that Smith completed in the preceding years paid off, because the Silver Queen was well-prepared to sustain the partnership through 1911, when miners exhausted the last of the profitable grades of ore.[320]

The Tom Moore Mine was another early participant in the revival, and while it seemed significant at first, the property was actually the foundation for a prolonged financial scheme. Samuel G. Martin, more promoter than experienced manager, became involved with the property in 1897, after a previous company enjoyed very brief success several years earlier. Martin

[319] *Silverton Standard* (1/13/06): 1.
[320] *Silverton Standard* (7/7/1900): 1; *Silverton Standard* (10/28/05): 1; *Silverton Standard* (4/23/10): 1.

convinced St. Louis investors to purchase the mine and appoint him as manager. He hired a crew that produced ore from the old upper workings through 1897. Martin reasoned that if upper workings offered ore, the depths of the vein would be even better, and recommended driving a haulage tunnel to undercut the vein system. The investors stalled, during which time Martin produced small batches of ore and sent them to local mills for testing. The results indicated that the ore was too complex to be profitable, but Martin loudly promoted the operation and pursued the tunnel idea anyway.

In 1901, investors provided Martin with enough capital to build a surface plant and start driving the Tom Moore Tunnel. By 1903, the tunnel was 2,000 feet long, but without profit. Martin continued heavy promotion and created press that production was imminent. Investors believed in tangible financial returns, and withdrew their support. Martin had siphoned off capital, incurred significant debt, fended off lawsuits, and scrambled to find more investors. He reorganized in 1903 as the Tom Moore Consolidated Mining Company, lost the property to bankruptcy in 1904, reclaimed it the following year under the Pittsburg San Juan Mining Company, and repeated this cycle annually through 1907.[321]

Legalities and furious investors finally caught up with Martin. While in Denver Martin was arrested and jailed, but not for fraud. In 1892, Martin's wife divorced him and was awarded spousal and child support payments. Instead of paying, Martin had her committed to an asylum. Upon her release, she filed a complaint. Martin used mining money to pay his way out of jail, but the story created a minor sensation in the press. Matters worsened for Martin in 1908. He had underestimated investors who backed the Tom Moore Gold Mining Company. Dennis Ryan, vice-president of the company, had ample experience with fraud and lawsuits. The Bassick Mine near Rosita was among his many lucrative ventures, and he kept that property locked in litigation with recalcitrant investors for two decades. Ryan had no patience for Martin and brought his power to bear. He leveled a lawsuit, revealed fraud, froze Martin's assets, and sought restitution.[322]

In 1900, the revival gained momentum in the Eureka district, and both local experts and outside investors initiated a wave of significant mining ventures around proven properties. Local experts developed the Hamlet Mine into one of the most important operations at Middleton, before passing the property on to outside investors. Samuel Dresback, an independent miner in Silverton, leased the Hamlet in 1900 and generated enough ore to prove the mine. James H. Robin examined the property and purchased it in 1901. During the year, Robin developed the vein with several tunnels and built a mechanized surface plant. He enjoyed regular income for three years and sold the mine to Colorado Springs investors in 1904 while the vein still offered ore. The new owners organized the Hamlet Mining & Milling Company and commissioned the Hamlet Mill at the mouth of Maggie Gulch. Charles Dale erected the facility in 1905, and it proved effective from the beginning. Manager William Lloyd increased the workforce to twenty-five, divided between producing ore in the existing workings, running the mill, and driving a

[321] *"Mining News,"* EMJ (4/25/03): 646; Silverton Standard (2/16/01): 1; Silverton Standard (3/21/08): 1.
[322] Silverton Standard (10/21/07): 1; Silverton Standard (3/21/08): 1.

deep haulage tunnel known as Level No.6, or the Mill Level, to undercut the vein. For the next several years, the Hamlet remained in this highly profitable but incomplete state.

The Mountain Queen, west of the Sunnyside Extension, followed a path similar to the Hamlet. A party of Ouray miners leased the mine for several years beginning in 1900 and produced ore from the upper workings. Rasmus Hanson, now in semi-retirement, purchased the property in 1904 for $25,000 and completed needed development. Now ready for production, Hanson convinced Cripple Creek interests to buy it for $100,000 in 1905. They organized the Mountain Queen Mining Company, invested heavily in a new surface plant, and commissioned a lower tunnel to undercut the shaft and develop the Mountain Queen Vein system at depth. Some local experts claimed that the vein was an extension of the Gold King's famed ore system, which the character of the ore suggested.[323]

During 1901, the companies involved in the revival grew in size, financial resources, and ambition. Edmond C. Van Diest organized one of the most important, the Eureka Exploration Company. Van Diest was a trained mining engineer and consultant, born into a mining family in 1865 in the Dutch East Indies. His father, P.H. Van Diest, brought the family to Boulder County in 1872 to manage the Caribou Mine before moving to Rosita in 1874, where he ran the Pennsylvania Reduction Works. When the smelter failed after around five years, the elder Van Diest accepted the position of chief of the land department for the surveyor general's office in Denver. The younger Van Diest studied engineering and metallurgy at the Colorado School of Mines, graduated in 1886, and entered the industry as manager of the mining business of the Trinchera and Costilla estates in Costilla County. He also accepted consulting jobs in southern Colorado and New Mexico, settling in Denver by the late 1890s. When the revival began in the Eureka district, Van Diest organized the Eureka Exploration Company as an umbrella organization to speculate with both proven and new properties.

Van Diest had the opportunity to buy three particularly promising mines for which he secured backing from railroad operators in the east. In 1900, he purchased the Ridgeway Mine in Maggie Gulch, on the eastern side of Galena Mountain opposite from the Green Mountain and Pride of the West mines. The following year, he purchased the Silver Wing and adjacent Fredericka at auction. The Ridgeway was a sound acquisition because like the Hamlet, it lay on a bold vein not yet developed. The Silver Wing had a record of production and was fully equipped with a mill that, with refitting, could treat ore from the two mines.[324]

Immediately after the purchase, Van Diest put twenty-five miners to work producing ore in the Ridgeway and Silver Wing and rehabilitating the mill. The facility provided the company with some income during the year, but because it was inefficient, Van Diest installed new concentration machinery. The ore in the Silver Wing resisted concentration, and so Van Diest focused on the easily treated payrock in the Ridgeway and Fredericka. When this was exhausted, Van Diest refitted the mill again in 1905 in an attempt to succeed with the complex ore that remained in all three properties. His third try failed, but the Ross Mining & Milling Company provided the solution. The company actively sought mines with ore compatible with the process

[323] Marshall and Zanoni, 1998: 145; *Mineral Resources*, 1907: 272; *Silverton Standard* (12/30/05): 2.
[324] *Colorado Mining Directory*, 1901: 114; *"Mining News," EMJ* (8/3/01): 147; *Silverton Standard* (6/15/01): 1; *Silverton Standard* (8/3/01): 1.

it employed at the Kendrick-Gelder Smelter. Much to the relief of Van Diest, the Ross company leased the Silver Wing in 1907, it at last generated income.

Despite completion of the Terry Mill and activity in the northern half of the district, the town of Eureka remained small in the first decade of the twentieth century, despite the energy of the revival. The town was fairly static with population of around one hundred residents and the handful of businesses that survived the mid-1890s depression. Most workers lived either at the mines or in Silverton. Alexander Anderson, manager of the Silverton Northern Railroad, in 1902 instituted regular commuter service between Eureka and Silverton. Not until 1910, however, after the mining revival tapered, did Eureka see measurable growth. The population doubled and two boardinghouses provided for workers. Guests stayed in the Eureka Hotel, liveries kept horses, entrepreneurs opened two saloons, and existing mercantiles did a sound business. Increased activity at the Sunnyside, regular rail service, and the decline of Animas Forks all increased Eureka's local importance.

Prominent mines in Cunningham Gulch drew attention to the southern portion of the Eureka district during the revival. New ventures funneled capital into the Pride of the West, Green Mountain, Old Hundred, and Buffalo Boy. The Pride of the West was the first in a sequence. After developing the property and working it for twenty years, Christian Schoellkopf was ready to sell. In 1897, Joseph Gibbons, Charles W. Denison, and A.B. Sullivan organized the Joe Gibbons Mining & Milling Company and bought the Pride for $65,000. They understood that the ore required concentration to make it profitable to ship and also bought the old King Solomon Mill at Howardsville. In 1898, the company pursued a costly improvement campaign in which workers erected a new surface plant, tramway and terminal on the floor of Cunningham Gulch, and new appliances in the mill. During 1899, a crew of around thirty-five produced a respectable fifty tons of ore per day and sent the material by wagon to the Howardsville mill. As at the Silver Wing, the mill was not as successful as expected, which limited the company to the highest grades of ore.[325]

In 1903, a squabble between the three principals turned into full-blown litigation, which caused work on the Pride to stall. Eben Smith, David Moffat, and their Denver syndicate took an interest and could purchase the mine outright, if they liked what they saw. The potential sale enticed the principals to cooperate again. Denison and Gibbons invested in additional underground development to highlight the vein, installed new surface machinery, and developed plans for a new mill at the lower tramway terminal. When Smith examined the property later in the year, he was impressed, but not enough to buy it. The principals regressed into litigation through 1907, when Gibbons bought out his partners. Gibbons then promptly reopened the mine and resumed production.

In 1904, John Slattery reopened the Buffalo Boy after years of inactivity. Slattery would later draw on his experience there when joining Otto Mears and associates in a lucrative lease at the Iowa Mine. Meanwhile, Howard Hines and investors from Ohio bought the Old Hundred. Hines and partners organized the Old Hundred Mining Company with the intent of developing

[325] *"Mining News,"* *EMJ* (2/19/98): 231; *Silverton Standard* (5/14/98): 1; *Silverton Standard* (2/18/99): 1.

the property into a complete mining and milling operation. Manager Robert Davis hired a crew of fifty to develop the workings, install machinery, erect a tramway to link tunnels, and build a power plant and tram terminal on the valley floor. In 1905, the company financed a mill at the terminal and had it running the following year. Miners began driving a haulage tunnel to undercut the vein system in 1907. The company assumed that the tunnel would open vast ore reserves, but in the interim the directors were content with the substantial amount of ore from the upper workings. As with the majority of the mines in Cunningham Gulch, the ore proved difficult to treat, the usual harbinger of difficulty.[326]

One of the most infamous ventures in the Eureka district was the Gold Prince Mine. Originally known as the Sunnyside Extension, the Sunnyside Extension Mining & Milling Company bought the Gold Prince from Rasmus Hanson in 1892. Hanson reaped the best ore during his tenure, and the Sunnyside Extension company struggled with the complex, low-grade material that remained. In 1897, the outfit went bankrupt, company official F.W. Popple was appointed receiver, and he attempted to repay the debts through income realized from ore production. In 1900, Popple sold the property to the Smuggler-Union Mining Company, whose principals also purchased the North Star. Smuggler-Union tinkered with the mine for several years, decided it was not worth further effort, and planned to sell.[327] Willis Kinney examined the operation, and thought that if it could be worked in a manner similar to his Gold King, the Sunnyside Extension would be at least as profitable. Flush with profits from the Gold King and Silverton, Gladstone & Northerly Railroad, Kinney, Davis, and Soule purchased the property in 1903 under the Gold Prince Mines Company. Kinney began planning facilities larger than those at the Gold King and made initial preparations for a substantial mill at Animas Forks, a two-segment tramway to the mill, and other new facilities. In anticipation of hauling construction materials and carrying out a stream of concentrates, the Silverton Northern Railroad finished a line from Eureka to Animas Forks in 1904, as had been proposed years before. The only viable route was up the Animas River, and the grade proved to be one of the most difficult in Mears' railroad system. It was so steep that an engine could haul only two full or three empty cars up at a time, and they were pushed to prevent breakaways.

In 1905, Kinney contracted for the mill and tramway. Meanwhile, the miners blocked six million tons of low-grade material, enough to supply the mill for fifty years. As the mill took form, and a number of innovations drew accolades from the greater mining industry. At a cost of $500,000, the mill was steel frame with reinforced concrete floors and foundations, forced-air heat, and electric power wired from the Animas Power & Water Company. The use of steel and concrete with individual motors to run specific appliances were departures from conventional mill design. The mill was capable of treating 500 tons of ore per day, and some experts claimed that the facility was the largest comparable in the state. Stoiber's Silver Lake Mill may have had a higher capacity but was smaller in size.[328]

[326] Henderson, 1926: 215; *Mineral Resources*, 1905: 209; *Silverton Standard* (9/17/04): 1; *Silverton Standard* (12/31/04): 1.
[327] Horn, 2010b; *"Mining News," EMJ* (7/24/97): 105.
[328] Horn, 2010b.

The tramway was an equally complex engineered Bleichert system. The route was not direct due to the obstacle of Treasure Mountain, so the tramway featured an angle station similar to the Silver Lake system. However, the Gold Prince tramway was further divided into three sections, which isolated potential damage from avalanche or fire. The tramway descended down Placer Gulch to a tension station; continued to an angle station on the northwest flank of Treasure Mountain and from there reached the mill at Animas Forks. The angle station and upper terminal featured concrete bases, steel frames, steam heat, and electric power.[329] At the end of 1906, the modern operation was complete. Miners began sending ore down the tramway to the mill, which processed the material and operated at around one-third capacity through most of 1907. The operation was a success, so Kinney and the local press claimed.

The Mineral Point Tunnel, a short distance west of Animas Forks, came to life in 1903 after remaining idle for nearly twenty years. N.R. Bagley, with support from the Rockefellers, revived the idea of driving the tunnel to undercut the Vermillion and Red Cloud veins. He organized the Frisco Mines & Tunnel Company, renamed the tunnel the Frisco-Bagley, and began work. Meanwhile, the company planned a mill and tested ore samples from the Red Cloud Vein to determine an effective treatment process. The investors patiently waited as Bagley slowly made progress through 1907. The following year, the tunnel struck the vein, where the ore proved to be uneconomical at depth. The operation stalled.[330]

The poor economic climate of the 1907 recession largely ceased development and production in the Eureka district. While some properties remained intermittently profitable, none were free of problems, and many failed within the next decade. For instance, the Gold Prince was nothing less than a monumental disaster, which deeply affected the mood in the entire county. At the end of 1907, low metals prices forced the company to stop the titanic mill. Without the mill, the company was unable to generate the income necessary to meet its debt obligations. At the same time, Davis and Soule, who provided most of the financing for the Gold King and Gold Prince, faced their own crises when the recession ruined other investments they held. These conditions precipitated a domino effect that brought down first the Gold Prince and then the Gold King. Davis, Soule, and the Gold Prince company all were overextended, and creditors clamored for payments on their loans. To help fund the Gold Prince, the partners diverted most of the Gold King's available resources, leaving that mine unable to meet its own debt obligations, as well. Angry creditors threatened to foreclose on both mines, and Davis and Soule negotiated a year to reconfigure their finances. A fire subsequently consumed the Gold King plant in 1908. By the end of the year, it was obvious that Davis and Soule could not extricate themselves and were bankrupted. The Gold King and Gold Prince were placed in receivership.

J.O. Campbell assumed Gold Prince receiver in 1909 and prepared to resume where the company left off. Campbell was qualified by his extensive experience with ASARCo, but even he was unable to mitigate the ensuing series of problems. Campbell hired Paul Hanson to restart

[329] Horn, 2010b.
[330] *"Mining News,"* *EMJ* (9/26/08): 638; *Silverton Standard* (12/26/03): 1; *Silverton Standard* (8/27/04): 1.

the mill, based on his experience with the Gold King. When Campbell and Hanson brought the mill into action, they discovered that the process lost a considerable percentage of the ore's metal content, despite its careful engineering. The Sunnyside Extension Mill was a testing plant to hone treatment methods known to be effective on Sunnyside Extension ore. Hanson refitted the Gold Prince Mill at great cost, tried again, produced a considerable amount of concentrates, but was still unsatisfied with the efficiency. Meanwhile, the Silverton Northern Railroad tracks washed out, stranding Animas Forks and preventing Campbell from shipping his concentrates. In 1910, Hanson ran the mill one last time with discouraging results, and shut it down. The court tried to find a buyer for the operation, but was unsuccessful.[331]

The Hamlet Mine was among the Eureka district's successes and remained highly productive through the 1907 recession. Unlike most other mining and milling combined operations, the Hamlet Mill generated concentrates as intended. In 1910, miners also drove the Level No. 6 Tunnel into the depths of the vein and found the high-grade ore. Just as the company prepared to develop the lower portion of the vein, William Lloyd, manager and driving force behind the entire operation, suddenly died. Activity stalled, while investors sought a capable replacement.[332] The Mountain Queen was another operation that remained profitable through the 1907 recession. The Cripple Creek owners completed significant improvements and sold to the Guggenheims in 1907. The Guggenheims installed new machinery and enjoyed ample production. Later that year, an avalanche wrecked the surface plant. The company rebuilt at great cost and kept the mine in production through 1910.

The Eureka district side of Cunningham Gulch was still a center of activity following the 1907 recession, but the mines were far from seamlessly productive. Once Joseph Gibbons assumed control over Pride of the West in 1907, he enjoyed sound production for several years and then leased the entire operation out. In 1910, I.C. Rosenfelt of Chicago, John Benson, and M. Pearson leased both the Pride and Green Mountain with the idea of working them together. Miners would produce ore from both and treat the material in the Green Mountain Mill. However, the new operators did not adequately consider that the high zinc content confounded milling. During the year, they had the properties in production and even went so far as to install a new compressor at the mill. As in the past, the mill did not recover enough of the metals, though, and the operation collapsed in 1912.

The Old Hundred Mining Company was already teetering when the recession pushed it over the edge. Howell Hines overextended the company in 1905 by gambling on the assumption that a tramway, mill, and power plant would facilitate production in economies of scale. Complex ore, faulted veins easily lost, and mill troubles prevented Hines from realizing the necessary income, and he defaulted on debts. An Ohio bank assumed control in 1908, and Hines personally visited Silverton to assess the situation, found additional financing, and tried a last

[331] Horn, 2010b.
[332] *"Mining News,"* *EMJ* (9/3/10): 476; *Silverton Standard* (8/20/10): 1; *Silverton Standard* (9/10/10): 5.

time in 1909 to salvage the operation. For two years, it generated significant amounts of ore, milled at an unknown location. At the end of 1910, Hines closed the mine as unprofitable.[333]

Mineral Point and Poughkeepsie Mining Districts

The mining revival of the late 1890s had only minor impacts on the Mineral Point and Poughkeepsie districts, due to the ventures of prospectors, rather than capitalists or large mining companies. The Ben Butler and San Juan Chief were the two principal operations in the Mineral Point district when the revival began. James L. Hill, New York investor, backed the Ben Butler Mining Company, which reopened the mine in 1898 and began production. Hill installed a new hoisting system the following year to work the vein at depth but then lost interest. In 1900, he sold to L.B. Jackson, who had purchased the San Juan Chief several years prior. Edward Brown maintained his lease on the San Juan Chief through the ownership change and produced small amounts of ore from the mine's shallow workings.[334] After purchasing the Ben Butler, Jackson planned to link the two properties with a haulage tunnel driven from the San Juan Chief. The project was risky as the tunnel would have to be around one mile long and hence extremely costly. Meanwhile, Jackson developed the Ben Butler and treated the ore in the San Juan Chief Mill. Neither of the properties was well-developed due to the inexperience of the past owners. The Ben Butler ore proved impractical to treat, and Jackson's operation collapsed in 1901.

The Mineral Point district otherwise had few mines of significance. The Bonanza King, Early Bird, Lion Tunnel, London, and Polar Star produced small tonnages between 1900 and 1903, but none were consistent. As a result, the mercantile in Mineral Point closed and M.M. Trickey moved his assay shop. The Poughkeepsie district was equally quiet. In 1899, Standard Oil reopened the Maid of the Mist and conducted development for a short time. In 1900, an unidentified interest tried working the Alaska, but it was sold the following year for back taxes owed by Horace Tabor. These two operations and a number of prospects provided just enough business to support the Poughkeepsie camp at the mouth of Poughkeepsie Gulch. During the late 1890s, it featured a mercantile, combination restaurant-saloon, several cabins, and mail. By the early 1900s, the camp disappeared.[335]

Mineral Creek Mining District

The Mineral Creek district was among the earliest areas in the county to boom with massive capital investment, mine development, and heavy production. All, however, met with the problems typical of operating in the San Juans. The Silver Ledge Mine, above the mostly vacant town of Chattanooga in the district's northern portion, was the first to draw investors of note. In 1897, a group of Denver elite including John L. Routt, Robert W. Speer, and Charles

[333] Marshall and Zanoni, 1998: 86; *Mineral Resources*, 1910: 432; *Silverton Standard* (11/14/08): 1; *Silverton Standard* (7/31/09): 3; *Silverton Standard* (11/27/09): 1.
[334] *Silverton Standard* (9/9/99): 1; *Silverton Standard* (6/9/1900): 1; *Silverton Standard* (9/22/1900): 1; *Silverton Standard* (10/13/1900): 1.
[335] Henn, 1999: 58; Ransome, 1901: 195; *Silverton Standard* (7/22/99): 1.

Hartzell bought the mine. Despite this, they organized the Silver Ledge Mining Company and contracted for a mill. A mill for an unproven property was predictably unwise. During the year, miners found plenty of ore, struck a gold vein, and began production. Workers completed the mill at the mine. By year's end, the Silver Ledge was in full production, and through 1898, miners ran the ore through the mill. But, at year's end, the company announced suspension for the winter, despite Silverton Railroad's all-season service. The company had overspent, while the mill was unable to recover adequate metal content. Debt forced the company into bankruptcy, and the creditors sued.

In 1899, the directors reorganized to reconfigure the debt and lease the property out. The strategy would provide regular income to repay creditors. The company appointed J.B. Warner as manager, who installed new surface facilities to make the mine attractive. Under the Elmira Mining & Milling Company's first lease, Warner oversaw a crew of ten who generated as many tons of ore per day. The operation proved successful enough to justify expansion, and the following year Warner hired more workers to run the mill. Although inefficient, the facility allowed Elmira to increase its production income. Warner convinced investors in the east to provide capital for more improvements and new mill appliances. A 1901 fire burned the entire surface plant, including the shaft house and mill, freeing Warner to erect a new mill. He replaced the mine plant, sited the new mill at Chattanooga, and had it running by the end of 1902. The Elmira company nevertheless suffered the same fate as its predecessor. Warner incurred more debt than he could repay, and the Bank of Silverton seized the property. Warner, however, came to an agreement to produce as much as possible and use the proceeds to repay the creditors. The effort lasted only through 1903, as the new mill proved only slightly better than the old, and Warner lost his position.[336]

The San Juan Mining & Leasing Company was the next outfit to lease the Silver Ledge, where it pioneered a significant trend in the regional industry. The company metallurgist recognized new demand for zinc and how to recover it with new concentration apparatuses. He innovated an electric separator that relied on a magnetic field to force zinc and iron particles from pulverized ore. The company refitted the mill in 1904 to both recover the zinc and condition the ore so that the rest of the metals could be captured. Although the separators were not perfect, they yielded the county's first meaningful production of zinc and reconsideration of the ore. At the Silver Ledge Mill, this translated into around thirty tons of concentrates per day.[337] For unknown reasons, the San Juan company did not continue its operation into 1905. Instead, D.E. Carmichael and Jesse Kramer assumed the lease and maintained heavy production with zinc separators. In the fall, litigation over unpaid debts restricted Carmichael and Kramer from extracting ore out of the workings. The partners retained only enough workers to recover low-grade material from the waste rock dump and treat it in the mill. After a year, the outfit exhausted the profitable material and moved on.

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[336] *"Mining News,"* EMJ (6/20/03): 945; *"Mining News,"* EMJ (6/27/03): 982; Silverton Standard (1/24/03): 2; Silverton Standard (6/6/03): 1.

[337] Henderson, 1926: 50; *"Mining News,"* EMJ (4/28/04): 699; *"Mining News,"* EMJ (9/8/04): 406; Silverton Standard (5/14/04): 1; Silverton Standard (8/6/04): 1.

The qualified success of the zinc process followed by closure of the mine to litigation had the effect of creating and then destroying a community almost overnight. Although Chattanooga had never fully recovered from the late 1880s recession, it was not completely abandoned, either. The small collection of buildings continued to serve as both a stop on the Silverton Railroad and southern gateway into the Red Mountain district, and a few prospectors and miners occupied cabins at times. Construction of the Silver Ledge Mill restored activity and population to the defunct settlement, and by 1904 a post office opened under the name of Silver Ledge. Excitement over the experimental zinc process drew attention to the hamlet. The Silver Ledge Mine closure, however, reversed two years of growth, and when the workers left, the post office closed.[338]

Sultan Mountain, with its row of well-developed mines, was another natural magnet for capital and large engineering projects during the mining revival. The trend began with the Victoria Mine, idle like the North Star property. In 1898, Victoria company manager Thomas Kane organized the Little Dora Gold & Silver Mining Company to lease the Little Dora workings. In 1899, Kane organized the Empire Consolidated Mining & Milling Company, secured financing, and purchased the Empire Tunnel and Victoria Mill. The Empire Tunnel, drove into the base of Sultan Mountain, tapped the Little Dora Vein, and with more work, could reach the parallel Hercules Vein as well. At the same time, Kane established the Hercules Consolidated Mining Company and purchased the Ajax and Boston tunnels and a second mill. He refitted the Victoria Mill, instituted production in the Empire Tunnel, and did very well. The Hercules company moved slower because it required more development than the Empire. In 1900, Kane refitted the mill, renamed one of the main tunnels the Hercules, and pushed it beyond the Little Dora to other parallel veins. Later in the year, Kane had the Hercules mining and milling combination in full production.[339]

To improve the economies of scale, Kane brought everything together under the Hercules Consolidating Mining Company in 1901. He maintained production from the Empire and Hercules tunnels, closed the Hercules Mill, designated the Victoria Mill as the Little Dora, and improved the plant in 1902. The company may have been the single largest employer in Silverton and retained a workforce of around fifty-five, producing 75 tons of ore per day. The figure was among the highest in the county at the time. The operation was not trouble-free, however, and complex ore forced Kane to install new milling machinery in 1905, junk the plant, and erect a completely new mill. Heavy production continued for several more years.[340]

A short distance to the south of the Hercules, wealthy investors included the King group of claims in an unusual mining and power scheme. In 1900, G.A. Brouillet of Boston organized the Sultan Mining, Smelting & Power Company, bought the King group, and announced plans to build a power plant on Animas River at Rockwood to provide the Sultan Mountain area with electricity. The relationship between the King group and the proposed power plant is uncertain,

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[338] Bauer, 1990: 132.

[339] *"Mining News,"* EMJ (3/11/99): 301; *"Mining News,"* EMJ (6/10/99): 688; *"Mining News,"* EMJ (8/18/1900): 198; Silverton Standard (12/31/99): 1; Silverton Standard (11/4/99): 1.

[340] Colorado Mining Directory, 1901: 112; *"Mining News,"* MSP (8/19/05): 130; *"Mining News,"* EMJ (8/16/02): 227; *"Mining News,"* EMJ (3/30/01): 411; Silverton Standard (12/6/02): 1; Silverton Standard (6/14/02): 1.

but Brouillet probably entertained the idea of a generator-consumer relationship similar to Stoiber's Silver Lake. The King group was supposed to be the principal electric consumer with the surplus power sold to other mines. The company made little progress, however, beyond starting a haulage tunnel and building a flume to the operation. In 1901, Edward M. Brown leased the group but did little better with it than he did at the San Juan Chief. The following year, the Royal Mining Company signed a lease, installed machinery, completed the tunnel to the King Vein, and began production.

The North Star Mine was the last major property on Sultan Mountain to benefit from the revival. The operation stalled in 1896 because the Silverton Mining Company directors were unwilling to reinvest into a mill that kept failing. In 1901, they sold the operation, with its 10,000 feet of workings on several veins, ineffective mill, and multiple tunnels, including the Sultan. John C. O'Neill, Chicago capitalist who already possessed interests elsewhere in the west, researched mines in the San Juans for potential investment. He reviewed the North Star and bought the company. During the summer, he hired a crew of fifty to rehabilitate the property and secured Robert McCartney, who helped Stoiber design the Silver Lake Mill, as manager. O'Neill's experts claimed that the North Star Vein probably held value at depth and advised sinking a shaft on the formation from within the mine. O'Neill commissioned the shaft that year.[341]

Preparing the operation for production consumed more than a year. McCartney rebuilt the mill, installed a power plant, continued rehabilitation, and oversaw the exploratory shaft. By the end of 1903, McCartney reported that the mine and mill were ready to produce, but died early in 1904 while at the Silver Lake Mill. McCartney's replacement had mixed reports. The mine and mill were in full production, but the shaft confirmed that the North Star Vein was too impoverished at depth to justify further attention. The manager assured O'Neill that the upper workings still offered plenty of ore, and began driving the Sultan and North Star tunnels farther to intersect the Belcher Vein. The company then repeated the pattern that stymied profitability in the past. The mill began losing some of the metals because the ore changed character, the company focused on the highest grades and delayed refitting the mill, and when the rich ore was exhausted in 1908, the company suspended.[342]

The 1907 recession impacted the Mineral Creek district in a manner similar to the county's other centers of mining. Most small operations ceased, while large mines survived for a few years before succumbing to the poor economic climate and exhaustion of ore. The Silver Ledge Mine was idle during the recession, because still locked in litigation. The owners came to terms in 1909 and offered a lease to the Ross brothers, who no longer operated the Kendrick-Gelder Smelter but retained their collection of zinc mines. They organized the Ledge Consolidated Mining Company, unwatered the shaft, and struck rich zinc ore. Through 1912, the mine enjoyed peak production. The *Silverton Standard* regularly reported accounts such as: "At

[341] *"Mining News,"* EMJ (12/28/01): 863; *"Mining News,"* EMJ (7/19/02): 93; *"Mining News,"* EMJ (8/16/02): 227; Silverton Standard (11/30/01): 1; Silverton Standard (8/2/02): 1.
[342] Silverton Standard (4/23/04): 1; Silverton Standard (6/25/04): 1; Silverton Standard (2/18/05): 1; Silverton Standard (1/2/09): 2.

the Silver Ledge overflowing bins are reported and more ore in the mine everywhere."[343] Willis Kinney, no longer at the Gold King, assumed the position of manager in 1911.

After production declined abruptly in 1913, Joseph Warner and William Feigel leased the mill alone in an attempt to run it as a custom plant equipped for zinc. The press stated: "The Warner Mill, formerly known as the Silver Ledge, appears in the list as the first recipient of custom ores in the camp for many years and will henceforth be an active factor in the industrial activity of the county."[344] The venture was sound in theory, but the complexity of ore in the western portion of the county caused it to fail after a year.

The Hercules Consolidated Mining & Milling Company easily weathered the 1907 recession and remained Silverton's flagship operation. Under Thomas Kane, the mining and milling combination produced heavily through 1910, despite complex ore and several adjustments to the mill. The Empire Tunnel developed the lower workings, and the Hercules (Boston) Tunnel was the principal point of access for the upper workings. The operation attained the status of largest county producer during 1910 before beginning a gradual decline. Around 1912, after nearly fifteen years of a constant yield, miners exhausted the profitable grades of ore. In 1913, Kane suspended operations, and the following year the property was auctioned to repay creditors.[345]

The Silverton Mining Company tried one last time to remodel the North Star Mill when the economy began to recover after the recession. In 1909, the company hired Paul Hanson from the Gold Prince Mill, to install a zinc recovery process. Toward the end of the year, he had the mill in operation, and the company optimistically prepared several ore bodies in the upper workings. The mill functioned well enough to sustain production through 1910 and then stopped. Supposedly, the company planned to install new motors, but when the mine failed to reopen, it became obvious that the same old troubles reappeared. The North Star remained quiet through foreclosure hearings in 1913.

Ice Lake Mining District

The Ice Lake district and its principal mine, the Bandora, followed inverse trends during the mining revival. The Bandora Mining & Milling Company played a key role in preparing the district for the revival by investing in development, building a mill, and grading a road. Even though development focused on the Bandora, it inspired confidence. The road also opened the area to other companies as early as 1897. The Golden Horn Consolidated Mining Company, backed by London investors, bought the Golden Horn property in 1897 and refitted a mill there. A group of Ouray miners leased the Lady Ellen and brought it into production. While these and other small mines opened during the late 1890s, activity at the Bandora wound down. The partnership of Patterson & Johnson signed a lease in 1897, produced well, but ran out of profitable ore the next year. The partnership did not renew the lease, and the Bandora company

[343] *Silverton Standard* (5/13/11): 1.
[344] *Silverton Standard* (8/9/13): 1.
[345] *Mineral Resources*, 1910: 432; "*Mining News*," *EMJ* (13/21/14): 637; *Silverton Standard* (3/12/10): 1.

conducted some development to restore the mine to a ready state. An unknown entity leased the mine again for a short time before the property went quiet for the rest of the revival.

The 1907 recession snuffed out most district activity except for the Bandora. The Ross Mining & Milling Company leased the mine in 1907 because its ore was suitable material for the Kendrick-Gelder Smelter, which the firm had purchased in 1905. The Ross company assembled a collection of mines, including the Bandora, either through acquisition or lease to provide a continuous flow of ore to the smelter. When the company sold the plant in 1908, it no longer needed the ore and relinquished the lease. Around this time, William Sullivan bought the mine back, developed another section of the vein, and resumed production. He was rewarded in 1911 with a rich strike, which sustained limited production for several years. When the ore was gone, Sullivan suspended the last major operation in the Ice Lake district.[346]

The World War I Revival, 1915 – 1921

The revival of the late 1890s and first half of the 1900s created an energy and atmosphere that San Juan County would never see again. Capital and mechanization lowered operating costs, allowing companies to extract higher tonnages of ore from greater depths and thoroughly explore the principal vein systems for more payrock. The improved milling technology also rendered previously uneconomical grades of ore profitable to process. The 1907 recession culled those mining operations based on speculation, poor science, faulty economic equations, and inadequate ore reserves. And yet, enough companies were able to weather the recession to maintain substantial production through 1910. That year the mining industry entered another watershed period. Most mines ran out of medium-grade ore and faced an end to the profitable low-grade material, which resulted in an overall decline of the industry. During the early 1910s, a handful of large mines carried the county, and the future of the industry did not appear bright. Despite this, the county improvements in concentration processes rendered zinc a metal worth recovering. Zinc was now in demand and smelters such as Pueblo and Salida competed for ore and concentrates. To encourage zinc production, in 1910, the Denver & Rio Grande Railroad offered rate reductions for ore shipped to smelters at Pueblo and Salida, and on concentrates to Canyon City. These conditions fostered a strong interest in the county's zinc resources, and some mines like the Silver Ledge came to rely on its production. In 1911, the American Zinc Ore Separating Company installed a trial recovery process in the Sunnyside Mill at Eureka. At the Sunnyside, American Zinc installed the first Huff Electrostatic machines in Colorado, which immediately proved successful. The Sunnyside company enlarged the plant for commercial use in response. It remains uncertain whether other companies in the county adopted the technology or if the Sunnyside Mill started accepting custom ores from other mines. In either case, the county's zinc production ascended in the early 1910s.[347]

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[346] "*Mining News*," *EMJ* (7/8/11): 85; *Silverton Standard* (2/23/07): 1; *Silverton Standard* (7/1/11): 1.

[347] Henderson, 1926: 50; *Mineral Resources*, 1911: 558; "*Mining News*," *EMJ* (7/23/10): 185; "*Mining News*," *EMJ* (1/27/12): 236; *Silverton Standard* (6/1/12): 1.

A few other major mines were scattered throughout the county, and they produced whatever type of ore they possessed. The Gold King, leased in 1910 by the Mears and Slattery syndicate, ranked second in terms of output. The Iowa, also syndicate-owned, was the county's third largest producer. The Eureka district saw a number of transitory ventures in the early 1910s. W.J. Rattle organized the Vermillion Mining Company in 1905 to work the Red Cloud Vein between Animas Forks and Mineral Point. He developed the vein through the Bonanza and Rattle tunnels, and built a mill in 1909. The company enjoyed production through 1911, when the directors sued each other over debt. When the Frisco Mines & Tunnel Company intersected the Red Cloud Vein in the Frisco-Bagley Tunnel, manager Charles Gagner reported the ore was unprofitable at depth. In 1910, Gagner dispatched a party of prospectors to examine the vein through the old Red Cloud workings near Mineral Point and confirm that the vein's upper reaches held value. They affirmed this, and in response, Gagner had miners drive a raise upward on the vein from within the Frisco-Bagley Tunnel. When miners found plenty of ore, Gagner commissioned the Frisco Mill in 1912 to treat the material. The mill did fine with ore from the upper zone but was unable to process the material from depth. When the upper zone was exhausted, the company struggled and suspended in 1914. When active, the Vermillion, Frisco-Bagley, and other small mines were the economic foundation for Animas Forks in the wake of the Gold Prince failure. The handful of mines, however, was insufficient to sustain the community, which hung on in a marginal state until 1913, when the business district burned. Instead of rebuilding, most people left, and, without a population of note, the post office closed in 1915. Animas Forks embodied the county's mining decline.

The southern portion of the Eureka district was a hotspot of activity during the early 1910s. The Hamlet Mining & Milling Company sought a new manager after William Lloyd died in 1910 and hired the highly experienced Etienne A. Ritter. Ritter decided to develop the mine for long-term production and convinced the investors to fund extensive work underground. The campaign took two years and was highly successful. The Intersection Mine, at the head of Minnie Gulch, proved to be a bonanza. In 1910, the Intersection Development Company discovered an untapped gold vein. The company installed a simple hoisting system and small mill, and enjoyed regular production for the next seven years. By limiting debt and the scale of the operation, the investors maximized their profits. Samuel Martin resurfaced after his stint in jail and moved on from the troubled Tom Moore operation to manipulating the Kittimac Mines Company to support his lavish lifestyle. The company developed what was originally known as the Minnie Gulch group. As he did with the Tom Moore, Martin promoted the Kittimac and its high potential for ore but made little progress in actual production. The Hamlet, Intersection, and Kittimac all contributed to the prosperity of Middleton and Eureka.[348]

The Buffalo Boy, west of the Intersection, showed great promise because it had not yet been systematically developed. In 1909, Joseph Bordeleau organized the Continental Mining Company to lease the property. Over the next three years, miners would encounter rich gold ore in the vein, lose the trace, develop the ore formation further, reestablish contact, and repeat the

[348] Colorado Mine Inspectors' Reports: Intersection; *Silverton Standard* (5/13/05): 6; *Silverton Standard* (1/1/10): 1; *Silverton Standard* (5/3/13): 1; *Silverton Standard* (9/27/13): 1.

cycle. Overall, the operation was moderately successful until a lawsuit among the owners froze the operation.[349]

Political unrest in Europe set the stage for another mining revival. When World War I began in 1914, manufacturing industries first in Europe and then in the United States mobilized to meet heavy wartime demand, and as the war progressed and devastated Europe's economy, governments sought monetary stability in silver. To the delight of the greater mining industry, the value of industrial metals and silver slowly rose again and then shot upward as the war dragged on. Silver ascended from an abysmal $.54 per ounce to $.73 and continued upward to $.84 in 1916, a price not seen since the Silver Crash of 1893. Lead and zinc almost doubled. Around 1910, zinc was valued at $.05 per pound and leaped to $.08 by 1917, while lead doubled from $.04 to $.08 per pound. Ores that were moderately remunerative by 1910 standards became almost the stuff of bonanza, and abundant low-grade ores were at last profitable.[350]

World War I ushered in a surge of activity across Colorado and restored a sense of optimism, purpose, and prosperity to San Juan County. Conditions were now different, however, when virgin ground still offered untapped resources. By World War I, the era of high-grade discoveries, overnight millionaires, and investment schemes was replaced by new generations of speculators, investors, and laborers reexamining areas that already witnessed decades of mining. Hard work, experience, training, capital, and some intuition were all necessary to find untapped deposits of profitable ore. The successful operators applied science, economics, and careful scrutiny to identify mines that still offered potential, and most of these were the properties with proven records of production.

One man who possessed the above qualities was Mears and Slattery syndicate member Louis O. Bastian, who introduced a technological development that revolutionized the definition of profitable ore. In 1914, Bastian installed the county's first flotation machines in the syndicate's Gold King Mill. Specific to complex ore, flotation was a new treatment process that exploited the behaviors of weight and gravity in separating metalliferous material from waste. Flotation relied on oil or detergent to float metalliferous material away from finely pulverized ore in rectangular cells or tanks. Mechanical sweeps or paddles shoved the metal-rich froth out of the cells and into troughs that carried the material onward to other processes. The Atlas Mill in the Sneffels district saw one of the first trials of flotation in the San Juans in 1914, and progressive Bastian brought it to San Juan County shortly after.[351]

Bastian concluded that flotation resolved the ore problems that had defied mill men for decades. Mining companies scrambled to find the capital for flotation in their mills, and 1915 saw a wave of installations. Bastian refitted the North Star and Iowa mills for the syndicate. James O'Kelly did likewise at the Hamlet Mill. The American Oil Flotation Company planned a massive plant at the Silver Lake Mill, and flotation expert James H. Hyde installed the process at

[349] *Silverton Standard* (1/2/09): 1; *Silverton Standard* (12/27/13): 1.
[350] Henderson, 1926: 216; King, 1977: 183; Saxon, 1959: 7-17.
[351] Colorado Mine Inspectors' Reports: Gold King; Henderson, 1926: 50; *Mineral Resources*, 1914: 299.

the Sunnyside. Widespread utilization increased through 1916, with Bastian busy at the Highland Mary and Contention mills, and flotation installed in the Green Mountain and Kittimac plants. Because the process was new, its application was not yet universally successful. Bastian clearly understood the process and his projects functioned correctly, but most of the others experienced initial problems.[352] By 1917, flotation began to deliver on its promise of improved ore concentration. Not only did flotation separate the metal constituents from previously untreatable ore, but also it rendered even lower grades of payrock profitable to produce. The result was that mining companies revisited previously ignored veins, reopened old workings, and recovered huge volumes of low-grade material cast off as waste.

World War I lasted longer than anticipated, prolonging inadvertent stimulus of the mining industry. The prices and demand for industrial metals remained high, specifically interest in silver because of its political and economic value abroad. As silver approached $.98 per ounce in early 1918, Congress fixed the price and levied foreign interest to support a subsidy for silver mining and increase profits. In April, the federal government approved the Pittman Act, which fixed the value of trade silver at $1.00 per ounce internationally.[353]

Silver mining interests in the county reveled in a price not seen since the Sherman Silver Purchase Act of 1890. In contrast to market trends following previous silver subsidies, the value of the metal continued to climb instead of erode. The affect on mining came with caveats, however, that presented challenges to profitability. Because of the war, inflation for mining supplies, equipment, transportation, and smelting fees was equally keen. Skilled labor was increasingly difficult to find as fewer young men replaced older miners leaving the workforce. To complicate matters, the ore that the workers did discover continued to decline in quality, which forced mining companies to generate higher tonnages.[354]

Two other trends conspired against the profitability promised by the Pittman Act. The first interfered with the transportation of ore, concentrates, and supplies. Specifically, the federal Railroad Administration assumed control of all railroads as a wartime mobilization asset for two years. The administration proved inefficient at managing freight traffic, which reduced service, delayed the movement of materials, and increased freight rates by 25 percent. Congress authorized payment to railroad companies for maintenance and operating costs, but the values were usually underrepresented, leaving some railroad companies in such poor financial condition that they closed.[355]

In October 1918, a Spanish influenza pandemic struck the nation with force. The flu spread quickly through Silverton and some of the boardinghouses at the large mines. Hundreds of individuals fell ill, and doctors and volunteer nursing committees quarantined and attended to them. Most of those who were ill languished for weeks before recovering, but a significant number died, which instilled fear throughout the county. The environment and working

[352] Colorado Mine Inspectors' Reports: Sunnyside; "Mining News," *EMJ* (5/15/15): 879; "Mining News," *EMJ* (9/4/15): 412; "Mining News," *EMJ* (11/4/16): 845; *Silverton Standard* (4/17/15): 1; *Silverton Standard* (12/25/15): 1; *Silverton Standard* (7/22/16): 1.
[353] "Events and Economics of the War," *EMJ* (5/18/18): 926; "Industrial News from Washington," *EMJ* (4/27/18): 804; Saxon, 1959: 8.
[354] George E. Collins, "Mining in Colorado in 1918," *EMJ* (1/18/19): 152.
[355] "Editorial Correspondence," *EMJ* (6/29/18): 1191; Sloan and Skowonski, 1975: 319.

conditions at the mines contributed to who contracted the illness, how fast it spread, and the number of deaths. Altitude, extreme cold in poorly heated buildings, and air pollution augmented risk to miners. From the moment a miner entered the workplace, he was exposed to a challenging respiratory conditions. In addition, the underground environment was cold and damp, the work hard, and the commute from the tunnel portal to the boardinghouse frigid, especially when the miner was already saturated with moisture and sweat. Physically taxed by these conditions, the miner was predisposed to pathogenic illnesses easily transmitted in crowded boardinghouses with poor sanitation.

A second wave of flu swept the county in November, and it was worse than the first. A significant proportion of the population fell ill, several hundred died, and panic set in. Mining companies closed due to both sanitary reasons and attrition of workforces. The situation grew so severe that the conservative *Engineering & Mining Journal* reported: "Spanish influenza caused more than 130 deaths in Silverton district in the last three weeks. Mines shut down will have difficulty in resuming normal operations owing to labor shortage, many miners having left camp. Epidemic appears under control."[356] The epidemic, however, was nothing close to being under control. Most public halls and buildings became infirmaries and morgues, and as the dead accumulated, flu committees buried the bodies in wooden boxes or blankets. In January and March of 1919, two more waves of contagion swept through the region. Silverton suffered, and the mining industry had a difficult time recovering.[357]

Despite these challenges and hardships, the combination of an effective zinc separation process, improvements in other milling methods, and the increase in metals prices revived the county's mining industry. Statistics for the latter half of the 1910s quantify the revival. During this time, the county featured nine prospects, thirty-five small mines, twenty-six medium-sized operations, and seven large producers, a significant increase over the turn of the century. Ore production gradually increased from $273,000 in silver, $508,000 worth of gold, and $203,000 in lead, and $50,000 for zinc in 1914 to $477,000 in silver, $257,000 worth of gold, $673,000 in lead, and $310,000 in zinc by 1918. As during the late 1890s revival, the fact that most of the ore was low in grade is significant because a greater tonnage of material had to be mined and treated per dollar realized.[358]

The declaration of Armistice in 1918 brought a long-awaited end to the World War I, but also it set in motion an irreversible decline of mining in much of Colorado. The economic and political trends of the next two years belied the impending doom. As soon as the war was over, European nations began the costly and protracted process of reconstruction, which maintained the high demand and value of silver and industrial metals. The price of silver crept from $1.04 per ounce in 1918 to as high as $1.11 by the beginning of 1920. With metals values increasing for almost two years after the war's end and production in the county during 1920 a record

[356] "Mining News," *EMJ* (11/23/18): 932.

[357] *Denver Times* (10/23/18): 4; *Denver Times* (12/6/18): 17; Smith, 1992: 103; Louis Wyman, *Snowflakes and Quartz: Stories of Early Days in the San Juan Mountains* (Silverton: Simpler Way Books, 1993) 54.

[358] Henderson, 1926: 216 for production figures. The number of mines was derived from a survey of Colorado Mine Inspectors' Reports.

$3,617,000, the impending industry-wide collapse across the west came as an even greater shock.[359]

For a brief time during the late 1910s, prior to the collapse of mining, tungsten joined the county's portfolio of exploitable resources. Early prospectors and assayers were aware that some veins in the Cement Creek drainage possessed high percentages of tungsten but took little interest because almost no demand existed for the metal. During the late 1890s, European steel manufacturers, primarily Krupps in Germany, developed a means of using it to make hardened steel alloys. Within several years, American and British steel companies followed. At the time, tungsten was exceedingly rare and few profitable deposits had been identified, which agents from the steel makers aggressively pursued. When the agents learned of the rich deposits in Boulder County around 1900, they stimulated a tungsten rush there. Individuals elsewhere in Colorado began to pursue tungsten deposits in earnest.

Prospectors familiar with Cement Creek remembered that some veins featured tungsten. Individuals communicated this to speculators that were interested in the metal. Charles Poulot and Charles Voilleque, French metallurgists that specialized in rare metals, were the first experts to respond. They were already in western Colorado developing the first uranium mines in North America and made the short trip to Cement Creek to examine the tungsten reports. In 1900, they examined the Leslie claims in Dry Gulch, one mile west of Gladstone, and leased the Fisher Mill to run tests on the ore. William Schultz, a Denver speculator, arrived around the same time, leased the Evaline claims and operated the mill. Refitting the facility successfully yielded concentrate tungsten ore which stimulated further interest.[360]

In 1903, Lucus Abbie and Joe Kattenbocker produced tungsten ore at the Ohio Mine in Dry Gulch and treated the material in the Fisher Mill. They produced concentrates and shipped them to Germany. Shortly afterward, Chicago investors organized the Venetian Mining Company, bought the Evaline Mine and Fisher Mill, and planned on consistent production. The operation failed, stifling the local tungsten market for years.[361]

The county's tungsten resources drew serious attention again during World War I. Weapons manufacturers found that hardened steel made with tungsten was well-suited for battle, and demand the metal reached unprecedented levels. This stimulated a wave of prospecting and mine examination throughout the northwestern portion of the county in 1915, with several operations in production the following year. Cement Creek was the center of interest. The Colorado Metals Company assembled a small tungsten monopoly in 1915. The company leased the Galty Boy and Congress mines, purchased the Sterling, and leased and refitted the idle Yukon Mill to concentrate the ore. Colorado Metals then accepted custom ore in the mill and fostered development of other operations during 1916. Frank C. Grimes and George Haskell organized the Cascade Tungsten Mining Company to develop claims in Cascade Gulch, and James Clifford worked the Conyers-Clifford, both on Cement Creek. Small outfits also

[359] Henderson, 1926: 216; Saxon, 1959: 8.
[360] "Mining News," *EMJ* (7/7/1900); *Silverton Standard* (4/14/1900): 1; *Silverton Standard* (5/12/1900): 1.
[361] "Mining News," *EMJ* (5/16/03): 762; *Silverton Standard* (5/2/03): 1; *Silverton Standard* (3/12/04): 1.

developed other properties in the area. The San Juan Tungsten Company organized in 1918 to lease the North Star Mine and refit the mill for tungsten ore. Although tungsten continued to draw interest through the 1950s, World War I was the only concerted period of production. When the war ended in 1918, demand for the metal stalled.

Las Animas Mining District

After approximately twenty-five years of continuous, heavy production, Silver Lake Basin remained one of the most important centers in the county. This was due largely to the Mears and Slattery leasing syndicate, which continued its lease at the Iowa Mine and sent the ore down to the Iowa Mill via tramway. The Melville and Iowa-Tiger Leasing companies ran most of the operation, while the syndicate leased additional ground in 1914 in the form of Delsante & Company. In 1913, Mears, Slattery & Pitcher leased the idle Silver Lake Mine from ASARCo and rehabilitated the Stoiber Tunnel. The combined Iowa and Silver Lake workforce was large enough to justify reopening the Arastra post office. Mears and Slattery renewed the lease in 1916 under the firm Slattery, Delsante & Gillette, also known as S.D. & G. Company. The syndicate maintained a constant but limited production into 1917, when experienced miners noticed an eight-foot-wide vein in the walls of the Stoiber Tunnel. The vein's copper, silver, and gold content were a boon to Mears and partners.[362]

The Mears syndicate was not the only entity to work the Silver Lake and Iowa mines during the first years of World War I. Small parties of lessees, mostly Italians previously employed by the Stoibers, enjoyed ample production. The Unity Tunnel was also abuzz with lessees who worked ground above and below the tunnel level. Various partnerships pooled their capital and modified the idle Bleichert tramway at the Unity so that it terminated near the Iowa Mill, where the lessees sent their ore. The Iowa Mill was the center for production in and around Silver Lake Basin. To improve the recovery of metals, Louis Bastian installed flotation equipment in 1915. Even with flotation, the mill workers had a difficult time keeping up with the ore flowing in from all directions. In 1916 alone, the mill processed a weighty 700 tons of concentrates from Iowa ore, as well as around fifty tons from the nearby Mayflower Mine.[363]

The Mayflower, located amid the cliffs forming the east wall of Arrastra Gulch, was a relatively late development. As early as 1913, G.H. Malchus scraped together enough capital to develop the property, begin production, and build a Bleichert tramway from the lower tunnel down to a terminal adjacent to the Iowa Mill. While the distance to the mill was very short, the steep, loose scree slopes made a reliable road impossible, and hence a tramway was necessary for meaningful production. Malchus hired a crew to lengthen the development workings. As the Mayflower proved itself, ASARCo examined it as a replacement for the idle Silver Lake Mine and took an option in 1914, but let the deal fall through. In 1915, the American Oil Flotation Company leased the Silver Lake Mill from ASARCo with the intent of converting the plant for

[362] Bauer, et al, 1990: 13; Colorado Mine Inspectors' Reports: Silver Lake; *Mineral Resources*, 1916: 374; "Mining News," *MSP* (10/18/13): 628; Prosser, 1914.
[363] "Editorial Correspondence," *EMJ* (10/17/14): 718; "Mining News," *EMJ* (9/4/15): 412; "Mining News," *EMJ* (5/27/16): 962; "Mining News," *EMJ* (8/19/16): 365; "Mining News," *EMJ* (12/16/16): 1078.

custom flotation. The custom business, however, was slow, and American Oil sought its own mine to provide a steady stream of ore. The Mayflower was the logical choice because it lay almost directly on the Silver Lake tram system. American Oil took an option on the property and paid Malchus $3,000 in earnest money, before workers accidentally set fire to the surface plant. The sale failed to go through because American Oil ceased to function. The Mears and Slattery syndicate moved in quickly as Malchus, ASARCo, and American Oil had collectively demonstrated that the Mayflower had the potential to become a significant producer. In 1916, the syndicate organized the Mayflower Leasing Company and developed enough ore for an excellent production run.

Although the Iowa, Silver Lake, and Mayflower mines produced well, they did not satisfy the Mears syndicate. One of the syndicate members probably was aware that Edward Innis ignored a number of silver veins in the Highland Mary Mine in his search for the lake of gold. Around the turn of the century, lessees and the Gold Tunnel & Railway Company attempted to find and mine the veins with limited success. The Mears syndicate was convinced that they could make the Highland Mary pay well with proper management, ore concentration, and expert miners. In 1916, J.H. Slattery & Company leased the property from owner Highland Mary Mining & Milling Company.[364] Initially, Slattery's lease included the mine's upper workings and the surface plant. In the past, the mine's various operators completed eight levels with the Mountaineer, also known as Level No.1, as the highest, and the Innis Tunnel, also known as Level No.8, the lowest. The main surface plant and the mill erected by the Gold Tunnel & Railway outfit stood adjacent to the Innis Tunnel. As originally equipped, the mill failed to recover enough of the ore's metal content, so Louis Bastian put a crew to work remodeling the facility. While the crew refitted the mill with flotation, Slattery sent ore down to the Contention Mill, which Bastian remodeled earlier. By December the workers were finished, and the Highland Mary Mill turned out around two tons of concentrates per day.

In 1917, Slattery remediated the inefficiencies posed by the haphazard organization of the underground workings. According to conventional mining engineering, underground levels should be linked by vertical passages that allowed ore mined in the highest levels to be easily transferred down to the lowest with little handling. Miners could then haul the ore out to a mill or holding bins. The Highland Mary, by contrast, had little such organization. Instead of expending enormous sums on the necessary underground connections, Slattery diverted the ore completely via two aerial tramways. One leg descended from Level No.2 Tunnel down to a station at the Level No.7 Tunnel, and the second leg followed west Cunningham Gulch to the mill. While the cost of a segmented system was high, it allowed large crews in both tunnels to produce as much ore as the tram buckets could carry. The efficiency, success, and tonnage realized by the Slattery lease confirmed the syndicate's expertise.[365]

During 1917 and 1918, the syndicate operated the Iowa, Silver Lake, Mayflower, and Highland Mary mines, among the best producers in the Las Animas district. This began to

[364] Colorado Mine Inspectors' Reports: Highland Mary.
[365] Colorado Mine Inspectors' Reports: Highland Mary; "Mining News," *EMJ* (9/29/17): 579; "Mining News," *MSP* (3/17/17): 389.

change the following year. At the Iowa and Silver Lake, three shifts of miners worked around the clock until the influenza epidemic suspended operations. The October pandemic swept the crew and Slattery personally nursed the sick in the boardinghouse. When the second wave further decimated the crew in November, he closed the mines and had the boardinghouse fumigated. Like most of the region's other mine operators, Slattery had a difficult time finding replacement workers and only reopened the Iowa in 1919. At that time, Slattery renewed the lease for Iowa alone under the Southwestern Mining Company and the Melville Leasing Company, but cut the workforce. The syndicate did not renew the Silver Lake lease, heralding an end to its run. These issues indicated that the Iowa and Silver Lake workings were running out of ore. The Iowa Mine then remained one of the Las Animas district's best producers through 1920, when operations collapsed.

The Mayflower and Highland Mary operations regressed in a similar manner. At the Mayflower, a crew of thirteen miners sent ore down to the Iowa Mill through 1918 and 1919 but were discharged the following year. The mine remained quiet until 1922, when Slattery, John F. Barnett, and Leonard L. Aiken organized the Mayflower Mining & Milling Company to work the property with a crew of only six. This operation only lasted a year. The Highland Mary Leasing Company kept the mine and mill producing through 1918 and developed several veins. Slattery suspended operations during the flu epidemic, and when he resumed, hired only ten workers in part because production declined. In 1920, Slattery found that the mill was not worth operating, shut the facility down, and did not renew the lease when it expired. Between 1918 and 1920, the county lost four of its most important producers.[366]

In Dives Basin, west of and above the Highland Mary, Daniel McLean continued to work the Shenandoah Mine through his Dives Leasing Company. McLean suspected that the mountain shared by the Highland Mary, Trilby, and Shenandoah mines concealed a hidden vein system. While this notion was not unlike Innis' lake of gold, McLean's hypothesis was founded on geological knowledge. His miners extracted as much as four tons of ore per day from the Shenandoah and conducted exploration for the elusive vein system as finances allowed. In 1917, McLean formed the O.S. Leasing Company and included the Trilby in his operation. He hoped to find the system from within the Trilby workings and with the Shenandoah to create a single entity. The underground connection was not realized, but he did make several substantial discoveries and operated both mines as a single unit with great success. As one operation after another closed in the Las Animas district, the Dives Leasing Company assumed the role as the most important producer by 1920. However, in 1921, after only nine months of operations, McLean suddenly laid off the workforce of thirty and shut this mine down, as well.[367]

On the opposite side of Dives Basin, the North Star Mine saw activity after remaining long idle. In 1916, a group of lessees reopened the original workings and produced a small

[366] Colorado Mine Inspectors' Reports: Highland Mary, Mayflower; *Mineral Resources*, 1918: 861; "Mining News," *EMJ* (7/27/18): 195; *Silverton Standard* (8/16/19); Weed, 1925: 724.
[367] Colorado Mine Inspectors' Reports: Shenandoah-Dives , Trilby; "Mining News," *EMJ* (1/20/17): 167; "Mining News," *EMJ* (9/15/17): 499; *Silverton Standard* (3/31/17).

amount of ore, before accidentally set alight the tunnel house. The miners moved into the old base camp in Dives Basin, found the mine difficult to work, and ended production in 1917. The mine, a cornerstone of the Las Animas district for years, saw no further activity of note.[368]

The Big Giant Mine, in Little Giant Basin below North Star Peak, also saw renewed activity during the World War I revival. William Keith drove a tunnel to the Big Giant Vein and built a mill in 1895, but the ore was too complex and Keith abandoned the operation within several years. Peter Orella, who operated the Standard Bottling Works in Silverton as early as 1907, came to the conclusion that the vein had high potential Keith left undeveloped. When metal values began to increase in 1914, Peter Orella & Company leased the Big Giant, Contention Mill, and Contention tramway. He rehabilitated the surface plant and underground workings and connected the Big Giant with the Contention tramway. Originally, the Contention Mining Company built the tramway to connect the Contention Mill on the Animas River with the North Star Mine outlet at the head of Little Giant Basin. In 1902, the Black Prince Gold Mining Company bought the tramway and adapted it to their operation around one-half mile below the Big Giant. In so doing, the Black Prince company shortened the tramway, leaving a gap between the Black Prince terminal and the Big Giant. To span this distance, Orella built a double-rope reversible segment and reused the old Keith Mill structure as his upper terminal.[369] Orella wisely realized that the Contention Mill would probably not treat the complex Big Giant ore and sent batches to the Silver Lake and Highland Mary mills for testing. In 1916, Orella finally settled on the best treatment process and hired Louis Bastian to install a flotation flow path almost identical to that at the Highland Mary Mill. Once finished, the facility treated ore not only from the Big Giant, but also from independent customers. Although Orella continued to lease the mine, he bought the mill to retain his investment in the facility.[370]

During the fall of 1916, someone, probably Orella, collected up the tailings left in Little Giant Basin by the 1889 North Star Mill and sent them to the Contention Mill to be processed. The terminal at the Big Giant was the nearest place to load the tailings, but a deep chasm blocked easy access. To overcome this, Orella built another double-rope system that ascended from the terminal up to a loading station on the basin floor, where workers transferred the material. Orella's complicated tramway system now included the tailings segment from the upper basin down to the Big Giant terminal, the double-rope segment from the Big Giant terminal to the Black Prince, and the Bleichert tramway to the Contention Mill.[371]

Ore in every mine in the county was slightly different in character even when from the same geological formation, and so it was with the Big Giant. By 1917, Orella realized that despite the flotation installed by Bastian, the Big Giant ore was still too complex to be easily

[368] *Mineral Resources*, 1916: 374; "Mining News," *EMJ* (8/19/16): 365; "Mining News," *EMJ* (10/27/17): 777.
[369] Colorado Mine Inspectors' Reports: Big Giant; "Mining News," *EMJ* (11/28/14): 980; "Mining News," *MSP* (4/3/15): 534; *Silverton Standard* (10/17/04); *Silverton Standard* (11/13/15).
[370] Colorado Mine Inspectors' Reports: Big Giant; "Mining News," *EMJ* (11/4/16): 845; "Mining News," *EMJ* (4/7/17): 647.
[371] "Mining News," *EMJ* (10/21/16): 769; Eric Twitty, *Basins of Silver: The Story of Silverton, Colorado's Las Animas Mining District* (Montrose, CO: Western Reflections, 2006): 16.

treated. Because shipping the ore as crude material was not feasible, he closed the Big Giant by 1918 while continuing to run the mill as a custom facility.[372]

The Black Prince Mine, on the west floor of Little Giant Basin, was among the operations that responded to the high value of silver. J. Robert Crouse and H.A. Tremaine of Chicago recognized the property's potential because, like its Big Giant neighbor, the vein had never been developed to depth. Further, the property required little capital because it already featured a 500-foot tunnel and an excellent surface plant. In 1920, the investors organized the Crouse-Tremaine Mines Company, purchased some claims and leased others, and leased the Contention tramway and mill.[373] A crew completed necessary repairs and began driving a haulage tunnel. By the end of 1920, the Black Prince had all the makings of a great operation, which is what the Las Animas district needed to counter the decline of its other mines. The staff of the *Silverton Standard* was impressed with the progress: "One of the largest undertakings of 1920 will be ready for production during 1921. The Black Prince Group, under development by the Crouse-Tremaine Mines Company, has been improved with sufficient buildings etc. to enable the management to carry out with the greatest speed the development of the Black Prince and other veins of the group."[374]

By the spring of 1921, miners made the long-awaited breakthrough into the main vein. In driving the haulage tunnel, the engineer followed the proper practice of undercutting the formation at depth so miners could work the ore body from the bottom up. There was one problem, however, there was no ore. The vein was highly mineralized, but lacked payrock of economic worth. The company was forced to suspend operations.[375]

During the World War I boom, the Lackawanna Mine became the focus of an important project. In 1917, John M. Wagner, who owned a number of mines in San Juan and San Miguel counties, confidently purchased the group of claims. During the winter, he made a deal with William A. Way, R.E.L. Townsend, and Melvin Smith to lease the main complex as the Lackawanna Mining & Reduction Company. Although relatively inexperienced, Way was a respected Silvertonian. Born in Hancock County, Illinois in 1874 to a family of some means, Way attended Western Illinois Normal School and studied law at the Northern Indiana Law School. He came to Silverton around 1904 and practiced law under Judge Searcy until 1913, when he established a partnership with H.E. Curran. In 1917, Way married Hazel Fletcher of Salt Lake City and went into practice on his own. Townsend had slightly more direct experience with Animas River mines than Way and had previously leased several properties. The Lackawanna failed to meet expectations, and the partners dumped the lease during the year and moved on to other mines around Eureka.

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[372] *Mineral Resources*, 1917: 840; "Mining News," *EMJ* (10/13/17): 663; "Mining News," *EMJ* (10/27/17): 777.
[373] Colorado Mine Inspectors' Reports: Black Prince.
[374] *Silverton Standard* (1/1/21).
[375] Colorado Mine Inspectors' Reports: Black Prince.

In late 1917, a group of investors from the east assumed the Lackawanna Mine lease as the D.L. & W. Mining & Reduction Company. Under manager C.B. Sheehan, a crew of twenty attempted to ready the operation for work through the winter. One team accompanied master tramway builder O.F. Sackett to the Titusville Mine, dismantled the idle Huson tramway, and rebuilt it at the Lackawanna. The upper terminal stood near the main tunnel, and the lower terminal was on the Silverton Northern Railroad. A second group erected a concentration mill at the lower terminal. A third workforce developed ore and engaged in minor production. While the mill was under construction, the company leased the Silver Lake Mill to process high-grade ore that miners discovered in 1918. After sending the ore to the Silver Lake Mill, little more was forthcoming, however. The compressor house and mill subsequently burned, and after the company collected insurance money, it rebuilt the structures and dissolved.

Before Silver Lake Basin ran out of ore at the end of the 1910s, its mines were a centerpiece of Otto Mears' financial structure. Not only did they yield significant profits, but Mears commissioned an unusual project involving the mill tailings dump that formed an artificial beach on the shore of Silver Lake. Ironically, Edward Stoiber was concerned enough with the water quality of the lake to install a sewer system for his boardinghouses, but flumed at least 500,000 tons of mill tailings from the original mill into the lake's north end. Supposedly, Stoiber did so to store the tailings for future reprocessing. Samuel Hallett planned on treating the tailings in the second Silver Lake Mill after ASARCo acquired the property, but the logistics proved to be too complicated. The tailings were in essence a ready form of extremely low-grade ore and, although they had been treated once in Stoiber's original mill, the tailings retained enough metal content to be profitable. The costly steps of crushing and grinding had already been done and the tailings only required advanced concentration.

Advanced concentration was the specialty of Arthur Redman Wilfley, renowned engineer and metallurgist who split his time between Summit County and Denver. Born in Missouri in 1860, in 1878 Wilfley accompanied his father to join the Leadville rush, set up a sawmill, and profited from the lucrative demand for lumber. The family ultimately went to Kokomo, just over Fremont Pass from Leadville, where young Wilfley became a prospector and miner. In 1882, Victor G. Hills, an engineer and surveyor, offered him a job as assistant surveyor. Wilfley learned quickly, became a partner with Hills, and in 1885 leased the White Quail Mine under the firm of Wilfley, Clark & Company. Investors provided Wilfley with capital to build a mill, which he designed to concentrate low-grade ore. Thus began a protracted career focused on the efficiency of milling and concentration.[376]

Wilfley continuously tinkered with various apparatuses to improve their performance. In 1895, he developed a particularly effective appliance that he patented as the Wilfley vibrating table and began selling as a practical model in 1896. The Wilfley table featured a stationary chassis and an irregular, four-sided tabletop that vibrated rapidly. The tabletop was coated with linoleum and numerous fine riffles, and, as it oscillated, metal-rich particles settled against the

[376] Jay E. Niebur, *Arthur Redman Wilfley: Miner, Inventor, and Entrepreneur* (Denver: Western Business History Research Center, Colorado Historical Society, 1982): 12-23, 30.

riffles while a water spray washed the waste away. Sales were slow at first, but the Silver Crash only energized Wilfley because his device addressed making low-grade ore pay. Eben Smith, principal of the Mine & Smelter Supply Company, contracted with Wilfley for the rights to make and sell the table, and the device netted a fortune in the Rocky Mountain West. Wilfley continued inventing and tinkering and in 1903 developed a multi-deck vibrating table specifically to treat finely ground slurry usually piped out of mills as waste.[377]

Mears, aware of Wilfley's ingenuity and skill, approached him regarding a technical solution to make tailings remunerative. In 1913, Mears explained the project to Wilfley, and obtained money from his leasing syndicate. Mears and Wilfley selected a mill site on the north side of the Animas River opposite the mouth of Arrastra Gulch, which seemed illogical, as it necessitated moving the tailings from Silver Lake Basin down and across the river. The adverse climate, propensity to freeze, and difficulty of access made Silver Lake Basin a poor choice, and why Mears and Wilfley did not adjoin the new plant to the Iowa Mill in Arrastra Gulch is not known. The system that Mears and Wilfley devised for moving the tailings was also unconventional. Special sand pumps mounted on a barge vacuumed up the tailings and piped them over to the outlet of Silver Lake, whose fall was increased by a low dam. The torrent carried the suspended particles over Arrastra Gulch's cliff headwall and down to the base, where another dam diverted the current into a large wooden drain box. Excess water flowed out of the box and the tailings reverted to a slurry, which flowed into a wooden flume that descended steeply along the gulch's west side. A trestle carried the flume out beyond the mouth of the gulch and over the river to the mill.[378]

As a concentration facility, the Mears-Wilfley Mill was completely novel. The interior was relatively level and featured only a handful of apparatuses that were radically different. However, the most imposing were grossly enlarged versions of Wilfley tables 12'-wide and 48'-long with two decks, in addition to several twenty-four-deck shaking tables. Wilfley designed the contraptions to treat the tailings in economies of scale. The giant tables were for coarse particles, and the twenty-four-deck machines treated slurry of extremely fine material. The Mears-Wilfley Mill featured additional processing machinery, although Arrastra Creek naturally completed some of the classification and separation stages that mills usually executed. According to design, the custom facility could treat 600 tons of Silver Lake tailings per day.[379]

Mears' workers consumed nine months building the mill and flume system, while Wilfley perfected his machinery. One device was a sand pump capable of withstanding the high-impact tailings project. The deck shaking table, also known as a slime table after the material it treated, occupied Wilfley such that he installed a unit in the Iowa Mill for testing. By late summer, Mears and Wilfley opened the mill after a $22,000 investment, around $407,000 today.[380]

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[377] Niebur, 1982: 73-5, 82, 84-8, 132-4; Spence, 1993: 369.
[378] "Editorial Correspondence," *EMJ* (4/4/14): 729; Niebur, 1982: 162; Prosser, 1914; *Silverton Standard* (8/28/15); Tucker, 2003: 117.
[379] "Mining News," *EMJ* (5/16/14): 1027; Niebur, 1982: 159; Prosser, 1914; *Silverton Standard* (8/22/14).
[380] Niebur, 1982: 164; Prosser, 1914.

The novel enterprise ran into trouble early in 1915. The flume developed a number of leaks because the tailings slurry acted like liquid sandpaper and wore the wood rapidly. Instead of lining the existing plank trough with sheet iron, Mears opted for concrete, another innovation that drew the attention of engineers who became interested in the project. More problematically, Wilfley's new machinery failed to perform as expected, despite the results of tests that suggested otherwise. Mears ultimately replaced the machinery with flotation.

Following troubleshooting, Mears operated the mill around the clock during in the short working season. During the rest of the year, however, the mill recovered around $5,000 per month, and so well worth the trouble. Mears and Wilfley must have enjoyed high profits since the mill was relatively inexpensive and the basic work of mining and crushing the tailings was already complete. From 1915 through 1918, Mears' railroad hauled off dozens of rail cars of concentrates that fetched, in total over $100,000. The facility functioned smoothly into 1919 when Wilfley, in ill health, sold his interest to Mears. During the year, Mears closed the operation, having exhausted the richest and most debris-free tailings.[381]

Eureka Mining District

The Eureka Mining District followed the general trends of its southern neighbor, the Las Animas district, during World War I. Mining companies responded readily to the improved climate and suspended just as quickly when that climate soured in 1921. The principal difference was that some of the mining operations had greater staying power than those in the Las Animas district. The Sunnyside was one, as the county's greatest producer with a size and complexity similar to the waning Silver Lake. Before John Terry died in 1910, he groomed his two sons to replace him. Joseph focused on managing the mine and William the mills. William built the zinc recovery plant in 1911 and Joseph the aerial tramway and other buildings after they burned two years later. The zinc plant and tramway functioned well, which confirmed confidence in the abilities of the two sons.[382] William led the Sunnyside's response to the improved conditions of World War I. He improved the efficiency of the Eureka mill, increasing income and rendering even lower grades of ore profitable to produce. In particular, he enlarged the Huff Electrostatic plant and consulted with James H. Hyde to install flotation in 1915. Over the course of a year, the Terrys were so impressed with flotation that they moved the machinery up to the Midway Mill and installed a larger set in the Eureka plant, increasing metals recovery even further. The mill at Lake Emma performed general concentration. By this time, Joseph managed a workforce of ninety employees producing 180 tons of ore per day, double the usual average per worker.[383]

For years, the local ASARCo directors eyed the Sunnyside but were distracted by constant trouble with the Silver Lake. It may be that as the Silver Lake wound down during the mid-1910s, they had enough energy and capital to consider other producers and targeted the

[381] *Mineral Resources*, 1917: 840; "Mining News," *EMJ* (10/7/16): 688; "Mining News," *EMJ* (10/6/17): 622; "Mining News," *EMJ* (7/27/18): 195; Niebur, 1982: 166.
[382] Colorado Mine Inspectors' Reports: Sunnyside; "Mining News," *EMJ* (1/27/12): 236; "Mining News," *EMJ* (12/20/13): 1192.
[383] Colorado Mine Inspectors' Reports: Sunnyside; "Mining News," *EMJ* (8/28/15): 372; *Silverton Standard* (7/29/16): 1.

Sunnyside. It remains uncertain whether ASARCo approached the brothers first or the reverse, but by 1917, the two parties began discussions. The Terrys, nearing retirement, were open to selling, and ASARCo made them a generous offer.

Repeating the pattern established with its Silver Lake properties, ASARCo bought the Sunnyside, as well as the other principal mines on the ore system to ensure long-term reserves. The mining giant also enlarged the operation. In 1917, ASARCo organized the Sunnyside Mining & Milling Company and consolidated the Sunnyside, Washington, and Gold Prince groups. W.G. Sharpe was president, F.W. Batchelder secretary, and E.L. Young manager. Young planned a new mill at Eureka capable of treating 500 tons per day and to finish driving the Terry Tunnel from the mill site to undercut the vein system at great depth. Overall, ASARCo's plan was the largest undertaking in the county since the Gold Prince operation. Young sent a crew of forty to dismantle the Gold Prince plant and incorporate the materials and equipment into the design. At the same time, Andrew Coyle gained the contract to drive a raise up into the old workings from the Terry Tunnel.[384]

The town of Eureka was already bustling because of the existing Terry Mill and nearby operations. New construction filled the available housing and provided business for local merchants. With the Sunnyside Mill finished in 1918, the town's permanent population reverted to around 250 people, an increase from prior years. Workers lived in several boardinghouses, received shaves and haircuts from Robert White, purchased candy and other treats from J.C. Hopper, saw physician William Carter when ill, and patronized C.F. Worden's billiard hall. Local residents purchased goods in J.F. Warnock's mercantile and feed and fuel at the McJunkin station. Visiting dignitaries lodged and dined at the Eureka Hotel and had the A.L. Lashbaugh livery tend their animals. Eureka was also home to several mining companies and assayers.[385]

At first, ASARCo had equally poor luck with the Sunnyside as at Silver Lake. A portion of the surface plant caught fire in 1917, and the following year burned to the ground. The new Sunnyside Mill was ready, but the destruction at the mine shut the operation down. The company hired a workforce of eighty to rebuild, and they made progress until the influenza epidemic, avalanches, and power blackouts stalled the effort. After more than a year, the new surface plant was ready and larger than ever. ASARCo continued Terry's practice of providing superior housing for the miners. The boardinghouse and bunkhouse each had three stories, dozens of rooms, and hot water, steam heat, and showers. Off shift, the miners visited the commissary equipped with billiards and a theater for films, while a doctor provided services. In total, the complex housed 220 workers, as many as Stoiber employed at the Silver Lake twenty years earlier.[386]

The ASARCo directors exhaled a sigh of relief during the summer of 1919 when the host of problems seemed to have passed. The new surface plant was finished, the mill ready, and the influenza epidemic over. A crew of 270 brought the mine into full production and doubled the

[384] George E. Collins, "Mining in Colorado in 1917," *Engineering & Mining Journal* (1/19/18): 143; Colorado Mine Inspectors' Reports: Sunnyside; Henn, 1999: 34; "Mining News," *EMJ* (4/14/17): 689; "Mining News," *EMJ* (4/28/17): 689; "Mining News," *EMJ* (6/15/18): 1109.
[385] *Colorado Business Directory*, 1918: 587; *Colorado Business Directory*, 1919: 480.
[386] Colorado Mine Inspectors' Reports: Sunnyside; *Mineral Resources*, 1919: 783; "*Mining News*" *EMJ* (6/9/17): 1043.

county's total output. However, in 1920, the national recession, an abrupt drop in the prices of industrial metals, and a decrease in demand forced ASARCo to suspend operations yet again. The company laid off hundreds of workers who left. Despite its massive investment, ASARCo responded to what appeared to be another countywide collapse of mining.[387]

The headwaters around Animas Forks and the Mineral Point district were nearly forgotten during the World War I revival. ASARCo's removal of the Gold Prince Mill was the largest project in either area, although several small ventures tried to get going during the revival. One was the idle Frisco-Bagley Tunnel, which eastern investors attempted to reopen in 1917. The other was the Columbus Mine on the north edge of Animas Forks. W.M. Johnson & Company produced from the Norton Vein until the early 1910s. In 1915, Arthur Johnson lengthened the Columbus Tunnel, the lowest of three entries, in an attempt to reach the Columbus Vein, and extracted ore from the upper workings to pay for the work. In 1917, A.S. Sturgeon, the subsequent operator, intermittently tried developing the ore formations. In 1918, Johnson returned as manager for the Gnome Mining Company, which resumed driving the lowest tunnel to the Columbus Vein. A crew of eight miners labored into 1919, but the vein did not offer profitable ore at depth, and Johnson closed the mine.

The central portion of the Eureka district was a complete contrast to the Animas Forks area. Perhaps the Sunnyside stimulated confidence among investors, but at any rate Minnie and Maggie gulches in particular saw three substantial operations gain momentum during the revival. However, just as they were on the brink of prosperity, these succumbed to the typical problems. The Intersection Mine at the head of Minnie Gulch yielded gold ore regularly since the Intersection company initially developed the property in 1910. After producing $177,000, the miners simply ran out of ore in 1917 and were unable to find more. With no ore, the company closed the mine, which had already lasted longer and generated more profits than expected.[388]

Farther down the gulch, D.W. Fleming was at work on the Caledonia, originally known as the Beaton Group where James Beaton developed a gold and silver vein during the 1880s. In 1905, Fleming organized the Peerless San Juan Mining Company to develop the vein at depth, built a mill in 1909, and on the eve of production, suspended due to the effects of the 1907 recession. In 1918, he reorganized the outfit as the Caledonian Mining Company and resumed where he left off. Little work was required to bring the Caledonia into production, and he ran the mill on low-grade ore and sent the higher grades of material to the Durango Smelter. This lasted into 1920, when the ore changed character at depth and miners exhausted the shipping-grade material. Unfortunately, the mill was unable to treat the remaining low-grade ore, but Fleming lacked the capital to refit the facility. In response, he scaled back operations, conducted development, and sought more money. In 1921, economic woes and a collapse in metals prices discouraged his investors, and he suspended work.

[387] Colorado Mine Inspectors' Reports: Sunnyside; Henn, 1999: 34; Marshall and Zanoni, 1998: 127; "*Mining News*" *EMJ* (9/6/19): 421.
[388] Colorado Mine Inspectors' Reports: Intersection.

During the late 1900s and early 1910s, the Kittimac Mines Company struggled with the Kittimac Mine, around one-half mile east of the Caledonia. The Kittimac paralleled the Caledonia, in part because it tapped the same ore system. The Kittimac had extensive underground workings, a mechanized surface plant, and a mill unable to treat the complex payrock. Unlike Fleming, however, the Kittimac company had enough capital to refit its mill under the guidance of an expert. In 1915, James Hyde installed Huff Electrostatic separators to recover zinc and flotation machines to provide the final separation of other metals. In 1916, after nearly four years puzzling out problems with the ore, the company successfully ran the mill for several months to demonstrate its effectiveness, then leased the entire operation out.[389]

The lessee was George A. Beaton, son of James Beaton, who had made a considerable fortune from the Caledonia Mine during the 1880s. George Beaton organized the Kittimac Mining & Milling Company to work the property. To avoid the pitfalls of earlier operators, Beaton hired his own experts to manage the mine and the mill. P.M. Collins of the American Oil Flotation Company ran the mill and improved the flotation process, and Augustus Malchus oversaw operations. Malchus was also involved with the Mayflower in Arrastra Gulch. Almost from the beginning, the mill did not recover adequate metals content and had to be refitted again. Later in 1916, the mill finally functioned as expected, and as an added benefit, miners discovered a rich pay chute underground during 1917. The operation became profitable, but short-lived as the ore declined in quality. Mired in debt, the Kittimac Mining & Milling Company was unable to meet its payments, causing the owner, Kittimac Mines Company, to default on its debts and declare bankruptcy. The Kittimac Mines Company, however, remained in possession of the mine and spent 1918 operating it to realize some income. Probably to evade creditors, principal Daniel Carey dissolved the company in 1919, found new investors, and moved the assets to the Sullivan Mines Company of Wyoming in hopes of resuming production. Carey was unable to work the mine, however, and the property remained quiet for several years. Finally, in 1921, Carey interested Pennsylvania investors who organized the San Juan Consolidated Mining & Milling Company to lease and bond the property. They hired a crew of five miners who rehabilitated the surface plant and began driving exploratory workings underground. As the nation's economic climate worsened, the new firm gave up.[390]

Above Middleton, experienced engineer Etienne Ritter continued preparing the property for long-term production for the Hamlet Mining & Milling Company. Workers refit the mill, pushed Level No.6 Tunnel to undercut the old workings, and developed the vein. In 1914, a portion of the mill burned, granting Ritter the opportunity to rebuild with flotation. In 1915, Ritter finally brought the operation into production, only to discover that the mill was still not effective enough. Before he was able to determine why, it burned to the ground. Insurance paid for a new, properly designed plant. By the end of 1916, Ritter started the operation for a second time and found that the new mill functioned perfectly. To keep the company from defaulting on

[389] Colorado Mine Inspectors' Reports: Kittimac; "Mining News," *EMJ* (9/19/14): 549; "Mining News," *EMJ* (10/19/15): 619.
[390] Colorado Mine Inspectors' Reports: Kittimac; "Mining News," *EMJ* (7/22/16): 201; "Mining News," *EMJ* (10/7/16): 688; "Mining News," *EMJ* (12/2/16): 999; Weed, 1922: 622; Weed, 1926: 648.

its debt payments, Ritter expedited production and had three shifts working around the clock. In 1917, the same two problems that plagued other companies in the region changed this. Miners reached an end of the easily treated ore, and the mill had difficulty with the remaining material. For the next two years, Ritter was caught in an endless cycle of intermittent production due to inconsistent payrock, searching for treatable material, and adjusting the mill. In 1919, investors were unwilling to spend any more money on the operation and suspended work. They leased the operation to Al Koltz in 1920. Koltz encountered the same problems, hired Louis Bastian to install the latest flotation equipment, and had no better luck. The Hamlet saw no further activity of note.

The east side of Cunningham Gulch, in the southern portion of the Eureka district, was another center of activity during the World War I revival. After remaining idle, the Green Mountain and Pride of the West mines became the focus of a well-engineered and coordinated effort, and the Gary Owen, quiet for at least a decade, also joined the county's roster of producers. These three mines, the Highland Mary, and several small operations sent so much ore out of Cunningham Gulch that the *Silverton Standard* offered special recognition: "Cunningham Gulch is the most active section of the county. Nearly all the old mines are going, and several new ones have started up."[391]

The Garry Owen, on the east side of Stony Gulch, was among the few mines to operate relatively free of problems through the revival. How the property escaped extensive development in the past is unclear. Experts suggested that it lay on the northeast end of the same ore system as the Green Mountain and Pride of the West, the two principal producers in the southern portion of the Eureka district. And yet, the Garry Owen attracted little interest. Philip Flynn, one expert, was convinced that the mine would yield if properly developed. During the early 1910s, he spent his available capital buying the associated claims but had little money left for necessary work. In 1917, Flynn organized the Wide West Mining Company, obtained investors, and leased the property to keep the operators separate from ownership. He employed William Pantalone as superintendent over a crew of twelve that built a surface plant and drove development workings. By 1918, Flynn's suspicions proved correct, and the miners struck ore rich enough to ship to the Durango Smelter without first being concentrated. Because Flynn was the first to tap the vein system, he found enough payrock to sustain sound production into 1922.[392]

The Green Mountain and Pride of the West, in contrast, were among the county's oldest producers and lay on the same vein system. Despite extensive development, the mines still offered plenty of ore for two principal reasons. The vein system possessed vast reserves, but past operators gave up because the payrock resisted every attempt at concentration. No one had yet tried flotation. In 1916, two separate companies cooperated to profit from the Green Mountain and Pride of the West. J.H. Bird & Company leased the Green Mountain, which featured three tunnels and a mill on the floor of Cunningham Gulch, all connected by tramway. The Pride of

[391] *Silverton Standard* (7/28/17): 1.
[392] Colorado Mine Inspectors' Reports: Gary Owen; *Silverton Standard* (3/10/17): 1.

the West Mining Company, managed by A.W. Harrison, leased the Pride of the West, which featured several tunnels, a power plant, and no mill. Both outfits prepared their mines for production, and the Pride company offered to refit the Green Mountain Mill with flotation. As part of the agreement, the Pride company realigned the Green Mountain tramway to serve its own needs, which was no loss for Bird because ore could be hauled out the lowest Green Mountain tunnel and directly into the mill. In 1917, the Pride company hired Bastian to install flotation, and it was successful from the beginning.

During the spring, both operations began production with great promise. Under Harrison, the Pride company generated around fifty tons of ore per day and ran it through the mill, while the Bird lease slowly sputtered to a stop. Bird turned his lease over to ASARCo during the summer, and the mineral giant brought the Green Mountain into regular production. ASARCo's interest in the mine was twofold. One was to profit from the ore, and the second to provide a stream for the Silver Lake Mill and offset the dwindling custom business. Thus, instead of treating ore in the Green Mountain Mill, located at the mine portal, ASARCo shipped the material to the Silver Lake plant instead. The mill was busy, however, on payrock from the Pride. The split arrangement continued through 1918, when dwindling ore reserves caused ASARCo to end its lease. The Pride company more than made up for the loss and was so productive, the mine assumed the status of fifth most important producer in the county. Around this time, Joseph Terry, flush from the sale of the Sunnyside, replaced Harrison. Terry's experience was immediately put to a test in 1919 when the company temporarily ran out of ore. The investors considered what to do, acceded to recommendations of an exploration campaign, and then stalled in 1921 due to the poor economic climate.[393]

Cement Creek Subdistrict

Other than the tungsten rush, the Cement Creek subdistrict was relatively quiet during the World War I except for two principal operations. The most important was the Gold King Mine, lifeblood of Gladstone and the Silverton, Gladstone & Northerly Railroad. The Mears and Slattery syndicate therein leased one of the county's top producers. The mine achieved this status during the early 1910s, and Bastian's groundbreaking 1914 application of flotation in the Gold King Mill only increased the yield. In 1917, the syndicate failed to renew its lease, and Willis Kinney seized the opportunity to regain the mine. Kinney must have understood that the syndicate rarely quit a lease unless the ore was gone, but he established the Gold King Extension Mines Company and put a workforce of eighty in search of ore and rehabilitating the mill for greater efficiency. Although fifty of the workers lived in Gladstone, the town's population was insufficient to support any business other than the Gold King boardinghouse. In 1919, Kinney located enough payrock to support intensive operations. With rehabilitation finished, he divided the workers into three shifts and kept them busy around the clock producing ore and running the mill. Kinney enjoyed this pattern until the economic climate of 1921 forced him to suspend.[394]

[393] Colorado Mine Inspectors' Reports: Pride of the West; *Mineral Resources*, 1918: 861; "*Mining News*" *EMJ* (7/28/17): 189.
[394] Colorado Mine Inspectors' Reports: Gold King; *Mineral Resources*, 1918: 862; "*Mining News*" *EMJ* (8/17/18): 325.

The Silverton, Gladstone & Northerly Railroad stopped running in conjunction with the Gold King, which adversely impacted the other principle operation in the Cement Creek drainage. In 1917, the Henrietta Copper Mining Company purchased the Henrietta in Prospect Gulch as justified by the increase in metals prices. The Henrietta was ready to produce because its surface plant and tramway were intact, and the Mears and Slattery syndicate provided rail service at the bottom terminal. The company hired experienced engineer E.W. Walter to reopen the property. Once the mine was in sound condition, Walter leased it to the Adam & Eve Mining Company, which enjoyed production until the profitable ore was gone in 1918. Walter employed a small crew to find more ore through 1921, when the economy soured and the railroad stopped running.[395]

Mineral Creek Mining District

The Mineral Creek Mining District remained depressed during the World War I revival, even though it featured what had been some of the county's most important mines. Unlike Silver Lake Basin or the Sunnyside Mine, the district's large operations were depleted at the turn of the century and had little profitable payrock left to offer. In contrast to the central portion of the Eureka district, the small and medium-sized mines did not attract interest either. The Coming Wonder was one exception, located on Anvil Mountain north of Silverton. The property overlay the Crown Jewell Vein which, like the Garry Owen in Cunningham Gulch, saw almost no development since the mid-1890s. Thus, three seasoned miners felt that Coming Wonder was an appropriate name for their new venture, sure to be highly productive, and formalized in 1916 as Andrean, Jackson & Gustafson. After only one year, however, Nels Anderson & Company replaced the trio, conducted additional development, and enjoyed sound production through 1917. The firm generated so much ore that the directors built a double-rope reversible tramway to lower it down to a shipping point. In 1918 Ed Johnson assumed the lease. Johnson specialized in leasing small mines and had just finished with the Aspen when he organized the Anvil Leasing Company. Under Johnson, a small crew kept the Coming Wonder in production for three years. In 1921, the declining economy shut the operation down.[396]

In Silverton, business owners and residents eagerly anticipated the impending reopening of the Hercules and North Star mines. Although owned by separate parties, both ceased work in 1911 or 1912 due to problematic ore, were foreclosed upon, and put up for auction in 1915. The North Star sold first. The size, condition, and history of property met the criteria favored by the Mears and Slattery syndicate. They formally purchased through the S.D. & G. Leasing Company, one of their many subsidiary organizations. Louis Bastian immediately refitted the mill with flotation, and Matt Delsante employed a small crew rehabilitating critical underground

[395] Colorado Mine Inspectors' Reports: Henrietta; "Mining News," *EMJ* (4/7/17): 647; "Mining News," *EMJ* (10/6/17): 622*; Silverton Standard* (6/9/17): 1.
[396] Colorado Mine Inspectors' Reports: Coming Wonder; "Mining News," *EMJ* (9/29/17): 579.

workings. In 1916, they began production, some miners sending low-grade ore from old stopes, others prospecting underground for fresh material. The North Star, however, lived up to its reputation for difficult ore and was among the few operations that truly challenged Bastian's expertise. His flotation process did not recover enough of the ore's metals content, so he refit the mill in 1916 with flotation machines of his own design. Miners generated ore from the North Star workings through 1917, when they began to run out of profitable grades of material. As production decreased, Delsante kept the mill busy with ore hauled from the syndicate's other leases, such as the Detroit-Colorado and Silver Lake. By the end of 1918, the syndicate was satisfied that they had exhausted the last vestiges of ore out of the North Star and let the lease lapse.[397]

Even though the value of metals remained high, the North Star gradually declined until it too succumbed to the economic troubles of 1921. The San Juan Tungsten Company leased the mine, refitted the mill, tried producing tungsten, and failed. Phillip Sartori subsequently leased the mill and used it to treat ore from the Silver Ledge Mine, hoping that it was more efficient than the Silver Ledge Mill. Matt Delsante returned in 1920, when his North Star Leasing Company leased the nearby Gladstone Mine and needed the mill to treat ore. Delsante built a tramway up to the Gladstone and enjoyed sound production through 1921. Except for a few limited partnerships, no one took an interest in the North Star workings for more than a decade afterward.[398]

The Hercules revived more slowly initially than the North Star. B.S. Robinson, Joseph M. Boyce, and other investors organized the Dora Consolidated Mining Company and purchased the operation in early 1916. The company split management of the mine and mill for efficiency. W.R. Chase oversaw teams of miners who began an exploration campaign and generated some ore, while John Hughes prepared the mill for its first run in almost ten years. When the entire property was ready for production, the company increased the workforce to sixty-five, employed at an efficient strategy tiered on the different grades of ore. Specifically, Hughes processed simple material on-site in the Little Dora Mill and sent complex payrock, usually with a high zinc content, to the Silver Lake Mill's custom flotation plant. This lasted into 1919 when, like other principal mines, miners exhausted the profitable grades of ore. The company conducted some development work, resumed production in 1920, but closed the next year.[399]

The Silver Ledge, at the head of Mineral Creek, was the district's third and last major operation during the World War I revival. In 1914, after Joseph Warner and William Feigel failed at their custom milling venture, Louis Bonavida and Baptiste Matties leased the mine, unwatered the shaft to the 400-foot level, and conducted development in new ground. They struck fresh ore, enticed Feigel to prepare the mill for operations, and had both in production by the end of the year. The operation did well into 1916, when Bonavida died, although his wife

[397] Colorado Mine Inspectors' Reports: Colorado Metals Co., North Star; "Mining News," *EMJ* (7/29/16): 242; "Mining News," *EMJ* (11/4/16): 845; *Silverton Standard* (1/22/16): 1; *Silverton Standard* (7/29/16): 1; *Silverton Standard* (10/14/16): 1; *Silverton Standard* (6/16/17).
[398] Colorado Mine Inspectors' Reports: North Star; "Mining News," *EMJ* (12/7/18): 1013; *Silverton Standard* (9/13/19): 2; *Silverton Standard* (10/4/19): 1; *Silverton Standard* (1/1/21): 1; *Silverton Standard* (8/13/21): 1.
[399] Colorado Mine Inspectors' Reports: Dora, Hercules; *Mineral Resources*, 1916: 374; *Mineral Resources*, 1918: 862; *Mineral Resources*, 1920: 588; "Mining News," *EMJ* (3/25/16): 581; "Mining News," *EMJ* (8/26/16): 404.

Jennie assumed his duties so the operation could continue. She held the lease, managed business affairs, and worked with Fiegel to refit the mill. Further adjustments became unnecessary because in 1917, the facility burned. Sartori now had to haul his ore to the North Star Mill, which impacted profitability. In response, Sartori leased the mill in 1919 and ran it until miners exhausted the Silver Ledge, which he closed later in the year.

Ice Lake Mining District

The Ice Lake Mining District's quiet state during the late 1910s gave no hint that a revival was under way in the rest of San Juan County. The only significant operation was the Bandora, which saw intermittent activity at best. William Sullivan, the mine's longtime operator, produced silver ore on a limited basis until around 1912, when he suspended operations because the best payrock was gone. When metals values began to creep upward, Sullivan waited until 1916 and reopened the Bandora, ostensibly under the Sullivan Mines Company. He employed a small crew that altered between occasional production and vein development on a seasonal basis into 1920, when metals prices reached their peak. Sullivan exploited the positive market to sell to Henry Wycoff and other Denver mine speculators, before metals prices fell within a year. Wycoff prepared for production and even contemplated moving the Yukon Mill onto the property, before the 1921 depression struck.[400]

Major Decline, 1921 - 1932

The spike of industry prosperity fostered by World War I ended by 1921 throughout Colorado. The impending collapse struck with full force as almost the entire mining industry failed, including the long-term producers. Conditions conspired against meaningful recovery. Within the county, nearly all the known profitable ore bodies had been discovered, developed, and worked to exhaustion after forty-five years of continuous activity. With the exception of a few late-comers such as the Little Nation, Coming Wonder, and Garry Owen, the county offered little potential for new discovery. In addition, the disappearance of custom concentration mills ensured that the small operations had nowhere to process their low-grade ore. Outside the county, as peace returned to the United States and Europe demand for and value of industrial metals returned to lower pre-war prices. Furthermore, a deep, postwar depression crept over the entire United States.

Those outside the county had only to consider statistics to recognize collapse. In 1921, the mining industry generated a lowly $5,000 worth of gold, $64,000 in silver, $25,000 in lead, and no zinc, tiny fractions of the previous years. Whereas miners produced $3,617,000 in 1920, this diminished to $100,000 in 1921 and slightly double that for the following year, the least amounts since 1882. The number of active mines fell proportionally. After 1921, the county had around twenty small outfits, six medium-sized mines, and two large producers. Compared with wartime, the small outfits fell by almost one-half and the rest by 75 percent. Only the late 1880s

[400] Colorado Mine Inspectors' Reports: Bandora; "Mining News," *EMJ* (8/21/20): 382; "Mining News," *EMJ* (11/13/20): 968.

recession compared. The loss of jobs and ruined economy forced nearly half the population to leave. In 1910, the county was home to around 3,000 individuals, and fewer than 1,700 remained to make a living as they could.[401]

With a decrease in business came a reduction in railroad traffic. James Pitcher closed the Silverton Railroad. Otto Mears, who had purchased the Silverton, Gladstone & Northerly Railroad, ended service to Gladstone. Only the Sunnyside Mine reopened in 1922 along with a handful of other companies hoping to profit from silver.[402] As early as 1920, however, the Federal Reserve targeted the Pittman Act, creating insecurity in the silver market. Western legislators and capitalists rallied in response, contested the anti-Pittman sentiments, and safeguarded the Act in 1922. This kept the county's mining industry alive, as federal statisticians noted the situation from a broad perspective:

> The situation in the Colorado metal-mining industry during the first half of 1922 was disappointing, but there was a marked improvement as the year drew to an end, particularly in November, when the prices for lead and zinc warranted hopes of a stable market. There was also an increased interest in investigation of the industry by capitalists. The price of $1 an ounce for silver derived from domestic ores under the Pittman Act was all that kept many Colorado mines in operation in 1922.[403]

Just as the region seemed to be on the verge of low-level stability, however, the comptroller general forced the Pittman Act to expire at the end of 1922. Silver reverted to its former value of around $.65 per ounce, and the state mining industry fell apart. Coupled with a broad economic shift toward finance and business, the expiration sealed the fate of silver mining in Colorado.[404]

Between 1923 and 1929, county residents left or found alternative sources of income. Silverton miner Zeke Zanoni and Ouray resident Roger Henn recounted the distillation of liquor to meet an enormous demand fostered by the Volstead Act, also known as Prohibition. Ethnic Slavs and Italians produced wine. Henn noted that Ouray was a natural center for these activities because of its remoteness and limited access. If Ouray was a sound location, Silverton was even better and conducted as much business. Zanoni claimed that in Silverton, small saloons and distilleries paid $25 per month to operate, large businesses provided $125, and the fees guaranteed protection against federal raids.[405]

Those workers who knew nothing other than mining faced a difficult struggle because their skills were specialized and narrow. With no better means of income, many individuals continued to mine with the lowered expectations of mere subsistence rather than finding bonanzas. They sporadically leased blocks of ground in what had been the richest properties,

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[401] Henderson, 1926: 216 for production figures; Schulze, 1977: 1920. The number of active mines was derived from a survey of Colorado Mine Inspectors' Reports.
[402] Sloan & Skowronski, 1975: 321.
[403] *Mineral Resources*, 1922, V.1: 527.
[404] "End of Pittman Silver Purchases Cut Profits Sharply," *EMJ* (12/1/23): 960; "News from Washington," *EMJ* (7/28/23): 165.
[405] Henn, 1999: 50-2; Marshall and Zanoni, 1998: 12.

secreting out small ore shoots and scraping together low-grade payrock left by previous outfits. The leases tended to be short-lived as the subsistence miners moved from claim to claim frequently. Production was limited to several tons per day. The lessees possessed resources opposite to the strategy of economies of scale. Specifically, they had plenty of time, very little capital, and expected little income, favoring hand-labor over mechanization. In an era of relatively inexpensive and readily available machinery, the prevalence of such methods effectively reversed fifty years of technological advancement, but also facilitated subsistence survival.

Another subsistence strategy was gathering low-grade ore already brought to the surface and abandoned by previous companies. While few companies willingly discarded profitable ore outright, improved milling technologies, especially flotation, rendered this material profitable. all The lessee sorted through waste rock dumps to recover formerly discarded payrock. Sorting was well-suite to these impoverished lessees because it was ready at hand and required virtually no capital or equipment except for shovels and screens. The work was not easy, though, and lessees withstood alternately wind, storms, brilliant sun, frigid temperatures, or snow. During the latter half of the 1920s, enough lessees braved the elements to constitute a small ore sorting industry focused on the formerly richest mines.

In addition to the subsistence miners, a handful of capitalized companies maintained some semblance of heavy industry in the county. They were few at the beginning of the 1920s and increased in number as general economic conditions improved during the decade. All shared similar characteristics that included proximity to transportation corridors, mines with histories of production, profitable grades of ore, and an increasing reliance on machinery. Only a few of the old mines in the county met these criteria, with the exception of the Eureka and Las Animas districts. None of the operations were trouble-free except for the Sunnyside and Mayflower, popularly known as the Shenandoah-Dives.

In 1922, ASARCo revived its subsidiary, Sunnyside Mining & Milling Company, and reopened the Sunnyside. The Sunnyside company had no intention of permanently closing after investing heavily in the property and resumed where it left off. A fortunate 162 miners were offered jobs underground and an additional fifty-four positioned at the surface plant and two mills. They produced and milled an impressive 500 tons of ore per day, double the normal average per worker. The Sunnyside was already the largest employer and accounted for nearly all the county's output, and yet the company enlarged the operation.[406]

Management understood that the high rate of production would eventually exhaust the known ore reserves and began a major development campaign in response. Most of the extant workings were on the original Sunnyside property, so the company had wisely purchased all adjoining claims in 1917 to support long-term operations. In 1922, the directors moved towards development, beginning with Ruben McNutt's old Washington. Miners started sinking the Washington Shaft with three compartments instead of the usual two to maximize anticipated production. By 1923, they reached the vein, drove development workings, and made available an

[406] Colorado Mine Inspectors' Reports: Sunnyside.

entirely new ore reserve. In response, the company increased the workforce to 360 and hired an additional 40 miners in 1926. An astounding 800 tons of ore poured out of the mine around the clock and passed down the tramway to the mill at Eureka. The amount of concentrates supported the Silverton Northern Railroad and constituted a huge percentage of the Durango Smelter's business. During 1926, the company reached production capacity and ensured its future by expanding the underground workings into most of the adjoining ground including the Gold Prince claims to the northeast and the old Mogul property to the northwest. Most of the ore was low in grade, but the company sustained operations for the rest of the decade.[407]

Although the Sunnyside was the county's most important operation, Charles Chase developed the Mayflower into a close second. Chase was convinced that in the Las Animas district, past mining operations gutted most of the high-grade ore in the upper reaches of the veins but left vast deposits of low-grade material at depth. Chase, an exacting engineer, based his educated opinion on twenty-five years of experience with deep mining in the San Juans. Born in Hartford, Wisconsin, in 1876, Chase's mining engineer father who brought the family to Georgetown during the 1880s. Charles went east to Minneapolis for schooling, graduating in 1893. He returned to Colorado, studied metallurgy at the University of Colorado, and sought work in the mining industry after graduating in 1898. Arthur Winslow hired him as surveyor and assayer at the Liberty Bell Mine at Telluride, from whence Chase became general manager. While at the Liberty Bell, Chase played various roles in the violent strikes that swept Telluride at the turn of the century. Overall, he proved responsive to reasonable union demands such as better living conditions, but he sided with the company and mine owners' association in the face of violence. When the industry slowed after the 1907 recession, Chase broadened his experience elsewhere. By the 1910s, he managed the Mogul Mining Company of South Dakota and the Primos Exploration Company's molybdenum operations at Empire, Colorado. Chase subsequently became chair of the Colorado chapter of the American Institute of Mining Engineers.[408]

As a consulting engineer in the 1920s, Chase secured a group of investors in Kansas City interested in starting a mining venture and suggested they focus on the San Juans. Surveying the areas with the greatest cumulative records of production, Chase visited the Las Animas district in 1925 and concluded that miners never reached the bottom of the low-grade veins around North Star Peak and Silver Lake Basin. Further, he found that the veins were part of a larger disseminated system. If they could be mined in economies of scale from a deep haulageway, the veins could provide returns for years.[409]

Chase contacted his Kansas City investors and found them keenly interested. Fortunately for Chase, the investors already had considerable experience with large-scale mining ventures and, in particular, James W. Oldham had organized the Wellington Mines Company, which operated one of Breckenridge's largest properties since 1906. Chase recommended that Oldham

[407] Colorado Mine Inspectors' Reports: Sunnyside; Marshall and Zanoni, 1998: 127; *Mineral Resources*, 1923: 636.
[408] Stone, 1918, V.2: 91; Reuben O. Norman, *Who's Who of Denver 1931-1932* (Denver: The Blue Book Company, 1932): 47.
[409] Charles A. Chase, *Shenandoah-Dives and North Star Mines 1925*.

and associates fund exploratory work at the North Star to confirm the continuation of the veins, and, if the hypothesis held true, that they acquire the mines around North Star Peak.[410]

Meanwhile, Chase planned a mining operation on the same scale as the Sunnyside. He consulted with engineer O.R. Whitaker to confirm his supposition that the North Star claims could only be accessed from underneath via a long haulage tunnel. The Mayflower was an ideal candidate because it already had a tunnel at low elevation, a location suitable for a tramway down to a mill on the Animas River. The tunnel would have to be lengthened to 5,000 feet to undercut North Star Peak, which presented the drawback of a high cost. Whitaker estimated that driving the Mayflower Tunnel would require eighteen months and $400,000, close to $4 million today. The investors did not flinch, however, and moved forward at once. In 1926, they organized the Shenandoah-Dives Leasing Syndicate and authorized Chase to buy the North Star, Shenandoah, Dives, and Mayflower mines.[411] Besides the location, Chase recognized that the Mayflower possessed several qualities that would save the organization capital. First, the tunnel already offered a small surface plant that could support underground work from the outset. Second, the tunnel accessed several veins capable of providing immediate income. Third, the tramway was serviceable and would carry ore down to the Iowa Mill, which Chase leased in 1928. Oldham and associates were pleased with Chase's careful planning. For the next several years, two crews of miners drove the Mayflower Tunnel toward North Star Peak and extracted 100 tons of ore per day from the existing veins. They sent the material down to the Iowa Mill, which also received ore from the Colorado-Mexico Mining Company, which had leased the Iowa workings since 1926.[412]

In 1929, the financial crash destabilized the economy again, and the situation in San Juan County worsened. Financial experts at first thought that market sectors were merely undergoing short-term adjustments, but as bank security and stock values continued to slide downward, they forecast a recession similar in scale to 1907. Between September and November, however, a financial panic pushed the nation into the Great Depression. All aspects of business and commerce imploded, thousands became unemployed, capital evaporated, and goods and services were curtailed or became no longer available. Under President Herbert Hoover, the nation's economic climate worsened through the early 1930s. Industry came to a standstill, and the prices for silver and industrial metals dropped to new lows. Silver fetched a mere $.29 by 1931. At the same time, copper decreased to $.11 per pound and lead to $.05 per pound.[413]

The Great Depression was unlike any economic bust that San Juan County or the nation had experienced. Few if any mining companies could pay their operating costs, let alone realize a profit. The Sunnyside suspended work in 1930. The county was devastated. Not only did the region lose most of its income, but now at least 30 percent of its residents were unemployed. Other principal mines closed. The abrupt halt to mining caused a ripple effect that worsened

[410] Chase, 1925; "Mining News," *EMJ* (10/30/20): 885; Weed, 1918: 711.

[411] Chase, 1925; Colorado Mine Inspectors' Reports: Mayflower; O.R. Whitaker, *Report on Shenandoah-North Star-Terrible-Mayflower Group* 1926.

[412] Colorado Mine Inspectors' Reports: Iowa, Mayflower; *Mineral Resources*, 1928: 855.

[413] *Minerals Yearbook*, 1937: 115; Saxon, 1959: 7-9, 14-7.

already poor conditions. With almost no freight traffic, the Denver & Rio Grande Extension reduced service between Silverton and Durango, and James Pitcher mothballed the Silverton Northern in 1930. ASARCo declared that it would close the Durango Smelter because the volume of business was insufficient to pay for the operating costs. By 1931, without a smelter, the little mining that survived ceased.[414]

The Shenandoah-Dives Mining Company, in the Las Animas district, was the only outfit to continue as the depression deepened. Prior to the crash, Chase contracted with Stearns-Roger to build a mill that rivaled the Sunnyside facility in size across the river from the Silver Lake facility. He also hired engineer Frederick C. Carstarphen to build a tramway between the mine and mill.[415]

The unique Carstarphen tramway drew industry attention. In broad form, the system operated like the Bleichert tramways that proliferated throughout the San Juans, but the set of towers and means of powering the traction cable differed. To save construction costs, minimize maintenance, and increase longevity, Carstarphen erected eleven steel towers instead of more numerous timber structures. In the upper terminal, the traction cable did not wrap around a giant sheave wheel, but instead made several ninety-degree bends around small pulleys powered by two motors. Approximately two miles in length, the Carstarphen Tramway was the longest operating system in the San Juans and transported buckets around the circuit in only forty-five minutes.[416]

When the Great Depression struck, the mill and tramway were almost finished, leaving Oldham and associates in a difficult position. Chase required more capital before he could produce ore in the economies of scale necessary to offset the declining value of silver. If Oldham and associates balked, they stood to lose the investment up to that point. Oldham and associates gritted their teeth, provided the funds, and waited for Chase to bring his vision to completion. In 1930, Chase finally began operating the mine and mill as a single ore production entity. A crew of fifty miners generated hundreds of tons of ore per day and another thirty-five workers provided support services and ran the mill. Profitability, however, remained elusive because the value of silver was half of the price that Chase used for his economic calculations in 1925.[417]

The difficult conditions required Chase to scrutinize all operating costs and efficiency measures. He personally inspected the mine and mill and constantly improved operations. During one visit to the machine shop, Chase discovered workers leaving broken domestic items for the repair when the opportunity arose. Over time, this practice had snowballed such that it was unclear how Chase might react. However, Chase congratulated a worker on an efficient use of time and the importance of the service. Chase understood that the Mayflower Mine was also a major community institution.[418]

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[414] Sloan and Skowonski, 1975: 335; Smith, 1992: 114.

[415] Dawn Bunyak, *Frothers Bubbles and Flotation: A Survey of Flotation Milling in the Twentieth Century Metals Industry* (Denver: 1998): 59, 63; Colorado Mine Inspectors' Reports: Mayflower; *Mineral Resources*, 1929: 954; *Mineral Resources*, 1930: 1072.

[416] Bunyak, 1998: 60-2; Colorado Mine Inspectors' Reports: Mayflower.

[417] Colorado Mine Inspectors' Reports: Mayflower; *Mineral Resources*, 1929: 954; *Mineral Resources*, 1930: 1072.

[418] Wyman, 1993:71.

Las Animas Mining District

To the residents of Silverton and Howardsville, every mining operation in the Las Animas district was essential and three revived ventures were welcomed during the 1920s. Joseph E. Dresback organized to take over the Highland Mary Mine when the Mears and Slattery syndicate ended its lease. While relatively young, Dresback was a trusted local businessman. Born in Bellevue, Ohio in 1891, Dresback came with his family to Silverton as a boy. In 1909, he took a job as clerk in the First National Bank of Silverton, then worked as an agent for Mears' Silverton Northern Railroad beginning in 1914. Dresback joined the army and went to Europe during World War I, returning in 1919 to marry. Dresback revived his railroad career and replaced C.W. Montgomery as auditor of Mears' railroads. Four years later, he was appointed manager of the Silverton Northern.[419] Because the Highland Mary Mine was vast, Dresback assumed that he could still find fresh ore in the underground workings. In 1923, he organized the Highland Leasing Company, put a small crew to work bringing low-grade ore out of old stopes, and began an examination for new veins. The company kept ten miners busy through 1927.[420]

C.H. Smith, J.E. Storey, and F.P. Despain held the same optimistic outlook about the Lackawanna Mine. In 1926, the three Utah investors organized the Lackawanna Mining Company and hired a crew of ten to rehabilitate the surface plant and underground workings for production. Instead of immediately extracting ore, however, they waited to build a concentration mill. Upon completion in 1928, the mill was equipped with flotation to treat the Lackawanna's complex ore. Initially, the mill generated enough concentrates to justify a shipment to the Durango Smelter.[421]

The Little Nation Mine was one of the few operations that not only weathered the previous collapse, but thrived. In 1923, the Little Nation Mining Company pursued plans to make the mine a sound producer. Within a year, the company built a new mill on the north edge of Howardsville, completed an aerial tramway, and developed the Royal Charter Vein, the principal ore body. The mill featured a modest conventional flow path and flotation, a combination known to work on the area's complex ore. The mill, however, did not recover the ore's metal content as expected, and manager A.G. Marsh concluded that it would have to be refitted. The investors would part with no more capital, however, forcing Marsh to suspend operations in 1924, which contributed to growing pessimism in the Animas River drainage.[422]

In 1927, William Way, a Silverton lawyer who had leased the Lackawanna in 1917, eyed the idle Little Nation. He felt that with proper management and close attention to the

[419] Sloan and Skowonski, 1975: 320; *Who's Who in Colorado: A Biographical Record of Colorado's Leaders in Business, Professional, and Public Life* (Boulder: Colorado Press Association, University of Colorado, 1938) 1032.
[420] Colorado Mine Inspectors' Reports: Highland Mary; *Mineral Resources*, 1923: 637; *Mineral Resources*, 1926: 761; *Mines Register*, 1937: 409.
[421] Colorado Mine Inspectors' Reports: Lackawanna; Horn, 2004; *Mineral Resources*, 1928: 856.
[422] Colorado Mine Inspectors' Reports: Mermac; *Mineral Resources*, 1923: 637; *Mineral Resources*, 1924: 566.

concentration process, the mine would pay. Way interested F.J. Bruening and Dan Harroun in a lease and they hired a crew of eighteen. The operation started well, but shut down after a year.[423]

In the Las Animas district, most mining companies and lessees active during the Great Depression tried their best to maintain operations and wait for a recovery. In 1928, E.A. Hiett, president of the Highland Mary Mining & Milling Company, had decided that the company would work the Highland Mary and no longer lease the property out. Immediately after Hiett brought the mine into production, the economy forced him to curtail operations. He maintained a small crew through 1930, when he reluctantly suspended operations.[424] In 1929, William Way and partners tried again with the Little Nation Mine, on the assumption that the economy would improve. However, not only did economic conditions worsen during 1930, metals values continued to fall. Way suspended operations in 1931.[425]

Eureka Mining District

In the Eureka Mining District, all the principal companies, except for the Sunnyside, suspended operations pending better times. The wait was too long for many, who dissolved by the mid-1920s. A few companies with patient investors retained one or two workers, employed largely to provide security and prevent equipment theft. When the economy recovered later, a few companies reopened several of the Eureka district's most important producers, particularly in Cunningham Gulch. When the Great Depression descended, mining companies and lessees tried their best to maintain operations. As the situation worsened, those outfits with debt were unable to meet their obligations and disappeared.

The northern portion of the Eureka district was quiet except for the Mountain Queen, among the mines brought back into meaningful production after the early 1920s collapse. In 1924, Mike Babich, Pete Dunk, and A.R. Walker leased the property, brought in their own equipment, and unwatered the shaft in preparation for production. By secreting out small ore chutes and extracting fill from old stopes, they generated around five tons of ore per day. Even though the mine was largely exhausted after forty years of intermittent activity, they found enough payrock to sustain the lease for three years before moving.[426]

The Buffalo Boy reopened concurrently with the Mountain Queen. In 1925, the Vertex Mining Company signed a lease, hired a crew of twenty-five, and invested capital to modernize infrastructure. The company installed an air compressor underground and provided workers with a boardinghouse equipped with a rare hot-air furnace. For three years, Vertex enjoyed sound production of medium-grade ore with significant profits going to shipping and smelting. Thus, in

[423] Colorado Mine Inspectors' Reports: Mermac; *Mines Register*, 1937: 810; *Mineral Resources*, 1927: 559.
[424] Colorado Mine Inspectors' Reports: Highland Mary; *Mineral Resources*, 1929: 954.
[425] Colorado Mine Inspectors' Reports: Iowa, Mermac; *Mineral Resources*, 1929: 855; *Mineral Resources*, 1930: 1072
[426] Colorado Mine Inspectors' Reports: Mountain Queen.

1929, the company built a mill at the mouth of Stony Gulch, the seed for a major improvement campaign. The mill featured flotation to ensure the efficient recovery of gold, silver, lead, and zinc. Vertex commissioned a tramway to lower the payrock to the new mill, a boardinghouse, and new surface facilities. Like Chase and the Mayflower, these plans were under way when the economy collapsed in 1929, and Vertex finished the costly improvements probably under the presumption that the economy would correct itself within a short time. Vertex brought the mining and milling combination into full production in 1930 only to suspend as metals prices tumbled.[427]

The Pride of the West Mining Company leased the Pride of the West in 1916, enjoyed heavy production until 1921, and then scaled back and waited for conditions to improve for the mining industry. By 1926, the company directors lost interest and failed to renew the lease. C.M. Lane saw value in the Pride, Garry Owen, and Old Hundred, and assembled the properties. In 1928, Lane organized the Pride Mining Company and prepared each property for heavy production. At the Pride, he financed a new mill at the lowest tunnel and linked the upper tunnels via tramway. At the Old Hundred, Lane directed a crew of ten to refit the mill with flotation and develop the vein. At the Garry Owen, a larger workforce repaired the surface plant and built a new tramway to Old Hundred Mill. Lane now controlled the three mines, as many tramways, two mills, and a powerhouse.[428] When the Great Depression began, Lane's empire crumbled under debt. He relinquished the lease on the Garry Owen and Old Hundred and turned the Pride over to the Altamont Mining Company. Both outfits attempted to produce through 1930 and then suspended.[429]

In 1928, Samuel Martin reappeared and perpetrated another investment scheme. Under the Treasure Mountain Gold Mines & Power Company, he acquired the so-called Martin Group near Middleton and promoted a tunnel project that he claimed would open up vast ore reserves. Martin forecast that the mine would yield enough ore to justify an electric trolley to haul the material to Middleton. Martin hired a workforce of fifty to build a substantial surface plant at the mouth of the Martin Tunnel. Martin intended for the surface plant to inspire confidence among investors and not to support work underground, which was the actual purpose of a surface plant. As proof, there was no work underground to support because the Martin Tunnel never progressed more than around 20 feet in length. The workers labored seasonally until 1929, when the economic collapse preceding the Great Depression exposed Martin's fraud.[430]

Great Depression Era Revival, 1933 – 1939

In 1932, Franklin Delano Roosevelt was elected president and the next year launched a variety of programs to revive the nation's economy. A year later, Roosevelt and advisors devised

[427] Colorado Mine Inspectors' Reports: Buffalo Boy; *Mineral Resources*, 1929: 953; *Mineral Resources*, 1930: 1073.
[428] Colorado Mine Inspectors' Reports: Garry Owen, Old Hundred, Pride of the West; *Mineral Resources*, 1929: 953.
[429] Colorado Mine Inspectors' Reports: Garry Owen, Old Hundred, Pride of the West; *Mineral Resources*, 1930: 1073.
[430] Colorado Mine Inspectors' Reports: Martin Group.

a plan intended to simultaneously devalue the dollar while reviving metals mining on a broad scale. The dollar was taken off the gold standard and the Federal Reserve bought gold at inflated prices. The plan stimulated gold mining as expected. In 1934, Roosevelt signed into law the Gold Reserve and Silver Purchase acts in hopes that they would resuscitate mining. The Gold Reserve Act raised the price of gold from around $20.67 to $35.00 per ounce and the Silver Purchase Act raised the value of silver from around $.48 to $.70 per ounce.[431]

Roosevelt's plan, combined with widespread destitution, unemployment, and New Deal programs, stimulated a revival of mining across the west. Experienced miners reopened properties known to still possess ore, and inexperienced laborers formed an operational workforce. Adding to the growing interest, advances in milling technologies rendered previously uneconomical ores profitable. Thus, mining companies began producing low-grade ore, but not with the expectation of high profits. Instead, they were satisfied with subsistence. Overall, the revival was minor compared to decades past, but the west, including Colorado, witnessed a return to the old mining districts on a scale not seen since World War I.

San Juan County responded slowly to improved conditions and incentives instituted by the Roosevelt administration. Few individuals with the resources for meaningful development took interest in abandoned properties. As the decade progressed, conditions improved just enough to resuscitate the industry and allow the county to join the rest of Colorado in its Depression-era mining revival. The demand for industrial metals increased slightly as some manufacturing resumed. Investors more freely funded mining ventures, seeking security in gold, which some of the county's mines were known to have produced in high volumes.

Statistics reflect how the county responded to the Depression-era revival. In 1933, the county generated $742,000 worth of ore, which increased to a substantial $2,323,000 by 1938 before declining. These figures indicate the county's overall production trends, but are slightly skewed because the Shenandoah-Dives alone contributed disproportionately more than the rest of the county's mines combined. The number of mines active during the 1930s better reflects the trend that the industry followed. Between 1930 and 1933, before Roosevelt's programs, there were five substantial prospects, ten small mines, two medium-sized operations, and the Sunnyside and Shenandoah-Dives mines as the large producers. When the Sunnyside closed in 1930, the Shenandoah-Dives was the only significant operation remaining. Between 1934 and 1939, numbers tripled to eight prospects, twenty-eight small mines, eight medium-sized operations, six large producers, and several placer mines. Despite the increase, county population declined significantly. The county had 1,900 residents in 1930 and only 1,400 in 1940.[432]

The strong interest in gold inspired ventures that varied widely in scale and sophistication. Some of the older miners searched their memories to recall likely sources of gold. Those without capital considered the idle mills that specialized in separating the gold content from ore whose leftover concentrates might be an easy source of the metal. In 1932, Forest Goody used a placer machine to recover gold from tailings at the Gold King Mill. Two years

[431] Robert S. McElvaine, *The Great Depression: America, 1929-1941* (New York: 1993): 164; Saxon, 1959: 7-8, 12, 14, 16.
[432] Schulze, 1977: 1930; Schulze, 1977: 1940. The number of mines was derived from a survey of Colorado Mine Inspectors' Reports.

later, unemployed individuals prospected the Silver Lake Mill site with some success. Other miners returned to the impoverished gold placers around Eureka and in Cunningham and Arrastra gulches and gleaned gold. Organized companies joined the return to placer mining and in 1934, rehabilitated the Buffalo Placer near Eureka with hydraulics.[433]

In terms of established hardrock mines, the Shenandoah-Dives continued to be the foundation of the county's economy and its largest employer. Chase's miners consistently proved that the veins under North Star Peak featured more low-grade ore at greater depths than previously suspected. Chase believed the Silver Lake Basin offered similar deposits, and that they would significantly increase the available reserves of payrock and hence extend the life of the mine. In 1937 or 1938, he commissioned the Silver Lake Cross Cut, intended to encounter the Silver Lake Vein first, followed by other mineralized formations. Miners bored the crosscut around the clock for several months before trouble swept the Shenandoah-Dives company.[434]

Chase had tried to reduce operating costs by demanding concessions from the workforce, but the miners and mill workers were unwilling to concede. The parties came to a stalemate in 1939, and the workers, who were thoroughly unionized, threatened to strike, which would have been disastrous to both sides. Chase figured that the threats were idle, and if not, such an action would be short-lived because the miners had no other hope of employment. He miscalculated, and the entire workforce struck in June and shut down the mine. Although unintentional, this caused independent companies that relied on the Mayflower Mill for custom concentration to falter. Residents in the county became polarized, but because Shenandoah-Dives miners and their sympathizers made up a majority of the population, the strike continued through the summer. Backed by investors with deep pockets, Chase waited out the workers fearful of losing their jobs. By the end of summer, the workers grew tired of their reduced union compensation and voted to return to work with no concessions. The union flexed its muscle, but Chase was now free to resume production on a greater scale then ever.[435]

By 1940, Chase's miners finally reached the Silver Lake Vein after thousands of feet, and the vein not only featured ore, but some of the material was higher in grade than expected. Chase originally had a lease agreement with ASARCo, and when ASARCo realized just how much ore Chase found, the company became keenly interested in mining its own property. Adept at business as well as mining, Chase secured a reverse lease arrangement where ASARCo paid him to use the Mayflower Tunnel as a point of access for the Silver Lake ground. The deal was a good one for Shenandoah-Dives. ASARCo provided royalties, maintained the crosscut, drove additional development workings, and assumed the financial risks should the Silver Lake and adjacent veins not pan out as hoped. The contract provided the Shenandoah-Dives company with income for eight years.[436]

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[433] Colorado Mine Inspectors' Reports: Gold King; *Minerals Yearbook*, 1935: 229, 231; *Minerals Yearbook*, 1936: 268.
[434] Colorado Mine Inspectors' Reports: Mayflower.
[435] *Durango Herald Democrat* (6/29/39); *Minerals Yearbook*, 1940: 277; *Silverton Standard* (7/14/39).
[436] Colorado Mine Inspectors' Reports: Silver Lake; *Minerals Yearbook*, 1942: 340.

The Silver Lake Crosscut was important for several reasons in addition to improving the profitability of the Shenandoah-Dives company. The passage increased ore production contributing to the local economy at a critical time. As the Great Depression dragged on, the meager revival in the county began to wane as miners cleaned out the last vestiges of ore from the handful of properties in production. For a brief time, it appeared that the Sunnyside Mine would fill the void left as independent mines began to close.

In 1937, the Sunnyside company announced that it was reopening its enormous mine, which created a furor of excitement. The company hired a crew of 177 workers, to prepare the surface facilities and underground workings. By September, the mine generated so much ore that it attained the status of Colorado's largest gold producer for 1937. The company did not convey, however, that the accessible ore reserves were almost gone and extensive work required to develop more. Imitating Chase, the company commissioned a deep tunnel from Eureka to undercut the entire property from the lowest elevation possible, but such a project required years. The existing ore bodies would not last that long at the current rate of production, and were in fact gutted within two years. The Sunnyside company was unwilling to pour money into the tunnel without returns from the rest of the mine. In 1939, as soon as the ore was gone, the company laid off the workforce, suspended the deep tunnel, and permanently closed the mine.[437]

The trend that the mining industry followed during the early 1940s originated in the Depression-era revival. Beginning in 1939, the county saw a wave of mines close because there was no longer enough low-grade ore even to sustain subsistence. And yet, from a broad perspective, the county's production figures remained deceivingly high because of the outstanding efficiency of the Shenandoah-Dives company. Depending on sources, by 1941, the county featured between ten and twenty-four active mines that produced less than $100,000 in metals, not including the Shenandoah-Dives. These figures did not fill ASARCo with confidence that it would be able to reopen the idle Durango Smelter. ASARCo mothballed the smelter at the beginning of the Great Depression due to a lack of ore and patiently waited for mining to resume. When the volume of ore and concentrates did not increase, the company dismantled the smelter in 1941. Although the smelter had been idle for years, its loss assured that the possibility of another meaningful revival was remote.[438]

Las Animas Mining District

For much of the county's history, the Las Animas Mining District seemed to offer endless ore reserves. In reality, however, the most extensive ore reserves lasted around fifty years, already an impressive span of time. But when the Great Depression began, nearly all veins had been exhausted of even their low-grade payrock, leaving little even for subsistence mining. Because of this, nearly all mines remained quiet and the Depression-era revival passed the

[437] Burbank and Luedke, 1969: 56; Colorado Mine Inspectors' Reports: Sunnyside; *Minerals Yearbook*, 1938: 276; *Minerals Yearbook*, 1939: 303.
[438] A survey of Colorado Mine Inspectors' Reports suggests ten active mines, although the 1941 *Minerals Yearbook* (p. 298) claims the figure was twenty-four.

district by. And yet, several properties seemed to offer enough potential to interest several successful ventures.

One was the Mabel, whose gold ore had been forgotten since around 1890. The mine was small and isolated in Deer Park at the district's southwestern corner. F.R. Steelsmith and others examined the property and found that the free-gold ore was largely gone, but the complex material would be profitable if a mill could be erected at the site. Building a mill was a challenge, however, because the mine was accessible only via pack trail. In 1933, Steelsmith organized the San Juan Mining Company and bought the property. In 1934, the mining crew used mules to drag in the components for a compact but highly functional surface plant and a small mill powered by a gasoline engine. The following year, manager J.B. Tusant began operations, and the mill recovered some gold bullion and generated concentrates. The workers returned on a seasonal basis until the mine finally closed in 1940.[439]

Concurrently, C. Lorimer Colburn examined the Trilby Mine at the mouth of Dives Basin. Dan McLean was the last to work the property around 1917. Colburn understood that some deep veins offered enough gold to support a limited operation, and he was careful not to stray into the adjoining claims purchased by Charles Chase. Colburn was a trained engineer who spent much of the 1910s working for the Bureau of Mines. In 1934, he returned to private industry as president of the Highland Mary Mining & Milling Company. Colburn entertained the idea of reopening the Highland Mary as well, but remained unable to convince his backers. In 1936, Joseph M. Bradley replaced Colburn as president and had better luck convincing investors. Either Bradley or Colburn, who remained as engineer, offered them a plan to extract ore from the Trilby and apply the proceeds to the Highland Mary. Bradley hired a large crew who rehabilitated the surface plant, upper workings, and portions of the lengthy Innis Tunnel. By 1939, Bradley brought the Highland Mary back into production and trucked the ore to the Mayflower Mill for concentration.[440]

As the company's situation improved, Bradley instituted several improvements to lower operating costs. He insisted on a new mill to prevent profit loss by sending the ore to the Mayflower. Bradley also found that the best ore was located in the mine's midlevel workings, which had no direct connection with the surface. Instead, miners had to haul the payrock out through a maze of passages and then down to the proposed mill. This inefficiency could be remediated by a new tunnel bored directly into the midlevel workings. In 1940, Bradley refit the existing mill with modern equipment, and the metallurgist proved his expertise by designing a facility that successfully recovered metals from the start. Bradley bored the new Bradley Tunnel and built a tramway down to the mill. By year's end, the operation was in full production and assumed the role of one of the county's most important mines.[441]

[439] Colorado Mine Inspectors' Reports: Maybell; *Mines Register*, 1937: 830.
[440] Colburn, 1936; Colorado Mine Inspectors' Reports: Highland Mary; *Mines Register*, 1937: 409.
[441] Colorado Mine Inspectors' Reports: Highland Mary; *Minerals Yearbook*, 1941: 311.

Eureka Mining District

After more than fifty years of activity, the Eureka district mines were bankrupt of easily accessed payrock, and few outfits were willing to risk the capital required to extract the meager amounts of ore that lay deep in the underground workings. As a result, the Eureka district was relatively quiet during the Depression-era revival, except for the principal mines on the east wall of Cunningham Gulch. The Green Mountain had been quiet since the late 1910s, but the Pride of the West was never fully abandoned. When the Great Depression began, owner A.W. Harrison kept several miners employed maintaining the property and conducting minor work underground to maintain title to the claims. Thomas B. Stearns and Tyson S. Dines were aware that both mines still possessed gold ore, and because they were adjoining properties on the same general ore system, the two mines could be worked as one. Dines backed several companies during the World War I revival and acquired a number of mines in the district during the 1920s. Stearns lived in Denver, invested heavily in mining during the Great Depression, and had ample resources from his connections with the machinery manufacturer Stearns-Roger. When President Roosevelt signed the Gold Reserve Act into law in 1934, the partners quickly organized Pride of the West, Inc.

The new company hired sixteen miners who conducted the usual rehabilitation work and built a new tramway to a loading station on the road to Howardsville. Within the year, they started trucking ore to the Mayflower Mill while metallurgists attempted to refit the mill that a predecessor company erected in 1928. By 1936, the company finished the mill and pulled the Green Mountain into the operation. Crews divided among the two mines generated thirty tons of ore per day from the Green Mountain and fifty at the Pride. The company eagerly anticipated running the refitted mill at capacity, but the troublesome ore of Cunningham Gulch thwarted efficiency, even with flotation. Dines directed miners to ship the payrock to the Mayflower Mill while an engineer resolved the metallurgical issues. By 1938, miners exhausted the ore worth shipping, and Dines suspended further work until the mill was back on line.[442]

The answer to the ore problem was clear but costly. An entirely new set of machinery was required, and the metallurgist recommended building a dedicated mill anew instead of adapting the existing plant at the Pride. Dines and Stearns decided that if they were going to pay for a new mill, they would offset the cost by soliciting custom concentration in addition to processing payrock from their own operation. For this reason, they chose Howardsville as the site, and Dines reorganized the company in 1940 to allocate capital.[443] The Pride company pushed mill construction through 1940. When tested, it was so well-engineered and orderly, the local mine inspector came away impressed after an examination. To make up for lost time, the company resumed heavy production and ran the mill at capacity. The operation passed into World War II as one of the county's largest producers.[444]

[442] Colorado Mine Inspectors' Reports: Pride of the West.
[443] Colorado Mine Inspectors' Reports: Green Mountain, Pride of the West.
[444] Colorado Mine Inspectors' Reports: Pride of the West.

While Dines and Stearns prepared to work the Pride of the West in 1934, John Gilheany watched from above while he did likewise at the Philadelphia upslope. The Philadelphia lay dormant for decades, until Gilheany signed a lease in 1934, began limited operations, and shipped ore to the Mayflower Mill. He reinvested some profits in improvements, which allowed him to bring yet more payrock out of the workings. By 1936, Gilheany doubled his crew to eight and maintained sound production through 1940, when work suspended.[445]

In 1934, Charles H. Kimball of West Virginia, backed by investors from Pennsylvania, purchased the Old Hundred Mine with the expectation of high returns. They organized the Old Hundred Gold Mining Company, bringing the old, upper workings into production first and applying the income toward developing the lower reaches of the vein. In 1935, the company hired a workforce of ninety, rehabilitated the entire property, built new buildings at the lower tunnel, and engaged in exploration. When the company deemed the mine was ready, fifty miners generated payrock while thirty workers ran the mill and surface facilities. In 1937, the operation collapsed, due to insufficient ore.[446]

In addition to old mines, several organizations from the district's past resuscitated during the Depression-era revival. The increase in gold and silver values brought Edmond C. Van Diest to reconsider the Fredericka and Ridgeway mines, which he initially developed during the early 1900s under the Eureka Exploration Company. Van Diest reorganized the outfit as the Metals Exploration Company, and in 1936 worked first the Fredericka and then the Ridgeway. The Fredericka was a short-lived affair that lasted for one year. The Ridgeway was more intensive and represented the emerging trend for companies to sort waste rock without ever reopening a mine's underground workings. In 1937, W.C. Service established the Ridgeway Gold Mining Company and leased the Ridgeway exclusively to recover low-grade ore from the waste rock dump. Service found that there was enough material to justify a tramway, which extended one mile to the road in Maggie Gulch. By 1938, Service ran out of waste rock and reopened the underground workings after all. He shipped 10 tons of payrock to the Mayflower Mill per day through the rest of the year.[447]

C.R. Walker reopened the Mountain Queen according to a similar pattern. In 1938, he leased the property from owner Tyson Dines, bulldozed an access road, and hauled off waste rock as low-grade ore. When this was gone by 1940, Walker hired five miners who installed a hoisting system and reopened the shaft. In 1941, they conducted exploration and found stringers of ore missed during the mid-1920s. These small chutes sustained minor production into World War II.

Mineral Creek Mining District

Although Silverton was center to the county's mining industry, it was unable to legitimately claim the title of true mining town until the 1890s, when the large mines on Sultan

[445] Colorado Mine Inspectors' Reports: Little Fannie.
[446] Colorado Mine Inspectors' Reports: Old Hundred; *Minerals Yearbook*, 1937: 333.
[447] Colorado Mine Inspectors' Reports: Fredericka, Ridgeway.

Mountain employed armies of miners who established residence there. In 1920, the mines closed and workers moved on, but Silverton remained a mining town in spirit. In 1935, Silverton reclaimed its status when Warren C. Prosser reopened the Hercules and North Star properties.

Prosser was an experienced mining engineer who worked in Colorado, and especially the San Juans, over several decades. He was also a gifted writer and contributed articles regularly to mining periodicals. He understood the difficulties of mining in San Juan County, especially how problematic the ore was, and yet he bought one of the most troubled properties. In particular, Prosser purchased the North Star after it closed in 1921. At the end of the decade, he organized the North Star-Sultan Mining Company and gradually rehabilitated the Sultan Tunnel, surface plant, and mill. His goal was to make the mine attractive to lease, but the Great Depression delayed interest.[448]

In 1934, with the values of gold and silver high, Prosser organized the Mystery Gold Mining Company and bought the adjacent Hercules complex. The North Star had surface facilities and an operational mill, and the Hercules greater potential to offer ore. Prosser aggressively pursued the lease idea, hired a large workforce, and began developing both properties through the Sultan and Hercules tunnels. In 1936, Prosser added the Little Dora and expanded his project to include linking all three mines.[449] Prosser leased out blocks of ground as quickly as his miners could condition them. In 1936, Intermountain Shares, Inc., managed by Bill Rich, worked the Wheal Alfred Mine with great success. At the same time, the Culver Leasing Company, backed by Dale Culver, produced soundly from the Little Dora and Hercules veins. Small parties worked other sections, and Prosser's own miners also produced regularly. In 1939, Roy Blakely sorted through the waste rock dump at the Empire Tunnel for low-grade payrock. None of these outfits, however, including Prosser's, remained operational by 1940.[450]

A handful of other ventures scattered elsewhere in the Mineral Creek district provided employment and some ore during the Depression-era revival. Since 1927, J.E. Carney and Thomas H. Woods tinkered with the Brooklyn, on the west side of Anvil Mountain, and hoped to bring the property into production some day. In 1935, Carney and Woods established the Brooklyn Mining Company, improved the surface facilities, and began shipping payrock. By 1936, they were successful until miners brought out the last of the ore in 1941. The Bonner joined the Brooklyn in 1936, producing regularly until 1940. Otto Anesi was the first to work the Silver Ledge since it closed in 1920. With little capital, he was unable to unwater the shaft, however, and was limited to the mine's upper levels. He generated small amounts of ore in 1939 and 1940. The Bandora Mine was still owned by the Sullivan family, which leased the remote property to Wilbur Maxwell & Associates in 1936. Maxwell rehabilitated the mine, produced payrock, and then turned the property over to the Blanco Mining Company in 1938. Blanco realized minor profits until 1940.[451]

[448] Colorado Mine Inspectors' Reports: North Star.
[449] Colorado Mine Inspectors' Reports: Little Dora, North Star.
[450] Colorado Mine Inspectors' Reports: Little Dora, North Star.
[451] Colorado Mine Inspectors' Reports: Bandora, Brooklyn, Silver Ledge; *Minerals Yearbook*, 1937: 333; *Minerals Yearbook*, 1941: 311.

World War II, 1941 - 1945

During the early 1940s, a combination of domestic and international events created a socio-economic environment that made mining perhaps even more difficult than during the Great Depression. The world slipped into war just as the United States showed signs of a long-awaited economic recovery. The improving economy coupled with mobilization for another sweeping conflict fostered a renewed demand for industrial metals and other minerals. On the surface, this seemed to offer the mining industry hope for a recovery. When the United States was drawn into World War II following the December 7, 1941 attack on Pearl Harbor, the federal government initiated programs to organize and control economic, material, and labor resources for the mobilization effort. With domestic resources of supreme importance, the government passed legislation addressing mining. War Production Board Ruling L-208, much to the dismay of mine owners across the west, mandated suspension of gold mining by October 1942 on grounds that it did not contribute to the war effort. Other legislation addressed the values of those metals sanctioned by the government. When the United States entered the war, the value of industrial metals and silver ascended to record levels, such that the War Production Board placed price caps to prevent profiteering. Finally, the Reconstruction Finance Corporation and Smaller War Plants Corporation, federal agencies, provided low-cost loans to mining companies willing to reopen idle mines and prospect for new metal deposits.[452]

The three rulings were not necessarily beneficial to San Juan County. Without being able to produce gold, many mining operations suspended work. Others skirted the issue by claiming their focus was industrial metals and any gold realized was a byproduct. Companies merely had to demonstrate that their ore possessed high percentages of industrial metals, which many did. The low-cost loan program had little impact locally, because few, if any, companies used the program to reopen mines, suggesting that the ore was impoverished. Price caps had the greatest impact, diminishing financial incentive to produce ore. As a result, World War II was not a time of recovery for the county as it was for other mining regions in Colorado, and in fact the industry regressed from the previous period. Between 1942 and 1945, the county possessed only two prospects, nine small outfits, four medium-sized mines, and two large producers, one-third the outfits operational during the Great Depression. Ore production, largely from the Shenandoah-Dives, increased slightly. Government statisticians noted that nationwide production of gold and silver fell to their lowest points since 1935.[453]

The Shenandoah-Dives, Highland Mary, and Pride of the West mines were the three largest producers in the county during the war. Not only did their operators contribute the bulk of the county's output, but they anchored the rest of the industry. In particular, each company ran a concentration mill and accepted ore from independent outfits on a custom basis. In so doing, they filled the void created when the Durango Smelter closed. Concentrates subsequently shipped by

[452] *Minerals Yearbook*, 1942: 80; Saxon, 1959: 17.
[453] *Minerals Yearbook*, 1942: 79. The number of active mines was derived from a survey of Colorado Mine Inspectors' Reports.

rail to the Golden Cycle Smelter in Colorado Springs or to the A.V. plant in Leadville. Without local ore treatment, the handful of independent companies may not have been able to remain in business.

The Shenandoah-Dives continued as the most important county employer, with the Highland Mary a distant second. Charles Chase ran the Shenandoah-Dives like the ore factory that it was. Joseph Bradley pursued a similar course at the Highland Mary on a smaller scale. The Pride of the West was among those mines that realized profit from gold but was able to continue production because its ore met War Production Board criteria for industrial metals content. Manager Fred A. Brinker maintained maximum production and in 1942 reopened the Green Mountain. To accommodate the higher volume of ore, Pride of the West, Inc., increased capacity at the mill at Howardsville. During the war, the company employed around sixty workers and processed 100 tons of ore per day.[454]

Previously quiet, the Cement Creek drainage attracted renewed interest. The Lark, a small mine on the west side of the drainage near the Henrietta, saw only minor development until World War II. In 1943, William H. Steel realized that the Lark Vein still offered ore and leased the property. Steel bulldozed a road to the Lark and began production with little preparatory work. He utilized the income and capital from the Lark Mining Company to buy the property, build surface facilities, and drive a lower tunnel. In 1944, the tunnel, linked with the rest of the underground workings and enjoyed a sound yield for the rest of the war.[455] The Lead Carbonate, amid the peaks east of Gladstone, also had escaped significant development during the previous sixty-five years of mining in the county. In 1940, owner Vaughn Jones reopened the tunnel and brought it into minor production, but suspended when the war began. He improved the surface plant in 1944 and began production on a meaningful scale. Jones continued through 1945, when he sold the property.[456]

Post-World War II Recovery, 1946 – 1954

The end of World War II marked a major turning point in the United States, a period of almost unrivaled prosperity. The economy soared as returning soldiers engaged in consumerism; coupled with post-war construction; and a nascent Cold War, which fostered demand for industrial metals on a huge scale. In theory, this climate should have stimulated mining. The increased value of metals was certainly an incentive. While the prices for gold and silver changed little, copper almost doubled to $.21 per pound, and lead and zinc more than doubled from $.06 to $.13 per pound. In tandem, improvements in mining and milling technology greatly reduced the cost of producing and treating ore.[457]

[454] Colorado Mine Inspectors' Reports: Green Mountain, Pride of the West.
[455] Colorado Mine Inspectors' Reports: Lark.
[456] Colorado Mine Inspectors' Reports: Lead Carbonate; *Minerals Yearbook*, 1940: 306.
[457] Saxon, 1959: 9, 14, 16, 17, 37.

By contrast, the prices for silver and gold remained static, but their values relative to the dollar actually declined slightly because of inflation. In 1947, foreign nations successfully lobbied the federal government to reduce tariffs on imported industrial metals, which were completely repealed in 1950. Eight years later, the Paley Commission actively fostered mining overseas in hopes that countries with strong economic ties to the United States would not ally with the Soviet Union. Mining in the west had an increasingly difficult time competing.[458]

Another disincentive was the dwindling labor pool. Youth less frequently engaged in mining. As a result, the older miners did not find dedicated individuals interested in carrying on the tradition of hardrock mining. The greatest challenge, however, was the insurmountable argument that the veins in San Juan County were bereft of ore.

Cumulatively, these factors ended intensive mining in the county. Through the mid-1950s, the county enjoyed one last push of activity. During the latter half of the 1940s, the industry slightly recovered. Between 1946 and 1949, the county featured twelve prospects, twenty-five small mines, nine medium-sized operations, and three large producers. While the number of active mines paralleled the Great Depression, ore production doubled. During the depression, mining companies, anchored by the Shenandoah-Dives, generated between $900,000 and $1.6 million. By the late 1940s, the output ranged from $2.3 million to $2.7 million. In concert with increases in production and number of mines, the population of the county rose slightly. In 1940, 1,400 people resided in the county, rising by seventy by 1950.[459]

Statistics indicate that, during the early 1950s, the postwar revival began to wane. Between 1950 and 1954, the county had ten prospects, fifteen small mines, seven medium-sized operations, and one large producer. Ore production peaked in 1951 at $3.3 million and then dropped off as two important mines closed. In 1951, the Highland Mary suspended, and the county's yield decreased to $2.8 million. In 1953, the Shenandoah-Dives stopped producing ore, and county output plummeted to $816,000. When the mill stopped treating custom ore later in 1953, many of the county's mines closed, and total production dropped to $151,000. The Shenandoah-Dives, Highland Mary, and Pride of the West, flush with success from heavy wartime production, led the county's mining industry into the postwar recovery. These three operations changed little and joined new ventures organized in 1946 and 1947, primarily in the Eureka district.

Las Animas Mining District

The Osceola Mine was one of the first properties reopened in the Last Animas district after the war ended. The Osceola Vein, on the east side of Cunningham Gulch, had been prospected early in the county's history, but only the upper portion saw any work of substance. In 1946, O.L. Larson determined that the lower extent probably offered ore worth extracting and leased the mine under O.L. Larson & Associates. Larson then built a surface plant at the lower

[458] Bunyak, 1998: 79; Saxon, 1959: 37, 39.

[459] Production figures from *Minerals Yearbook*, 1946-1950 and S.M. Del Rio, *Mineral Resources of Colorado: First Sequel* (Denver: State of Colorado Mineral Resources Board, 1960) 272. The number of mines was derived from a survey of Colorado Mine Inspectors' Reports. See Schulze, 1977: 1950 regarding population statistics.

tunnel, drove exploratory workings, and struck the vein. By 1947, he brought the mine into production and shipped ore to the Mayflower Mill. For unknown reasons, Larson did not return the next year. A.B. Crosby, who specialized in leasing proven mines, recognized enormous potential and assumed the lease. In 1948, he and J.H. Harvey organized the Osceola Mining & Milling Corporation to provide capital for more development and buy the Lackawanna Mill. A handful of miners generated around six tons of ore per day, processed the material in the mill. The operation changed hands in 1951 but remained a sound producer for several years.[460]

The Silverton Mining Company owned the Mighty Monarch at the base of Kendall Mountain, which it reopened in 1947 after it lay quiet for nearly fifty years. The ore was complex and high in zinc content. The company rehabilitated the lower tunnel, extracted ore, and shipped the material to the Mayflower Mill. The returns were poor, and in 1948 the company built a test mill of its own. Workers trucked in and assembled portable components and tried processing the ore with conventional methods. The ore proved too difficult, and the operation ceased. The mill removed elsewhere.[461]

The Little Nation ranked with the Osceola in importance. Beginning with Henry Frecker's work on the Royal Charter Vein during the 1900s, the mine saw a series of operators that invested more than they recovered. The principal reason was that the ore resisted concentration, including flotation, but was not rich enough to pay for long distance shipping to advanced mills. In 1942 and 1943, the Mermac Mining Company trucked ore to the Mayflower Mill, but this was not economical. When values increased following World War II, the Royal Charter ore became profitable to produce. In response, the Little Nation Leasing Company leased the mine in 1947 and became the first outfit to work it on a profitable basis for a sustained period. The company ignored the surface facilities, tramway, and mill at Howardsville, so carefully designed in the 1920s, and instead brought in portable equipment. Workers bulldozed roads and began trucking ore to the Mayflower Mill. The operation remained small, but profitable, until the Mayflower Mill stopped accepting custom ore in 1953.[462]

Eureka Mining District

The Eureka Mining District hosted the greatest number of mining ventures following the war. The northern portion, in particular, saw a number of old mines reopened. The region attracted little interest after the late 1890s revival and so still had low-grade ore to offer. The Burrows Mine initially developed by the McIntyres of Animas Forks during the mid-1870s, reached its potential in 1947. At that time, H.G. Knapp & Associates leased the claim, which featured only an open-cut and a tunnel. Knapp bulldozed a road, brought in portable equipment, and began extracting ore. Miners then drove a lower tunnel to develop deeper portions of the vein and enjoyed seasonal work until 1953, when the Mayflower Mill closed.[463]

[460] Colorado Mine Inspectors' Reports: Osceola; *Minerals Yearbook*, 1947: 1371.
[461] Colorado Mine Inspectors' Reports: Mighty Monarch.
[462] Colorado Mine Inspectors' Reports: Mermac; *Minerals Yearbook*, 1948: 1465; *Minerals Yearbook*, 1953, V.3: 270.
[463] Colorado Mine Inspectors' Reports: Burrows.

The Columbus Mine near Animas Forks saw more activity in the few years after World War II than in the decades prior. William Erikson reopened the mine in 1943 to meet wartime demand for industrial metals and found the property a ready-made producer. The mine featured a haulage tunnel driven to the Columbus Vein at the turn of the century, but the vein lay fallow because the ore was low in grade. By the 1940s, trucking and the Mayflower Mill rendered the ore profitable, and Erikson brought the mine into production. He gradually increased the workforce during the war, and afterward hired more. In 1947, Erikson's crew generated fifty tons of ore per day, but trucking consumed so much money, Erikson considered building a concentration mill. In 1950, he finally erected a small plant at the mine, but was a little late to maximize the benefit that it provided. He ran the mill through 1951, when his miners exhausted the ore reserves underground. Exploration conducted in 1952 failed to find more payrock, which forced Erikson to close the mine and dismantle the mill.[464]

The Gold Prince Mine reopened, nearly fifty years after the monumental failure of the Gold Prince Mines Company. The Sunnyside Mining Company bought the property in 1917 for the Sunnyside Extension Vein, which the company worked at depth prior to closing in 1930. The vein's upper, northeastern section still offered low-grade ore, which attracted the Venture Leasing Company in 1951. Company principal William Gianetto understood the ore was complex and might not be profitable, so he distributed small batches to different mills for testing. William Gianetto grew satisfied that he had found a process that would concentrate the ore. He purchased the Slick Rock Mill at Ouray and rebuilt it on the old tramway terminal foundations at the mine. In 1953, Gianetto began operations, but shortly afterwards ceased. Perhaps the mill did not recover the metals content Gianetto hoped for, or the Mayflower no longer accepted his concentrates. For some reason, he did no further work at the property.[465]

W.L. Chase exemplified the practice of serial leasing common in the county. In 1947, his Great Eastern Mining Company leased the Great Eastern, Silver Wing, Sioux City, and Klondyke, all in and around Burns Gulch. Moving from one property to the next, a crew of nine miners conducted exploratory drilling, extracted shallow ore, and planned to develop the deeper reaches of the veins through the Silver Wing Tunnel. By 1950, the company aggressively developed the area's veins and leased the Pride of the West Mill at Howardsville to process ore. During the year, a crew of thirty-six generated 100 tons of ore per day, and although the volume fell during 1951, the operation was productive until it suspended in 1954.[466]

The Great Eastern Mining Company leased the Pride of the West Mill in 1951 after the owner, Pride of the West, Inc., ran out of ore in both the Pride and Green Mountain mines. As noted, the Pride company was among the three largest and most consistent producers in the county through the Great Depression and post-war recovery years. Emulating the familiar pattern, the Pride ore system had a limited amount of payrock, and company directors paused to consider their options. At the end of 1950, after fifteen years of heavy production, the company

[464] Colorado Mine Inspectors' Reports: Columbus; *Minerals Yearbook*, 1950: 1459.
[465] Colorado Mine Inspectors' Reports: San Juan County, Gold Prince.
[466] Colorado Mine Inspectors' Reports: Great Eastern.

discharged most workers and stopped the mill. To keep some income flowing in, the company leased the mill to Great Eastern and the mines to several small parties. In 1954, the company halfheartedly attempted to operate the Pride and hired a small crew of eight miners, who worked alongside almost as many lessees. By 1955, the company withdrew, leased the Pride mine and mill, and closed the Green Mountain Mine entirely.[467]

The Old Hundred Gold Mining Company was among the last outfits to operate an aerial tramway in the county. In 1948, the Old Hundred company bought its namesake mine and the Gary Owen with the intent of operating them together. The outfit rehabilitated the mill and tramways to both mines and enjoyed successful production for several years. Because the mill was able to process only some of the ore, miners trucked additional material to the Mayflower plant. When the Mayflower closed, the Old Hundred company lost a significant share of its revenue stream and suspended operations.[468]

Cement Creek Subdistrict

The Cement Creek drainage enjoyed its highest level of activity since the late 1890s immediately following World War II. The Lead Carbonate and Lark mines anchored the activity. Vaughn Jones operated the Lead Carbonate through the war and demonstrated its capacity as a sound and reliable source of ore. In 1946, he sold the property to H.P. Ehrlinger, Fred Archibald, and John Archibald, all experienced leasing other mines in the county. The new owners prepared the mine for production by erecting new facilities, including an ore concentration mill at Gladstone. Ehrlinger and partners produced and milled approximately fifty tons of ore per day through 1952 and then leased the entire operation to the Bonita Mining Company. The mill allowed the company to survive when the Mayflower plant closed. The mill earned additional income by treating some custom ore for local independent outfits. In 1955, Wyoming Tungsten Mines assumed the lease, ran the mill through the next year, and then shut down the mine.[469]

William H. Steel's Lark Mining Company converted the Lark from a shallow prospect into a sound producer, and Steel ran the mine into the post-war recovery period. In 1947, his other company, the U.S. Oil & Development Company, absorbed the Lark. U.S. Oil had much greater financial resources, which Steel directed toward the adjoining Henrietta and Ohio mines. In 1950, Steel acquired both complexes, shut the Lark down, and sent his miners to the Henrietta. At the same time, he leased the Ohio to Ed Walby and Milo Williams. Walby and Williams remained committed to the economy of tramways, which they repaired and used the double-rope system at the Ohio. Meanwhile, Steel's miners generated twelve tons of ore per day in the Henrietta until 1954, when he suspended the Henrietta, but leased the Lark to the Columbine Leasing Company and subsequently the Ruhter Mining Company.[470]

[467] Colorado Mine Inspectors' Reports: Pride of the West; *Minerals Yearbook*, 1949: 1439; *Minerals Yearbook*, 1951: 1469.
[468] Colorado Mine Inspectors' Reports: Garry Owen; *Minerals Yearbook*, 1950: 1459; *Minerals Yearbook*, 1952, V.3: 238.
[469] Burbank and Luedke, 1969: 60; Colorado Mine Inspectors' Reports: Lead Carbonate; *Minerals Yearbook*, 1946: 1408.
[470] Colorado Mine Inspectors' Reports: Henrietta, Lark, Ohio.

Mineral Creek Mining District

The post-war recovery did not impact the Mineral Creek Mining District to the same degree as the rest of the county. Most activity focused on modern prospecting and small leases, confirming that the mines had little profitable ore left to offer. Although the North Star and a few others remained active, they operated for brief periods by limited parties. The Silver Ledge was the only to yield briefly a significant amount of ore. During World War II, Joseph Bradley purchased the Silver Ledge, but because the Highland Mary consumed his attention, Bradley did little with the Silver Ledge except lease it to the San Juan Mining & Milling Company in 1947. The company used core drills to prospect the vein to the north of the shaft and located ore. Instead of encountering payrock within the vein, the company discovered a completely new formation on the vein's west side. The new formation was so close to the surface that the company could extract ore with heavy equipment instead of incurring the high cost of underground development. With bulldozers and power shovel, the company stripped away the overburden in 1949, exhumed high volumes of payrock, and trucked the material to the Mayflower Mill and the American Zinc Mill at Ouray. The operation lasted three years, when the Silver Ledge saw no further activity.[471]

Coda

Although the Shenandoah-Dives Mining Company closed the Mayflower Mill in 1953, the mining industry in the county slowly atrophied. From the mid-1950s onward, the industry was highly unstable and dissipated in importance. The statistics for the latter half of the 1950s reflect this decline. The county's output fluctuated wildly between a high of $537,000 in 1956 and a low of $36,000 in 1961. Because the Shenandoah-Dives and Mayflower were idle, these figures represent the volatility of independent outfits. Between 1955 and 1959, the county featured only seventeen prospects, nine small mines, two medium-sized operations, and one large producer, among the fewest in the county's history.

Finding ore became increasingly difficult after seventy-five years of prospecting and production, for the payrock truly was exhausted in most known mines. Those companies that stayed in business employed strategies of mobility and serial leasing rather than allegiance to specific properties. The companies specialized in secreting out small pockets of high-grade ore scattered throughout the county. To do so, companies used drilling programs, portable equipment, and experts to chase ore reserves as they could. Because most pockets lay within known veins, most activity remained in the historic centers.

The Argyle Mining & Milling Company and Technical Services Company were among the county's typical outfits during the 1950s. Barney Blackmore organized the Argyle company around a lease he obtained on the Pride of the West. In 1954, Blackmore trucked his ore to the Pride of the West Mill, which he also ran beginning in 1955. At the same time, the Osceola Mine came up for lease. Blackmore and partners realized they could operate both mines and lease the

[471] Colorado Mine Inspectors' Reports: Silver Ledge; *Minerals Yearbook*, 1947: 1465.

Pride of the West Mill to treat the ore. The Argyle company also accepted custom payrock for treatment from other outfits. The arrangement generated surplus capital, which the company applied to exploration of other properties, including the Black Hawk Mine in the Cement Creek drainage. Most went bust, but the Argyle produced small lots of ore for brief periods of time from disparate leases. In 1958, the Pride company left the mining business altogether and offered the Argyle company its property. Two years later, however, during a brief spike in interest in the region's mines, the Argyle company also left the mining business.[472]

While Blackmore's miners extracted ore from the Osceola Mine in 1955, the Technical Services Company did likewise from another section of the property, which it leased. J.C. Grant established the company, popularly known as Tec-Ser, early in the 1950s to conduct drilling and minor property development. The company moved toward speculation and eventually became interested in leasing mines. The Osceola was among the company's most successful operations and yielded ten to twenty tons of ore per day, which was also shipped to the Pride Mill. Argyle and Tec-Ser speculated with the same properties at different times, such as the Black Hawk leased by Argyle in 1955 and by Tec-Ser the following year. Tec-Ser also worked the Lucky Jack, Caledonia, and other properties for brief times. In 1957, the company left the region.[473]

In the late 1950s the Mayflower Mill announced reopening. The Shenandoah-Dives company had suspended operations in 1953 because it was out of ore and lacked capital to develop new formations that geologists discovered through sample drilling. To secure capital, the organization merged with the Marcy Exploration Company, a uranium company in Durango, forming the Marcy-Shenandoah Corporation in 1957. The company reopened the mill to custom business, which caused a surge of excitement among mining outfits still in existence. This proved short-lived, however. The company shut down the mill almost immediately because the mining industry could not provide enough ore to offset operating costs.[474]

Mining interests in the county interpreted the mill closure as a sign that Marcy-Shenandoah was canceling its plans. As a result, most outfits suspended operations. Marcy-Shenandoah, however, prepared to refit the mill, bring the Shenandoah-Dives Mine back into production, and complete deep development that the Sunnyside company had abandoned in 1938. The Shenandoah-Dives Mine would serve as a temporary source of ore, and the deep workings on the Sunnyside property meant to provide a long-term stream of payrock. In 1959, Marcy-Shenandoah leased the Sunnyside from ASARCo and drove the American Tunnel to strike the Sunnyside and Washington veins under Lake Emma. Unlike the old Sunnyside company, Marcy-Shenandoah did not site the tunnel at Eureka, but instead started from the Gold King Tunnel at Gladstone. Marcy-Shenandoah enlarged the tunnel, and renamed it the American. But before Marcy-Shenandoah made progress, it sold to the Standard Uranium Corporation, based in Moab, Utah, in 1960. Standard Uranium reorganized as Standard Metals to include the new assets and pushed ahead with the original plan.[475]

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[472] Colorado Mine Inspectors' Reports: Osceola, Pride of the West; *Minerals Yearbook*, 1955, V.3: 284; *Minerals Yearbook*, 1957, V.3: 301; *Minerals Yearbook*, 1958, V.3: 238.

[473] Colorado Mine Inspectors' Reports: Lucky Jack, Osceola; *Minerals Yearbook*, 1957, V.3: 301.

[474] Bunyak, 1998: 80.

[475] Bunyak, 1998: 80; Colorado Mine Inspectors' Reports: American Tunnel; *Minerals Yearbook*, 1959, V.3: 238.

To provide immediate income, Standard Metals reopened the Shenandoah-Dives Mine and Mayflower Mill and worked them together. Miners sent some ore to the mill in 1960 and increased production in 1962. Meanwhile, workers drove the American Tunnel to the impressive length of two miles, connected it with the old Sunnyside workings, and began hauling ore out by the trainload. The volume was sixty tons per day in 1962, which continued to increase beyond the 800-ton record that the Sunnyside company established during the late 1920s. The American Tunnel was a complete success and funneled a constant stream of ore into the late 1970s. As a result, the county's yield increased to more than $4 million per year.[476]

During the 1960s, the number of active operations decreased to six small mines, one medium-sized outfit, and one large producer. Continuing the trend of the 1950s, these were based around limited pockets of ore and therefore tended to be short-lived and inconsistent.[477] From 1960 through the 1970s, independent outfits further waned in stability and production, and the county's mining industry became synonymous with Standard Metals. In 1970, a failed copper mine in Arizona bankrupted Standard Metals, and the Washington Mining Company assumed the American Tunnel. Washington continued heavy production until 1978, when weak ground in the highest workings collapsed and drew Lake Emma's waters into the mine. The day was fortunately Sunday, when no miners were at work, or they would have perished. The force of the water rushing through the passages and out the tunnel scoured the interior of the mine and destroyed nearly all structures and equipment. The operation never recovered, despite attempts by three successive companies to bring the tunnel back into production. The American Tunnel, the county's last significant mine, closed definitively in 1991.[478]

[476] Colorado Mine Inspectors' Reports: American Tunnel, Mayflower; *Minerals Yearbook*, 1960, V.3: 246.
[477] The number of active mines was derived from a survey of Colorado Mine Inspectors' reports.
[478] Colorado Mine Inspectors' Reports: American Tunnel; Henn, 1999: 35; Marshall and Zanoni, 1998: 203.

Section E 2: Mining and Milling Methods, Technology, and Equipment

Following is a discussion of the general methods and technologies used to find and extract metals from the hardrock and placer deposits of San Juan County. In many cases, specific methods and technologies correspond to particular periods of significance, while others apply over the course of the county's mining history from 1860 through 1991. This portion of the text has been adapted from Section E of a previous Multiple Property Documentation Form, *The Mining Industry in Colorado* (revised 2008).[529] This adaptation is with permission from authors Jay Fell and Eric Twitty. Content relevant to mining in San Juan County is presented in an edited format. Inapplicable property types from the statewide context were deleted. Embedded illustrations were removed in compliance with more recent National Park Service guidance.

Placer Mining

The Nature of Placer Deposits

For thousands of years, humankind prized gold for its rarity, appearance, malleability, and chemical stability. Gold oxidizes and forms compounds only under unusual physical circumstances and otherwise remains in its native state. Superheated fluids and gases associated with geothermal and magmatic activity tend to deposit gold in the forms of veins, replacement bodies, and disseminated deposits in rock formations. Typically, mountain-building events such as those that uplifted the San Juans created the fluids, gases, and the geologic conditions for gold ore, which often included other metals such as silver, lead, and zinc.

Over the course of eons, erosion attacked the mountains and dismantled the ore veins that cropped out on ground-surface. Most of the minerals and metals were washed into waterways where they suffered reduction and dissolution, both physically and chemically, and decomposed into sediments. Stream action concentrated the sediments on the floors of drainages, and high runoff mobilized the sediments and washed them downstream.

Because gold is soft and inert, however, it neither dissolves nor forms chemical compounds and only slowly disintegrates through physical reduction. Hence, as erosion freed gold from its parent veins, the particles migrated into nearby drainages and slowly sifted downward into the gravel floors due to their weight. As each high runoff event mobilized and shifted the stream gravel, the gold particles worked their way down toward the bedrock floor where they became concentrated and remained for thousands of years. Over time, water carried the gold from small, steep gulches near the parent veins into streams and then rivers.

Because erosion is an unending process, fresh gold was constantly freed from its parent veins while the older material continued to accumulate on the bedrock floors. Hence, fine gold

529 Jay Fell and Eric Twitty, *The Mining Industry in Colorado Multiple Property Documentation Form* (Denver: Office of Archaeology and Historic Preservation, Colorado Historical Society, 2008).

disseminated throughout the upper strata of a stream's gravel often represented a richer deposit at depth. Overall, miners termed gold-bearing gravel *placer deposits* and referred to broad areas of such gravel as *placer fields*.

In San Juan County, prospectors and miners encountered three principal types of placer deposits. The first consisted of what were known as *gulch placers* or *gulch washings*, and these consisted of rich, gold-bearing gravel lining the floors of minor drainages that were often steep. Because gulch placers lay near a parent vein, offered few places for fine material to settle out, and were subject to high-energy stream flows, the gravel tended to be coarse, the gold particles large and rough, and the gravel beds thin.

Miners recognized the second type of deposit as a *river placer*, and it was created when streams introduced gold into the Animas River. The water currents sifted the gold downward into the lower levels of the gravel, where the particles became concentrated. The third type, informally known as *blanket deposits*, was limited to relatively arid areas that featured gold veins at ground-surface. Erosion and weathering attacked the veins and freed the gold, but runoff was not sufficient enough to immediately shunt the metal into waterways, leaving a veneer of gold-bearing soil easily processed by hand.

Prospecting for Placer Gold

While some of the placer deposits lent themselves to specific types of extraction processes, all could be discovered by basic prospecting. All a prospector need do was excavate pits in stream gravel and reduce the material in a gold pan. The presence of a few flakes of gold from the upper gravel suggested the potential for more at depth, spurring the prospector to dig deeper pits. By the late 1850s, experienced prospectors understood that the worth of a deposit could only be accurately assessed by testing gravel from near bedrock, which required considerable labor to expose. If the prospector confirmed the presence of placer gold in profitable quantities, he was ready to begin mining.

Placer Mining Methods

One of placer mining's main attractions was that it was within practical and economic reach of both individual miners and organized companies. Gulch placers and gold-bearing soil saw mining by individuals who worked by hand, and by companies with complex systems that depended on infrastructures. River placers, however, tended to be the domain of capitalized companies because they required capital investment for flumes, long sluices, and workforces to excavate high volumes of material.

When working by hand, individual miners often employed pans, cradles, and small sluices to separate gold from gravel. Miners merely excavated pits and trenches into streambeds, and when they approached bedrock, the miners shoveled the gold-bearing material into a cradle or sluice. A cradle was a portable wooden box with a rounded bottom, a slanted board featuring riffles, and a lever. The miner rocked the cradle back and forth while introducing water, which

washed off the gravel and left the heavy gold trapped behind the riffles. A sluice was a small, portable wooden flume with riffles nailed to the floor. The miner placed it in a stream and shoveled gravel into the interior, and the flow of water washed the light gravel away. When miners exhausted the gold-bearing gravel in their pits and trenches, they shifted laterally, began new excavations, and filled the old pits with new tailings. Over time, this created hummocky assemblages of tailings piles, pits, trenches, and buried excavations.

Organized mining companies had the same goals as individual miners, only they relied on infrastructures to process gravel in high volumes from groups of claims. Companies often erected systems of sluices, work stations, water-diversion structures to move streams out their beds to expose gravel, and ditches and flumes to deliver water to otherwise dry areas. The sluices tended to be lengthy and featured either several branches feeding into a trunk line or several parallel sluices. Common sluices ranged from 2' wide and as deep, to 4' wide and 4' deep. They stood on timber piers supported by timber or stacked rock footers and featured a relatively gentle gradient so fine gold was not washed off. Workers usually installed the sluices in trenches and shoveled the surrounding gravel into the current flowing through the device. After prolonged excavation, workers reduced the height of the surrounding gravel until the sluice bed manifested as a raised berm.

When the sluice floor became choked with fine sediment, a worker closed the headgate and shut off the water flow so the gold caught behind the riffles could be recovered. Workers stepped down into the sluice and, under watch of a guard or superintendent, began removing large gold particles and scraping out gold-laden sand. The particles were collected and weighed while the sand was treated with mercury, which amalgamated with gold dust that was too fine to be easily picked out. After cleanup operations, the sluice was ready for more gravel and a worker opened the headgate, admitting water again.

While hand-methods were highly effective for gulch and blanket placers, the costs of labor were too high and the rate of processing too limited for most extensive deposits. By nature, these deposits tended to feature fine gold disseminated through broad, deep gravel beds that had to be mobilized and processed in economies of scale for profitability. Such conditions required the investment of considerable capital to build the infrastructures necessary to achieve production in economies of scale, and mining companies arranged their infrastructures to carry out several distinct methods.

One of the most popular and earliest was known as *booming*, and it involved the sudden release of a torrent of water into placer workings from a nearby reservoir. The rush of water mobilized and carried gravel en masse through sluices, where riffles often retaining mercury collected the gold. To facilitate both the consumption of high volumes of water and the processing of large tonnages of gravel, companies formally engineered their infrastructures. Networks of supply ditches pirated water from area streams and directed it to the placer mine and the reservoir, distribution ditches shunted the liquid into the sluices, and boom ditches carried water from the reservoir into the workings. All featured headgates, and the sluice systems were as noted above.

Hydraulic mining, developed in California and practiced in San Juan County, was another method for processing thick gravel beds in economies of scale. A monitor, also known as a giant, was the key instrument in hydraulic mining. A monitor was a large nozzle that emitted a jet of water under pressure so great that miners were unable to swing sledge hammers through it. A worker played the jet against gravel banks, which crumbled and liquefied, and with the help of booming, were washed into sluices. The infrastructure for hydraulic mining was similar to that for booming with additional components for the monitors. To create the necessary pressure, ditches delivered water to a reservoir located far upslope from the mine, and a flume or pipe directed water into a structure known as a pressure box. The structure was basically a rectangular tank made of planks retained by stout framing at least 6' wide, 6' high, and 8' long. A pipe known as a penstock, often at least 24" in diameter, exited the structure's bottom and descended to the mine, decreasing in diameter incrementally to increase the water current's velocity and pressure. The pipe entered the placer workings and connected to a monitor located on a strategically placed station, which commanded a full view of the gravel banks.

Hardrock Mining

The Nature of Hardrock Ore Deposits

Although placer gold initially drew prospectors to San Juan County, it was hardrock ore that kept them in the region. In general, profitable minerals and metals found in the hard, metamorphic and igneous rock formations of the mountains constituted hardrock ores. In the county, the principal precious and semiprecious metals were silver and gold, while the principal industrial metals were lead, zinc, and copper. Uranium drew interest but saw little production, and a few companies extracted small tonnages of tungsten between 1900 and around 1920.

The common traits shared by most of the hardrock ores, which influenced how companies mined them, were the nature of the ore formations. Most of the ore formations were functions of the volcanism that built the San Juan Mountains. During these periods, superheated, plastic magmatic bodies slowly intruded the basement rocks deep under the surface and exerted great pressure. As these bodies made their way upward, pockets of liquid rock and superheated fluids and gases attempted to escape through paths of least resistance. Faults and fissures provided these paths, and they ranged from microscopic to several feet in width and tended to be oriented vertically. As the gases and fluids lost pressure and heat during ascent, insoluble minerals first precipitated out on the fault walls, followed by soluble minerals and metals with low melting points. The result was irregular and mineralized bands or seams impregnated with metals, which the mining industry recognized as *veins*. Most veins were barren of metals while some offered disbursed ore and a few featured rich pockets or stringers, and nearly all terminated less than 1,000 feet deep. While this is a great oversimplification of San Juan County's geology, some understanding is necessary to appreciate how the mining industry extracted ore.

Prospecting for Hardrock Ore

Finding the ore formations was the first step in hardrock mining, and this was the task of prospectors. Popular history suggests that individual or pairs of prospectors found rich gold and silver veins by simply excavating pits with pick and shovel, or wandered the countryside until they encountered rich outcrops. In actuality, successful prospecting involved a basic knowledge of mineralogy and geology, hard work, patience, and strategy and planning. Prospectors also rarely worked alone because parties ensured safety and security, increased the likelihood of finding ore through group efforts, and hastened the examination and sampling of mineral bodies.

The process of prospecting often began with a cursory survey of an area of interest where prospectors sought geological and topographical features suggestive of ore bodies. They often examined visible portions of bedrock for seams, outcrops of quartz veins, dykes, unusual mineral formations, and minerals rich with iron. Where vegetation, sod, and soil concealed bedrock, prospectors also scanned the landscape for anomalous features such as water seeps, abrupt changes in vegetation and topography, and changes in soil character.[530]

If an area offered some of these characteristics, the party of prospectors may have shifted to more intensive examination methods. One of the oldest and simplest sampling strategies, employed for locating gold veins, began by testing steam gravel for gold eroded off a parent vein. By periodically panning samples, a party could track the gold upstream, and when members encountered the precious metal no more, they knew they were near the point of entry. The party then turned toward one of the stream banks and began excavating test pits and panning the soil immediately overlying bedrock in hopes of finding a continuation of the gold. They tested samples horizontally back and forth across the hillslope in attempts to define the lateral boundaries of the gold flecks, then moved a short distance upslope and repeated the process. Theoretically, each successive row of pits should have been shorter than the previous one, since erosion tended to distribute gold and other minerals in a fan from their point sources. By excavating several rows of pits, the prospectors were able to project the fan's upslope apex where, they hoped, the vein lay. Employing such a sampling strategy occasionally paid off, but the party of prospectors had to undertake considerable work digging prospect pits with pick and shovel, hauling soil samples to a body of water over rough terrain, and panning in cold streams. It seems likely that the French party discovered the Little Giant Mine with these methods.[531]

One of the greatest drawbacks to systematic panning was that it detected only gold but missed silver and industrial metals, which were actually San Juan County's claim to fame. To find minerals in addition to gold, prospectors scanned the stream gravel and other areas of exposed soil for what they termed *float*, or isolated fragments of ore-bearing rock. As with free-gold, natural weathering fractured ore bodies and erosion transported the pieces downslope, often in the shape of a fan. If the prospectors encountered ore specimens, they walked transects to define the boundaries of the scatter, narrowing the search to the most likely area. Applying the

[530] Charles A. Bramble, *The ABC of Mining: A Handbook for Prospectors* (Santa Monica: Geology, Energy & Minerals Corporation, 1980 [1898]) 11-13; Robert Peele, *Mining Engineer's Handbook* (New York: John Wiley & Sons, 1918): 381-5; George Young, *Elements of Mining* (New York: John Wiley & Sons, 1946) 19-26.
[531] Bramble, 1980: 11-13; Peele, 1918: 381-5; Young, 1946: 19-26.

same methods used to locate gold veins, prospectors excavated groups or rows of pits and traced ore samples until they could project where the vein supposedly lay. With high hopes, the prospectors sank several prospect pits down to bedrock and chipped away at the material to expose fresh minerals.[532]

If the exposed bedrock suggested the presence of an ore body, the party of prospectors may have elected to drive either a small shaft or adit with the intent of sampling the mineral deposit at depth and confirm its continuation. After clearing away as much fractured, loose bedrock as possible with pick and shovel, a pair of prospectors began boring blast-holes with a hammer and drill-steels. They often bored between twelve and eighteen holes, 18" to 24" deep, in a special pattern designed to maximize the force of the explosive charges they loaded. Prior to the 1880s, prospecting parties usually used blasting powder, and by the 1890s, most converted to stronger but more expensive dynamite. Until economic ore had been proven, the operation was classified as a *prospect adit* or *prospect shaft.*

Deep Exploration and the Development of Ore Bodies

A *prospect* differed greatly from a *mine*. A prospect was an operation in which prospectors sought ore. The associated workings ranged from groups of pits to shallow adits or shafts with as much as hundreds of feet of horizontal and vertical passages. A mine, by contrast, usually consisted of at least several hundred of feet of workings and a proven ore body. All mines began as prospect operations, and when prospectors determined the existence of ore, the activity at the mineral claim often shifted at first to quantifying how much ore existed, and then to profitable extraction.

The general methods by which prospectors and miners searched for and extracted ore and equipped their mines to do so were universal throughout the west. San Juan County was no exception, and the methods fell into common patterns. The most elementary was converting the prospect into a mine once a company proved ore. Usually, the company hired a crew of miners who proceeded to enlarge the prospect adit or shaft and systematically block out the mineral body. At the point where a tunnel or shaft penetrated the formation, miners developed it with internal workings consisting of *drifts* driven along the vein, *crosscuts* extending 90 degrees across the vein, internal shafts known as *winzes* which dropped down from the tunnel floor, and internal shafts known as *raises* which went up. Drifts and crosscuts explored the length and width of the ore, and raises and winzes explored its height and depth.

Miners and prospectors consciously sank shafts or drove adits in response to fundamental criteria. A shaft was easiest and the least costly to keep open against fractured and weak ground, and it permitted miners to stay in close contact with an ore body as they pursued it. A shaft also lent itself well to driving a latticework of drifts, crosscuts, raises, and winzes to explore and block out an ore body.

[532] Ibid.

Mining engineers discerned between vertical and inclined shafts. One contingent of engineers preferred inclined shafts because mineral bodies were rarely vertical and instead descended at an angle. In addition, inclined shafts needed smaller, less expensive hoists than those used for vertical shafts. The other camp of engineers, however, claimed that vertical shafts were best because maintenance and upkeep on them cost less. Vertical shafts had to be timbered merely to resist swelling of the walls, while timbering in inclines had to also support the ceiling, which was more expensive, especially when the passage penetrated weak ground. Inclined shafts also required a weight-bearing track for the hoist vehicle, which, including maintenance such as replacing rotten timbers and corroded rails, consumed money.

An adit or tunnel, by contrast, was easier and faster to drive and required significantly less capital than a shaft. Some mining engineers determined that the cost of drilling and blasting a shaft was as much as three times more than an adit or tunnel. Prospectors and mining engineers alike understood that adits and tunnels were self-draining, they required no hoisting equipment, and transporting rock out and materials into the mine was easier. However, adits and tunnels were not well-suited for developing deep ore bodies because interior hoisting and ore transfer stations had to be blasted out, which proved costly and created traffic congestion. One other problem, significant where the rock was weak, lay in the enormous cost of timbering the passages against cave-in. While the exact differentiation between a tunnel and an adit is somewhat nebulous, mining engineers and self-made mining men referred to narrow and low tunnels with limited space and length as *adits*. Passages wide enough to permit incoming miners to pass outgoing ore cars, high enough to accommodate air and water plumbing suspended from the ceiling, and extending into substantial workings have been loosely referred to as *tunnels*.[533]

Despite the hypothetical advantages of shafts and tunnels, in some cases factors beyond miners' or engineers' control governed the actual choice. Geology proved to be a deciding criterion; steep hillsides, deep canyons, and gently pitching ore bodies lent themselves well to exploration and extraction through tunnels. In many cases prospectors who had located an outcrop of ore high on a hillside elected to drive an adit from a point considerably downslope to intersect the formation at depth, and if the ore body proved profitable, then the mining company carried out extraction through the adit.[534]

One additional, significant factor influenced the decision to sink a shaft instead of driving a tunnel. Historians of the west aptly characterized intense mineral rushes as frenzies of prospectors who blanketed the surrounding territory with claims. In most districts, including those in San Juan County, the recognized hardrock claim was 1,500' long and 300' to 500' wide, which left limited work space both above and below ground. A shaft was the only means to pursue a deep ore body within the confines of such a claim.[535]

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[533] Eric Twitty, *Riches to Rust: A Guide to Mining in the Old West* (Montrose, CO: Western Reflections, 2020) 36.

[534] Colliery Engineer Company, *Coal & Metal Miners' Pocketbook* (Scranton: Colliery Engineer Company, 1893) 257; International Textbook Company, *A Textbook on Metal Mining: Steam and Steam-Boilers, Steam Engines, Air and Air Compression, Hydromechanics and Pumping, Mine Haulage, Hoisting and Hoisting Appliances, Percussive and Rotary Boring* (Scranton: International Textbook Company, 1899) A40:8.

[535] *Morrison's Mining Rights*, Denver, CO, 1899:17, 20; Peele, 1918:1474.

The Mine Surface Plant

Driving underground workings required support from facilities on the surface. Known among miners and engineers as the *surface plant*, these facilities were equipped to meet the needs of the work underground. Large, productive mines boasted sizable surface plants while small prospect operations had simple facilities. Regardless of whether the operation was small or large, the surface plant had to meet five fundamental needs. First, the plant had to provide a stable and unobstructed entry into the underground workings. Second, it had to include a facility for tool and equipment maintenance and fabrication. Third, the plant had to allow for the transportation of materials into and waste rock out of the underground workings. Fourth, the workings had to be ventilated, and fifth, the plant had to facilitate the storage of up to hundreds of thousands of tons of waste rock generated during underground development, often within the boundaries of the mineral claim. Generally, both productive mines and deep prospects had needs in addition to the above basic five requirements, and their surface plants included the necessary components.

The basic form of a surface plant, whether haphazardly constructed by a party of inexperienced prospectors or designed by experienced mining engineers, consisted of a set of *components*. In terms of underground operations, the entry usually consisted of a shaft collar or a tunnel portal, and transportation arteries permitted the free movement of men and materials into and out of these openings. At tunnel operations, miners usually used ore cars on baby-gauge rail lines, and at shafts, a hoisting system lifted vehicles out of the workings. Materials and rock at shaft mines were usually transferred into an ore car for transportation on the surface. The surface plants for all types of mines included a blacksmith shop where tools and equipment were maintained and fabricated, and large mines often had additional machining and carpentry facilities. Most of these plant components were clustered around the tunnel or shaft and built on cut-and-fill earthen platforms made when workers excavated material from the hillslope and used the fill to extend the level surface. Once enough waste rock had been extracted from the underground workings and dumped around the mouth of the mine, the facilities may have been moved onto the resultant level area. The physical size, degree of mechanization, and capital expenditure of a surface plant was relative to the constitution of the workings below ground.

In addition to differentiating between surface plants that served tunnels from those associated with shafts, mining engineers further subdivided mine facilities into two more classes. Engineers considered surface plants geared for shaft sinking, driving adits, and underground exploration to be different from those designed to facilitate ore production. Engineers referred to exploration facilities as *temporary-class plants*, and as *sinking-class plants* when associated with shafts. Such facilities were by nature small, labor-intensive, energy inefficient, and most important, they required little capital. *Production-class plants* on the other hand usually represented long-term investment and were intended to maximize production while minimizing operating costs such as labor, maintenance, and energy consumption. Such facilities emphasized capital-intensive mechanization, engineering, planning, and scientific calculation.

Mines underwent an evolutionary process in which the discovery of ore, the driving of a prospect shaft or tunnel, installation of a temporary plant, upgrade to a production plant, and eventual abandonment of the property all were points along a spectrum. Depending on whether prospectors or a mining company found ore and how much, a mine could have been abandoned in any stage of evolution. Engineers and mining companies usually took a cautionary, pragmatic approach when upgrading a sinking plant to a production plant. Until significant ore reserves had been proven, most mining companies minimized their outlay of capital by installing inexpensive machines adequate only for meeting immediate needs.

Mining engineers extended the temporary and production-class classifications to structures including machine foundations. Because of a low cost, ease of erection, and brief serviceable life, timber and hewn log machine foundations were strictly temporary while production-class foundations consisted of concrete or masonry. The structure of wooden foundations usually consisted of cribbing, a framed cube, or a frame fastened to a pallet buried in waste rock for stability and immobility. The construction and classification of machine foundations is of particular importance because they often constitute principal evidence capable of conveying the composition of the surface plant.[536]

Surface Plants for Tunnels

The surface plants for tunnels and shafts shared many of the same components. Yet, because of the fundamental differences between these two types of mines, the designs and characteristics for each were different. Following is a list and description of the principal components found at most tunnel operations.

The Tunnel Portal

The tunnel portal was a primary component of both simple prospects and complex, profitable mines. Professionally trained mining engineers recognized a difference between prospect adits and production-class tunnels. Height and width were the primary defining criteria. A production-class tunnel was wide enough to permit an outgoing ore car to pass an ingoing miner, and headroom had to be ample enough to house compressed air lines and ventilation tubing. Some mining engineers defined production-class tunnels as being at least 3½' to 4' wide and 6' to 6½' high, and anything smaller, they claimed, was merely a prospect adit.[537]

Mining engineers paid due attention to the tunnel portal because it guarded against cave-ins of loose rock and soil. Engineers recognized *cap-and-post timber sets* to be best suited for supporting both the portal and areas of fractured rock further in. This ubiquitous means of support consisted of two upright posts and a cross-member, which miners assembled with precision using measuring rules and carpentry tools. They cut square notches into the timbers,

[536] Eric Twitty, *Reading the Ruins: A Field Guide for Interpreting the Remains of Western Hardrock Mines* Masters Thesis (Denver: University of Colorado, 1999): 30-2.
[537] Peele, 1918: 459; George Young, *Elements of Mining* (New York: John Wiley & Sons, 1923): 463.

nailed the cap to the tops of the posts, and raised the set into place. Afterward, the miners hammered wooden wedges between the cap and the tunnel ceiling to make the set weight-bearing. Because the tunnel usually penetrated tons of loose soil and fractured rock, a series of cap-and-post sets were required to resist the ground, and they had to be lined with *lagging* to fend off loose rock and earth. In areas penetrating swelling ground, the bottoms of the posts had to be secured to a floor-level cross-timber or log footer to prevent them from being pushed inward. Wood used for the purposes of supporting wet ground decayed quickly and had to be replaced as often as several times a year. Professionally trained mining engineers claimed that dimension lumber was best for timber sets because it decayed slowly and was easy to frame, but high costs discouraged its use where logs were available.[538]

Mine Transportation

Miners working underground generated tons of waste rock that had to be hauled out, while tools, timbers, and explosives had to be brought in. As a result, both prospect operations and large, paying mines had to rely on some form of a transportation system. The conveyances used by prospectors had to be inexpensive, adaptable to tight workings, and capable of being carried into the backcountry. To meet these needs, prospect outfits often used wheelbarrows on plank runways. Mining engineers recognized the functionality of wheelbarrows but classified them as strictly serving the needs of subsurface prospecting because of their light duty.[539]

Outfits driving substantial underground workings required a vehicle with a greater capacity. The vehicle most outfits chose was the ore car, which consisted of a plate iron body mounted on a turntable riveted to a rail truck. Cars were approximately 2' high, 4' long, and 2½' wide. They held at least a ton of rock and had a swing gate at the front to facilitate dumping. Further, the body pivoted on the turntable to permit the operator to deposit a load of rock on either side of or at the end of the rail line.

Ore cars ran on rails that mine supply houses sold in standard sizes. The units of measure were based on the rail's weight-per-yard. Light-duty rail ranged from 6 to 12 pounds per yard, medium-duty rails included 12, 16, 18, and 20 pounds per yard, and heavy rail weighed from 24 to 50 pounds per yard. Prospecting outfits usually purchased light-duty rail because of its transportability and low cost. Mining engineers erecting production-class transportation systems had miners use at least medium-duty rail because it lasted longer.[540]

The specific type of rail system installed by a mining outfit reflected the experience and judgment of management, the financial status of the company, and the extent of the underground workings. The basic system used in nearly all Colorado mines consisted of a main line that extended from the areas of work underground, though the surface plant, and out to the waste rock dump. Productive mines and deep prospect operations usually had spurs underground extending to tunnel faces, stopes, and ore bin stations. Substantial mines with extensive surface

[538] International Textbook Company, 1899: A40-42.
[539] Twitty, 2002: 36.
[540] International Textbook Company, 1899: A40, 53; Young, 1923: 192.

plants also featured spurs on ground-surface extending to different parts of the waste rock dump, to a storage area, and to the mine shop. Many large mines built special stake-side, flatbed, and latrine cars for the coordinated movement of specific materials and wastes.

Mining engineers understood that hand-tramming single-ore cars were the most cost-effective transportation at small and medium-sized operations. But at large mines, they strongly recommended pulling trains with draft animals. As mining matured through the nineteenth century, miners learned that mules were the best animals suited for work underground because they were reliable, strong, of even temperament, and intelligent. The electric locomotive, termed an *electric mule* by some miners, arrived in the west during the 1890s. The early machines consisted of a trolley car motor custom-mounted onto a steel chassis, and they took their power from overhead *trolley lines* strung along the mine's ceiling.

The spread of electric mules to San Juan County proved slow. Locomotives required special mechanical and electrical engineering, were too big for the tortuous workings of most mines, and required considerable capital. A small locomotive cost $1,500 and $7.50 per day to operate. A mule, on the other hand, cost only $150 to $300 to purchase and house, and between $.60 and $1.25 to feed and care for per day.[541]

Upgrades to the rail line presented the engineer with additional costs. Mules were able to draw between three and five ore cars weighing approximately 2,500 pounds each, for which16-pound rails spiked at an 18" gauge proved adequate. But electric locomotives and their associated ore trains usually weighed dozens of tons, and as a result they required broad tracks of heavier rail. Mining engineers recommended that at least 20-pound rail spiked 24" apart on ties spaced every 2' be laid for small to medium-sized locomotives. Heavy locomotives required rail up to 40-pounds per yard spiked at 36" gauge. The reason for the heavy rails and closely spaced ties was that the machines pressed down on the track and perpetually worked uphill against the downward-flexed rails. This wasted much of the locomotive's power and energy, and engineers sought to minimize the sag with stiff rails on a sound foundation.[542]

Some mining engineers criticized the fact that electric locomotives were tied to the fixed route defined by the trolley wires. To remedy this problem, electric machinery makers introduced the storage battery locomotive around 1900, which had free reign of the mine's rail lines. Despite its independence, very few of San Juan County's mining companies employed battery-powered locomotives because they were costly and required a recharging facility.

A few mining engineers espoused the compressed air locomotive, which consisted of a compressed air tank fastened to a miniature steam locomotive chassis. These locomotives were able to negotiate tight passageways, had plenty of motive power, spread fresh air wherever they

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[541] General Electric Company, *Electric Mine Locomotives: Catalogue No. 1045* (Chicago: General Electric Power and Mining Department:, 1904) 23; Peele, 1918: 862, 871.

[542] Colliery Engineer Company, *Coal Miners' Pocketbook* (New York: McGraw-Hill Book Co., 1916): 767; International Textbook Company, *International Library of Technology: Hoisting, Haulage, Mine Drainage* (Scranton: International Textbook Company, 1906): A55, 6; International Textbook Company, *International Correspondence School Reference Library: Rock Boring, Rock Drilling, Explosives and Blasting, Coal-Cutting Machinery, Timbering, Timber Trees, Trackwork* (Scranton: International Textbook Company, 1907): A48, 2; International Textbook Company, *Mine Haulage: Rope Haulage in Coal Mines, Locomotive Haulage in Coal Mines, Mine Haulage Systems, Calculations, and Cars* (Scranton: International Textbook Company, 1926) 1; Young, 1923: 192.

went, operated on the ubiquitous 18" rail gauge, and did not require complex electrical circuitry. However, compressed air locomotives cost as much as their electric cousins and required a costly compressor capable of delivering air at pressures of 700 to 1000 pounds per square inch. Locomotives and the necessary improvements were well beyond the financial means of most of San Juan County's mining outfits. The companies continued the traditional method of pushing single cars by hand.

The Mine Shop

Every mine required the services of a blacksmith who maintained and fabricated equipment, tools, and hardware. The common rate for driving a tunnel with hand-drills and dynamite in hard rock was approximately 1' to 3' per 10-hour shift. Over the course of such a day, miners blunted drill-steels in substantial quantities, and for this reason, the blacksmith's primary duty was to sharpen those steels.[543]

To permit the blacksmith to work in foul weather, mining companies erected buildings to shelter the shop. The building tended to be small, simple, and rough, and operations lacking capital often relied on local building materials such as logs. Prospecting and mining outfits almost invariably located the shop adjacent to the tunnel portal or shaft collar to minimize unnecessary handling.

In general, blacksmiths required few tools but much skill for their work. A typical basic field shop consisted of a forge, bellows or blower, anvil, quenching tank, hammers, tongs, swage, cutter, chisels, hacksaw, snips, small drill, workbench, iron stock, hardware, and basic woodworking tools. Prior to the 1910s, outfits deep in the backcountry often dispensed with factory-made forges and used local building materials to make vernacular versions. The most popular type of custom-made forge consisted of a gravel-filled, dry-laid rock enclosure usually 3' by 3' in area and 2' high, and miners in forested regions substituted small logs. A tuyere, often made of a 2' length of pipe with a hole punched through the side, was carefully embedded in the gravel, and its function was to direct the air blast from the blower or bellows upward into the fire in the forge.

The size of a shop and its appliances were functions of capital, levels of ore production, and era. The shops at small mines typically featured a forge and blower in one corner of the building, an anvil and quenching tank next to the forge, a work bench with a vice along one of the walls, and a lathe and drill press. The appliances were usually manually operated.

A greater availability and affordability of steam engines and air compressors during the 1890s brought power appliances within reach of many companies. Typical shops at medium-sized mines featured traditional facilities augmented with power appliances such as lathes or drill presses. Because medium-sized mines had materials handling needs exceeding those at small mines, forges were typically either 4' x 4' free-standing iron pan model, a gravel-filled iron tank 4' in diameter and 2' high, or a 3' x 3' gravel-filled wood box. In addition to the above

[543] Herbert C. Hoover, *Principles of Mining* (New York: McGraw-Hill Book Co., 1909) 150; International Textbook Company, 1907:A48, 13; Peele, 1918: 184; Young, 1946: 87.

appliances, many shops at large mines were also equipped with a mechanical saw, grinder, and pipe threader, which may have been power-driven.

The physical composure of a shop building reflects the financial state of a mining company. In general, the buildings were rough and vernacular in design and construction. Vernacular is defined as an adaptation of conventional forms and construction to the conditions, function, capital, and materials available to the mining outfit. The buildings were rarely designed by professional architects and instead were planned to meet specific needs. Outfits with limited financing used local building materials while well-capitalized mining companies often erected frame buildings. Two traits shared by most shops were windows for natural light and earthen floors to minimize the risk of fire started by loose embers.

At large, substantial mines, the primary function of shop laborers continued to be drill-steel sharpening. But when compressed-air powered rock drills, used to bore blast-holes, became common during the 1890s, the sooty blacksmiths changed their sharpening methods. The noisy and greasy machines produced high volumes of dulled drill-steels and broken fittings. Contrary to today's popular misconceptions, San Juan County's mining outfits did not immediately adopt rock drills when they were introduced during the late 1870s. Instead, the conversion required thirty years, and during the period, blacksmiths became proficient in sharpening both hand-steels and machine drill-steels, each of which had specific requirements.[544]

In the first decade of the twentieth century, mining equipment manufacturers introduced drill-steel sharpening machines to expedite the sharpening process. The early drill-steel sharpeners, similar in appearance to horizontal lathes, were costly and few were employed in San Juan County. The Silver Lake Mines Company was among the few organizations to use the early sharpeners. During the 1910s, rock drill makers introduced compact units that stood on cast iron pedestals bolted to timber foundations. Both moderate and well-financed mining companies in the county installed the revised types with increased frequency through the 1910s. Most companies with limited funds, on the other hand, continued to rely on traditional forge sharpening methods for decades afterward.

The most profitable mining companies equipped their shops with additional power appliances for advanced fabrication. The power hammer permitted a single blacksmith to complete work requiring a team of two. Well-capitalized companies installed factory-made models consisting of a heavy plate iron table fixed to the top of a cast iron pedestal, and a piston hammer that pounded items with tremendous force. Those companies unwilling to buy the factory-made hammers instead adapted heavily worn but operational rock drills. The drill was fixed onto a stout vertical timber, and when a shop opened the air valve, the drill's chuck rapidly tapped an iron table.[545]

Mine Ventilation

[544] International Textbook Company, *International Library of Technology: Mine Surveying, Metal Mine Surveying, Mineral-Land Surveying, Steam and Steam Boilers, Steam Engines, Air Compression* (Scranton, International Textbook Company, 1924) A24, 1.
[545] Twitty, 1999: 77.

The use of explosives, open flame lights, laboring miners' respiration, and natural gases often turned the atmosphere in underground workings into an intolerably stifling and even poisonous environment. Mining outfits approached this problem by installing one or a combination of two basic ventilation systems. The first, *passive ventilation*, relied on natural air currents to remove foul air, but it proved marginal to ineffective in dead-end workings. *Mechanically assisted systems*, the second, were production-class in duty and required elementary engineering.

Some prospecting outfits cleverly combined passive and mechanical means. One of the simplest was a canvas windsock on a wooden pole, which drew air from breezes and directed it through canvas tubing or stovepipes into the underground workings. The drawback was poor performance on calm days. Another system involved convection currents created by ordinary woodstoves to draw foul air out of the underground workings. The stove stood near the mine opening, and ventilation tubes extended from the stove into the underground workings. When a fire burned in the stove, the hot gases rising up the stovepipe created a vacuum in the ducting and siphoned foul air out of the mine.[546]

A few prospecting operations employed primitive mechanical systems for ventilation. These outfits used large forge bellows or small, hand-turned blowers to force air through stovepipes or canvas tubing into the workings. A bellows effectively ventilated shallow adits and shafts, but it lacked the pressure to clear gases from deep workings. Hand-turned blowers cost more money and took greater effort to pack to remote locations, but they forced foul air more surely from workings.

The simple windsocks and hand-turned blowers were insufficient for medium-sized and large mines, and engineers applied better methods. One of the most popular involved an *incast* air current balanced by an *outcast* current laden with the bad air. Multiple mine openings proved to be the most effective means of achieving a flushing current, and temperature and pressure differentials acted as the driving forces.[547]

Mechanical ventilation proved to be the most effective, but also was more expensive than passive systems. One of the most popular and effective was the use of power-driven fans and blowers, offered three basic varieties by machinery manufacturers. Engineers termed the first design, dating to the 1870s, the *centrifugal fan*, and miners knew it as the *squirrel cage fan*. This machine consisted of a ring of vanes fixed to a central axle, much like a steamboat paddle wheel, enclosed in a shroud. As the fan turned at a high speed, it drew air in through an opening around the axle and blew it through a port in the shroud. Manufacturers produced centrifugal fans in sizes ranging from one to over ten feet in diameter. The small units were employed for both mining and a variety of other purposes such as ventilating industrial buildings, and the largest units saw extensive application in coal mines. The second type of fan also acted on centrifugal principles, but it consisted of a narrow ring of long vanes encased within a curvaceous cast-iron

[546] Twitty, 1999: 51.

[547] International Textbook Company, 1899: A41, 133; International Textbook Company, *Coal and Metal Miners' Pocket Book* (Scranton: International Textbook Company, 1905) 381; Robert S. Lewis, *Elements of Mining* (New York: John Wiley & Sons, Inc:, 1946 [1933]) 454; Peele, 1918: 1038; Young, 1923: 255.

housing. The *propeller fan*, the third type of blower, was similar to the modern household fan, and it too was enclosed in a shroud.

Surface Plants for Shafts

The surface plants that supported work in shafts incorporated many of the same components as those for tunnels. However, due to the vertical nature of shafts, their surface plants also included hoisting systems, which had to meet specific engineering requirements. Typical hoisting systems installed by outfits in San Juan County consisted of a hoist, headframe, power source, and hoisting vehicle. As always, the financial state of the outfit, physical accessibility, and the quantity of proven ore governed the sophistication and cost of the system.

Shaft Form and Hoisting Vehicles

Experienced prospectors and mining engineers recognized that crude prospect shafts were inadequate for anything other than a cursory examination of the geology underground. Where a prospecting outfit strongly suspected or had confirmed the existence of ore, they sank a better, more formal shaft conducive to deep exploration and production. By the 1880s, mining engineers distinguished between temporary-class and production-class shafts.

Engineers understood that the size of a shaft directly influenced how much ore could be hoisted out of the ground. Temporary-class shafts often featured one large compartment 3½' x 7' in the clear or less. During the 1880s, engineers established a standard for the composition of production-class shafts. The convention dictated the division of the interior into a *hoisting compartment* and a *manway*, also known as a *utility compartment*, as well as guide rails in the hoisting compartment for a hoisting vehicle. Further, mining engineers defined the hoisting compartment as being at least 4' x 4' in the clear. By the late nineteenth century, the definition expanded as a result of larger vehicles. Mining engineers felt that a 4' x 5' hoisting compartment was better suited for ore production, and 5' x 7' was best.[548]

Mining engineers also came to recognize the utility of balanced hoisting. The use of one hoisting vehicle to raise ore became known as *unbalanced hoisting*, and while this system was very inefficient in terms of production capacity and energy consumption, it was the least costly and hence most commonly employed. *Balanced hoisting* relied on the use of two vehicles counterweighing each other, so that as one vehicle rose the other descended. Such a design required two hoisting compartments and a double-drum hoist, which constituted a considerable expense. But the hoist only had to do the work of lifting the ore, and as a result this system was energy efficient and provided long-term savings. Some companies anticipating production over an extended period of time invested the capital in balanced systems. The Sunnyside Mining Company did exactly that during the late 1910s when it sank its Washington Shaft.

[548] Lucien Eaton, *Practical Mine Development & Equipment* (New York: McGraw-Hill Book Company, 1934) 13; International Textbook Company, 1905: 261; Peele, 1918: 251; Young, 1923: 171, 461.

Mining companies in San Juan County chose from four basic types of hoisting vehicles. The first was the *ore bucket*, the second was the *ore bucket and crosshead*, the third was the *cage*, and the last was the *skip*. The ore bucket found great favor at prospects and small mines because its shape and features were well suited to primitive conditions. The typical ore bucket consisted of a body with convex sides that permitted the vessel to glance off shaft walls without catching on obstructions. Manufacturers forged a loop into the bail to hold the hoist cable on center and riveted a ring onto the bottom of the bucket so the vessel could be upended once it had reached the surface.

Mining companies engaged in deep shaft sinking took great risks when they used ore buckets. To prevent the bucket from catching on the shaft walls and emptying its contents onto the miners below, some mining companies installed a hybrid ore bucket hooked to a frame that ran on guide rails the length of the shaft. The frame, known as a *crosshead*, held the ore bucket steady and provided miners with a platform to stand on, albeit dubious, during their ascents and descents. Besides safety, another advantage was that miners working underground were able to switch empty buckets with full ones. Many small, poorly financed companies favored this type of hoisting vehicle because of its low cost. In any form, mining engineers considered ore buckets as temporary-class hoisting vehicles.

A mining industry institution for over 120 years, the cage consisted of a steel frame fitted with a deck for miners and rails for an ore car. Nearly all cages used in San Juan County featured a stout cable attachment at top, a bonnet to fend off falling debris, and steel guides that ran on special fine-grained 4” x 4” hardwood rails. After a number of grizzly accidents in which hoist cables parted, mining machinery makers installed special safety-dogs on cages designed to stop an undesired descent. Most dogs were toothed cams controlled by springs kept taut by the weight of the suspended cage. If the cable broke, the springs retracted, closing the cams onto the wood rails.

Cages proved highly economical because mining companies did not have to spend time manipulating ungainly ore buckets. When the cage stopped at a station underground, a miner merely pushed on an ore car, and when the cage was at the surface, another worker withdrew the car. But cages presented mining companies with several drawbacks. One of the biggest lay in boring a shaft that had enough space not only for the cage, but also to accommodate timbering for the guide rails.

Cornish mining engineers originally developed the skip for haulage in the inclined shafts of Michigan copper mines during the 1840s and 1850s, and they became popular in Colorado’s mines. The skip consisted of a large iron or wood box on wheels that ran on a rail line. The vehicles had little deadweight, held much rock, and, because they ran on rails, could be raised quickly. Skips were lighter than cages because they did not have the combined deadweight of the vehicle and ore car, resulting in energy savings. Skips also offered the benefit of being quickly filled and emptied, resulting in a rapid turnover of rock. Shortly after the turn of the century, western mining companies began replacing cages with skips for use in vertical shafts. The change gained momentum slowly through the 1900s, accelerated during the 1910s, and by the 1930s most large and many medium-sized mines used skips.

Hoists

When either prospectors or mining companies sank a shaft, they had to install a hoist to raise material out of the underground workings. Like other surface plant components, hoists came in a wide range of sizes, types, and duties. Hoists designed for prospecting adhered to *sinking-class* characteristics, and hoists intended for ore production met *production-class* specifications. The *hand windlass* was the simplest form of sinking-class hoist, and prospectors used it for shallow work. The windlass was a manually powered winch consisting of a spool made from a lathed log fitted with crank handles. Because the windlass wound by hand, its working depth was limited to approximately 100'. Prospectors sinking inclined shafts had the option of using what was termed a *geared windlass* or *crab winch*, which offered a greater pulling power and depth capacity. Geared windlasses cost much less than other types of mechanical hoists and were small and light enough to be packed into the backcountry. The winch was not easily used at vertical shafts, however, because its frame had to be anchored onto a well-built timber structure.[549]

[549] Twitty, 2002:145.

Table E 2.1: General Hoist Specifications: *Type, Duty, and Foundation*

Hoist Type	Hoist Class	Foundation Size	Foundation Footprint	Foundation Profile	Foundation Material
Hand Windlass	Shallow Sinking		Rectangular	Wood frame over shaft	Timber
Hand Winch	Shallow Sinking	3’ x 3’.	Square or Rectangular	Flat	Timber
Horse Whim: Malacate	Shallow Sinking	7’ - 10’. diameter	Ovoid Depression	Cable Reel Axle Located in Pit	Timber
Horse Whim: Horizontal Reel	Sinking	4’ x 4’.	Rectangular	Timber Footers in Depression	Timber
Horse Whim: Geared	Sinking	4’ x 4’	Rectangular	Timber Footers in Depression	Timber
Steam Donkey	Sinking	Portable	Rectangular	None	None
Gasoline Donkey	Sinking	Portable	Rectangular	None	None
Single Drum Gasoline	Sinking	2.5’ x 8’ to 4’ x 14.5’	Rectangular	Flat	Timber or Concrete
Single Drum Gasoline	Sinking	2.5’ x 8’ to 4’ x 14.5’	T-Shaped	Flat	Timber or Concrete
Single-Drum Steam	Sinking	6’ x 6’ and smaller	Rectangular	Flat	Timber or Concrete
Single-Drum Steam	Light Production	6’ x 6’ to 7.5’ x 10’	Square or Rectangular	Flat	Concrete or Masonry
Single-Drum Steam	Moderate Production	7.5’ x 10’ and larger	Rectangular	Irregular	Concrete or Masonry
Double-Drum Steam	Moderate Production	4’ x 7’ to 7’ x 12’	Rectangular	Irregular	Concrete or Masonry
Double-Drum Steam	Heavy Production	7’ x 12’ and larger.	Rectangular	Irregular	Concrete and Masonry
Single-Drum Geared Electric	Sinking	5’ x 6’and smaller	Square or Rectangular	Flat	Concrete
Single-Drum Geared Electric	Production	6’ x 6’and larger	Square or Rectangular	Flat	Concrete
Single-Drum Direct Drive Electric	Production	5’ x 6’ and larger	Square or Rectangular	Flat	Concrete
Double-Drum Geared Electric	Heavy Production	6’ x 12’	Rectangular	Irregular	Concrete
Double-Drum Direct Drive Electric	Heavy Production	6’ x 12’	Rectangular	Irregular	Concrete

(Reproduced from Twitty, 2002: 319).

Prospect operations often worked at depths greater than the limitations presented by windlasses, forcing them to install more advanced hoisting systems. The *horse whim* proved popular because it was relatively inexpensive, portable, and simple to install. Through the 1860s, the mining industry accepted the horse whim as a state-of-the-art hoisting technology for both

prospecting and ore production. But by the 1870s, practical steam hoists came of age, and the status accorded to horse whims began a downward trend. By around 1880, mining engineers felt that horse whims were well-suited for backcountry prospecting, but too slow and limited in lifting power for ore production. Regardless, mining companies with little income continued to use whims in San Juan County into the 1910s.

Prospect outfits could select from several types of horse whims. The simplest and oldest, christened by Hispanic miners as the *malacate* (mal-a-ca-tay), consisted of a horizontal wooden drum or reel directly turned by a draft animal. Early malacates featured the drum, a stout iron axle, and bearings fastened onto both an overhead beam and a timber foundation. Prospectors usually positioned the drum to rotate in a shallow pit lined with either rockwork or wood planking. The cable extended from the drum through a shallow trench toward the shaft, it passed through a pulley bolted to the foot of the headframe, then up and over the sheave at the headframe's top. The draft animal walked around the whim on a prepared track, and the prospectors usually laid a plank over the cable trench for the animal to walk across. The controls consisted of brake and clutch levers mounted to the shaft collar, and connected to the apparatus by wood or iron linkages that passed through the trench.[550]

Mining machinery makers offered factory-made horse whims that were sturdier and performed better than the older handmade units. The *horizontal reel horse whim* consisted of a spoked iron cable reel mounted on a timber foundation embedded in the ground, and it performed like the malacate. These whims remained popular among poorly funded prospect operations into the 1900s. The *geared horse whim* appeared in Colorado during the 1880s, and it remained popular among prospectors into the 1910s. The machine consisted of a cable drum mounted vertically on a timber frame, and a beveled gear that transferred the motion from the draft animal's harness beam. Geared whims were faster, could lift more than horizontal reel models, and featured controls and cable arrangements like the other types of whims. A horse whim required a headframe over the shaft, and the structures were small, simple, and temporary-class in duty. Prospectors favored a tripod, tetrapod, or a small four-post derrick that was just wide enough to straddle the shaft.[551]

Prospect operations working deep shafts began using steam hoists by around 1880. These systems required a relatively substantive infrastructure that had to be planned and engineered, and hence they were beyond the financial means of poorly financed outfits. Steam hoisting systems included a heavy hoist and boiler, cable, pipes, headframe, and foundations. The mining company also had to provide a reliable source of water and fuel for the boiler. After around 1880, the *geared single-drum duplex steam hoist*, known simply as single-drum steam hoist, was the most popular type. These hoists became the ubiquitous workhorse for shaft mining and featured a cable drum, two steam cylinders flanking the drum, reduction gears, clutch, brake mechanism, and throttle.

[550] Twitty, 2002: 161.
[551] Twitty, 2002: 162.

Mining engineers selected the specific model and size of hoist primarily according to budget and secondarily on speed and anticipated depth of the workings. Nearly all sinking-class hoists had bedplates smaller than 6' x 6' in area and were driven either by gearing or by a friction-drive mechanism. A friction drive consisted of rubber rollers that pressed against the hoist's drum flanges, and while these systems cost less than geared hoists, they were slow and apt to slip under load. The sinking-class hoists had strength often less than 40 horsepower, a slow speed of 350' per minute, and a payload of only several tons. Regardless, many mining companies used these hoists for ore production.[552]

Steam equipment presented two sets of problems for those prospect outfits working deep in the backcountry. Not only did the outfits have to haul and erect the hoisting system, but also continuously fed it fuel and water, which was costly. In the early 1890s, the Witte Iron Works Company and the Weber Gas & Gasoline Engine Company both developed practical petroleum engine hoists, which alleviated these issues. These innovative machines were smaller than many steam models, required no boilers, and their concentrated liquid fuel was by far easier to transport than wood or coal.

Despite the potential advantages of petroleum hoists, mining companies in San Juan County did not immediately embrace the apparatuses. Steam technology, the workhorse of the Industrial Revolution, held convention in the mining industry into the 1910s for several reasons. First, many mining companies were by nature conservative and continued to rely on steam out of familiarity. Second, petroleum engine technology was relatively new and not yet widely used, especially for hoisting. The outfits employing petroleum hoists during the 1890s found the engines to be cantankerous and their performances limited. Further, petroleum hoists were slow with speeds of 300' to 400' per minute, had lifting capacities of at most 4,500 pounds, and were restricted to working depths less than 1,000'. For these reasons, professionally educated mining engineers felt the hoists were barely adequate for sinking duty, and total acceptance took approximately fifteen years.[553]

The petroleum hoists available to San Juan County's mining outfits were similar in form to old-fashioned steam donkey hoists. A large, single-cylinder engine was fixed to the rear of a heavy cast-iron frame and its piston rod was connected to a heavy crankshaft in the frame's center. Manufacturers located the cable drum, turned by reduction gearing, at the front, and the hoistman stood to one side and operated the controls. Because the early petroleum engines were incapable of starting and stopping under load, they had to run continuously, requiring the hoistman to delicately work the clutch when hoisting and to disengage the drum and lower the ore bucket via the brake.

For production-class hoists, steam technology maintained supremacy into the 1920s, when electric motors were finally advanced enough. Machinery manufacturers offered production-class steam hoists in a wide array of sizes, as well as with *first-motion* or *second motion* drive trains. First-motion drive, also known as *direct-drive*, meant that the steam engine's

[552] Twitty, 2002: 319.
[553] Twitty, 2002: 173.

drive rods were coupled directly onto the cable drum axle, like how the drive rods were directly pinned onto the wheels of a steam locomotive. Second-motion, also known as a *geared-drive*, consisted of reduction gearing like the sinking-class hoists discussed above.

The difference in the driving mechanisms was significant in both performance and cost, and each served a distinct function. Gearing offered great mechanical advantage, permitting the use of small steam cylinders and a compact footprint. First-motion hoists, on the other hand, required the cable drum be mounted at the ends of large steam cylinders so the drive rods could gain leverage. Where the footprint of geared hoists was almost square, the footprint of first-motion hoists was that of an elongated rectangle with the long axis oriented toward the shaft. First-motion hoists were high-quality production-class machines that saved money only over protracted and constant use. Geared hoists were intended to be inexpensive and meet the short-term needs of modestly capitalized mines. They were not as strong, fast, or fuel-efficient. The large size, high-quality steel, and the fine engines made the cost of first-motion hoists three to four times that of geared hoists, costing from approximately $1,000 to $3,000 for light to heavy models. First-motion hoists had speeds of 1,500’ to 3,000’ per minute, compared with 500’ to 700’ per minute for geared hoists. Geared hoists usually relied on old-fashioned but durable slide valve engines, while first-motion hoists usually were equipped with Corliss valves engines, which consumed half the fuel.[554]

While the costs of purchasing first-motion hoists were high, so were the installation expenses. Because geared hoists were self-contained on a common bedplate, the construction crew merely had to build a simple foundation with anchor bolts and drop the hoist into place. First-motion hoists, on the other hand, required raised masonry pylons for the steam cylinders and the cable drum bearings, a well for the drum, and anchor bolts for the brake posts. The hoist pieces then had to be maneuvered into place and simultaneously assembled.

Mining engineers chose specific hoists for the power they delivered, proportionally relative to the hoist’s overall size. Geared hoists smaller than 6’ x 6’ were for deep exploration and delivered less than 40 horsepower. Hoists between 7’ x 7’and 9’ x 9’ were for minor ore production and offered 75 to 100 horsepower. Hoists 10’ x 10’ to 11’ x 11’ were for moderate production and generated up to 150 horsepower, and larger units were exclusively for heavy production. Mining engineers rarely installed geared hoists larger than 12’ x 12’, because for a little more money, they could have obtained an efficient first-motion hoist.[555]

Regardless of the drive mechanism, single-drum hoists were restricted to shafts with single hoisting compartments, which had inherent inefficiencies. Double-drum hoists, on the other hand, offered greater performance because they increased production while saving energy costs. They achieved this through balanced hoisting as discussed above. However, double-drum hoists possessed several drawbacks that limited their appeal to particularly well-financed mining companies. The hoists were considerably more expensive than single-drum models, and sinking and timbering a shaft with two hoisting compartments constituted a great cost.

[554] Twitty, 2002: 199-201.
[555] Twitty, 2002: 320.

Like single-drum hoists, double-drum units came with geared or first-motion drives. Geared models, ranging in size from 7' x 12' to 12' x 17', were slower, less powerful, and noisier than their direct-drive brethren, but cost much less. The ultimate answer for raising the maximum quantity of ore in minimal time was the installation of a double-drum, first-motion hoist. This type of hoist ranged in size from approximately 18' x 25' to over 30' x 40' in area, and its visual impact mirrored its performance. The extreme difficulty and exorbitant costs of transporting and installing these massive machines relegated them to only the most heavily capitalized mining companies. Not only did these types of double-drum hoists permit mining companies to maximize production, but also they served as a statement of a company's financial status, levels of productivity, and quality of engineering.

As early as around 1895, San Juan County's well-capitalized mining companies, such as the Silver Lake Mines Company, embraced electric hoists for work underground. By 1900, electric hoists also saw greater use on the surface, as well. Like steam hoists, electric models came in four basic varieties: geared single and double-drum units, and direct-drive single and double-drum units. The geared electric hoists were much like their steam ancestors. The gearing permitted hoist manufacturers to install small and inexpensive motors ranging from 30 to 300 horsepower. Direct-drive electric hoists, on the other hand, had huge motors rated up to 2,000 horsepower attached to the same shaft as the cable drums.[556]

As with steam hoists, mining engineers classified single-drum electric hoists smaller than 6' x 6' in area as sinking-class in duty. Most production-class hoists featured motors rated to at least 60 horsepower for single-drum units and 100 horsepower for double-drum units. Even with large motors, these geared hoists had slow speeds of less than 600' per minute, a limited payload capacity, and were unable to work in the deepest shafts.[557]

During the capital-scarce Great Depression, many mining companies had to settle for small, slow, sinking-class hoists out of economic necessity. These companies used hoists with motors rated at only 15 horsepower, which in better times might have been used for light work underground. Some outfits cobbled together hoists from machinery that had been cast off during earlier decades. Miners exercised creativity in reusing obsolete machinery, and their solutions fell into several basic patterns. One common method involved obtaining an old, geared steam hoist, stripping the steam equipment, and adapting an electric motor. Another clever means was to leave the steam equipment intact and substituted compressed air for steam to power the hoist. The only drawback was that a costly, multistage compressor had to supply the air. In some cases, impoverished mining operations were able to contract with neighboring companies that possessed the necessary compressors for the air. A third practice was to assemble hoists from odd pieces of machinery. A favorite system involved coupling a small hoist, stripped of everything but the brake and clutch, to the power train of a salvaged automobile. Slow, noisy, and of questionable reliability, these contraptions allowed many mining operations to turn a

[556] Eaton, 1934: 86, 295; Lewis, 1946: 187; William Staley, *Mine Plant Design* (New York: McGraw-Hill Book Co., 1936) 137; Young, 1946: 203; E.N. Zurn, *Coal Miners' Pocketbook* (New York: McGraw-Hill Book Co., 1928): 760.
[557] Twitty, 1999: 341.

small profit. Lacking the money and knowledge of how to construct a proper foundation, miners simply bolted the hoist and salvaged automobile to a flimsy timber frame that had not necessarily been anchored in the ground.[558]

Some small and medium-sized mining outfits were able to afford factory-made gasoline hoists during the Great Depression. Mining companies continued to use the old single-cylinder gasoline hoists, and they also purchased factory-made donkey hoists offered by machinery suppliers such as Fairbanks-Morse and the Mine & Smelter Supply Company. The donkey hoist manufactured during the 1930s consisted of a small automobile engine that turned a cable drum through reduction gearing. The makers designed the little machines to be portable, and they affixed all of the components onto a steel frame.

Few shaft mines in the county today retain their hoists and instead feature the foundations, which are distinct. By examining the footprint of a foundation, the researcher can often determine the exact type of hoist that served a mine. Foundations for production-class *single-drum steam hoists* and *single-drum electric hoists* tend to be slightly rectangular and flat, feature at least six anchor bolts around the outside, and usually consist of concrete or masonry. Foundations greater than 8' x 8' in area may feature a depressed center that once accommodated a large cable drum. Foundations for *double-drum geared steam hoists* tend to possess an elongated rectangular footprint oriented 90 degrees to the shaft. They usually consist of concrete or masonry, feature a perimeter of anchor bolts, and include wells for the cable drums. Small anchor bolts on the edges of the drum wells often braced brake shoes.

Double-drum geared electric hoists were bolted to foundations similar to those for their steam-driven counterparts. The principal difference manifests as a separate mount for the electric motor, which is often rectangular, less than 4' x 5' in area, and features four anchor bolts.

Direct-drive hoists were usually bolted to complex foundations that anchored the machines' individual components. The foundation usually consists of two parallel masonry footers capped with dressed sandstone or granite blocks. The blocks toward the rear supported the steam cylinders and those toward the front supported the cable drum's bearings. Single-drum hoists required one depressed well between the footers for the cable drum, and double-drum hoists required two wells. In addition, a masonry pylon stood between the wells to support the drum axle. Foundations for single-drum hoists are rarely larger than 14' x 19' in area, and those for double-drum hoists are greater.[559]

Steam Boilers

Boilers were necessary components of steam-powered hoisting systems. While specific designs of boilers evolved and improved over time, the basic principle and function remained unchanged. Boilers were iron vessels in which intense heat converted large volumes of water

[558] Twitty, 1999: 341, 343.
[559] Twitty, 2002: 240.

into steam under great pressure. Such specialized devices had to be constructed of heavy boilerplate iron riveted to exacting specifications, and they had to arrive at the mine ready for neglect and abuse. The problem that boilers presented was that they were bulky, heavy, cumbersome, and required engineering to install.

During the 1870s, the *Pennsylvania boiler*, *locomotive boiler*, and *upright boiler*, also known as the *vertical boiler*, quickly gained popularity among the county's prospect operations. These boilers were well-suited to the county's difficult geographic and physical environment because they were self-contained and freestanding, ready to fire, and able to withstand mistreatment. Because the three types boilers were designed to be portable at the expense of efficiency, mining engineers declared them fit only for sinking duty.

In general, the above boilers consisted of a shell that contained water, flue tubes extending through the shell, a firebox inside the shell at one end, and a smoke manifold. When the fireman stoked a fire in the firebox, he adjusted the dampers to admit enough oxygen to bring the flames to a steady roar. The flue gases, which were superheated, flowed from the fire through the flue tubes, imparting their energy to the surrounding water, and they flowed out the smoke manifold and up the smokestack.

The boiler front featured a glass sight tube much like the level indicator on a coffee urn so the fireman could measure the water level. Boiler tenders usually kept the boiler three-quarters full, the empty space being necessary for steam to gather. When the fire grew low, the boiler tender opened the fire door, the upper of two cast- iron hatches, and threw in fuel. Mining engineers recognized that cord wood was the most appropriate fuel in remote and undeveloped mining districts because poor roads and great distances from railheads made importing coal too expensive. However, coal was the most energy-efficient, a half ton equaling the heat generated by a cord of wood, and as a result mining operations proximal to commercial centers preferred it.

During the 1880s, mining companies came to appreciate the utility and horsepower of the locomotive boiler, so named because railroad engine manufacturers favored it for building locomotives. The boiler consisted of a horizontal shell with a firebox built into one end and a smokestack projecting out of the other end. Nearly all models stood on wood skids and were easily portable, but some required a small masonry pad underneath the firebox and a masonry pillar supporting the other end. Locomotive boilers were usually 10' to 16' long, 3' in diameter, and stood up to around 6' high, not including the steam dome on top. These workhorses, the single most popular sinking-class source of steam into the 1910s, typically generated from to 30 to 50 horsepower, enough to run a hoist.[560]

Upright boilers were the least costly of all models. They tolerated abuse well and were the most portable, but they were highly inefficient and could not generate much horsepower. Upright boilers consisted of a vertical water shell that stood over a firebox and ash pit integral with a cast-iron base. The flue tubes extended upward through the shell and opened into a smoke chamber enclosed by a hood and smokestack, which appeared much like an inverted funnel. Upright boilers required little floor space and maintenance and were so durable that they almost

[560] Twitty, 1999: 204.

could have been rolled from site to site. Plenty of remote prospect operations saw great advantage in vertical boilers, and consequently these steam generators enjoyed substantial popularity into the 1910s.[561]

The third sinking-class boiler widely used was the Pennsylvania model. This unit combined the form and portability of the locomotive boiler with the function of the Scotch marine boiler, discussed below. Like the other portable boilers, the Pennsylvania boiler featured an enclosed firebox surrounded by a jacket of water. The flue gases traveled through tubes in the shell, rose into a small smoke chamber at the rear, reversed direction, traveled toward the front through more tubes, and escaped through a smokestack. The Pennsylvania boiler, which originated in the Keystone state's oil fields, proved to be remarkably efficient.[562]

Developed in Scotland for maritime purposes, the Scotch marine boiler was the least popular sinking-class steam generator. Scotch marine boilers consisted of a large-diameter shell enclosing the firebox, and the path for the flue gases was similar to that of the Pennsylvania boiler. While this type of boiler was one of the most efficient portable units, it never became popular because convention dictated the use of other types, and because it was heavy, large, and difficult to haul to remote locations.[563]

Engineers who designed production-class surface plants rarely relied on portable boilers because of their inefficiency. Rather, engineers predominantly used *return-tube boilers* in masonry settings, or they erected *water-tube boilers*, which offered the ultimate fuel economy. The concept and design behind the return-tube boiler was innovative. The boiler shell, part of a complex structure, was suspended from legs known as *buckstaves*, so named because they prevented the associated masonry walls from bucking outward. The masonry walls enclosed the area underneath the boiler shell, and a heavy iron façade shrouded the front. A firebox lay behind the façade underneath the boiler shell. Under the firebox lay an ash pit, and both were sealed off from the outside by heavy cast-iron doors. When a fire burned, the superheated flue gases traveled from the firebox along the belly of the boiler shell and rose up into a smoke chamber at the rear of the structure. They reversed direction and traveled toward the front through large flue tubes extending through the shell, and then exited through the smoke manifold. The path under and then back through the boiler shell offered the flue gases every opportunity to transfer energy to the water within and convert it into steam.

Return-tube boilers were workhorses that withstood the harsh treatment and neglect typical of the mining industry. However, boiler tenders had to attend to a few basic details to avoid accidental death, disastrous explosions or ruptures. First, they had to keep the boiler at least two-thirds full of water. Second, the fireman had to clean the ashes out of the ash pit regularly to ensure that the fire did not suffocate. Third, the fireman verified that the water and

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[561] Terrell Croft, *Steam Boilers* (New York: McGraw-Hill Book Co., 1921) 48; International Textbook Company, 1899: A18, 34; Frank B. Kleinhans, *Locomotive Boiler Construction* (New York: Norman W. Henley Publishing Co., 1915) 12; Rand Drill Company, *Illustrated Catalogue of the Rand Drill Company, New York, U.S.A.* (New York: Rand Drill Company, 1886) 47; W.H. Tinney, *Gold Mining Machinery: Its Selection, Arrangement, & Installation* (New York: D. Van Nostrand Company, 1906) 50.

[562] Twitty, 1999: 206.

[563] Colliery Engineer Company, 1893: 262; International Textbook Company, 1899: A18, 28; Peele, 1918: 2083; R.H. Thurston, *A Manual of Steam Boilers: Their Design, Construction, and Operation* (New York: John Wiley & Sons, 1901) 31.

steam valves were operational and that the pressure did not exceed the critical point. Last, the fireman had to feed the fire. Skilled firemen were able to add just enough fuel in an even distribution so that the fire kept a fairly constant glow. To ensure that firemen and boiler tenders had easy access to plenty of coal, the mining engineer usually had a coal bin built facing the firebox doors. In other circumstances cordwood may have been stacked in the bin's place.

Mining companies with plenty of capital installed additional devices to improve the energy efficiency and performance of their return-tube boilers. First, they may have arranged feed-water tanks to allow sediment and mineralization to settle out. Second, some companies installed feed-water heaters, which were small heat exchangers that used some of the boiler's hot water or steam to preheat the fresh feed water. These moderated the shock of temperature changes to the boiler, prolonging the vessel's life and increasing fuel efficiency. A few engineers working at the largest mines automated the input of coal with mechanical stokers. Engineers also fitted heavily stoked boilers with rocking or shaking grates that sifted the ashes downward, promoting better combustion of the fuel. Last, companies wrapped the heater, steam pipes, and exposed parts of the boiler with horsehair or asbestos plaster as insulation.[564]

At the time when boiler technology was nascent, in 1856 an American inventor named Wilcox devised a boiler radically different and more efficient than the best return-tube models. Wilcox's system consisted of a large brick vault capped with several horizontal, iron water tanks and an assemblage of fifty to sixty water-filled iron tubes. The vault contained a firebox, ash pit, and smoke chamber. The tubes drew water from one end of the tanks and sent the resultant steam to the other end. By 1870, the design, known as the *water-tube boiler*, had been commercialized and manufactured by the firm Babcock & Wilcox.[565]

After Babcock & Wilcox's water-tube boiler had proven itself in industrial applications, mining engineers began to take an interest. The fact that the water ran through the tubes and not around them greatly increased the liquid's heating area, which resulted in greater efficiency than return-tube boilers. In addition, the threat of a catastrophic explosion was almost nonexistent. By the 1890s, a number of mechanical engineers had devised other water-tube boilers, such as the Heine, Sterling, Wickes, Hazelton, and Harrisburg-Starr.

The problem with all of the above models, however, was that they required much more attention than the rugged return-tube boilers, were significantly more costly, and were beyond the understanding and field skills of average mining engineers. As a result, water-tube boilers saw use only at large, well capitalized mines under the supervision of professionally trained engineers. Both the Silver Lake and Iowa mines relied on such advanced boilers for most of their steam. As the prices of water-tube boilers fell during the 1900s and capital became abundant following the Silver Crash of 1893, their popularity grew, but the embrace of electricity in the 1910s prevented the widespread adoption of water-tube boilers.

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[564] Magnus Ihlseng, *A Manual of Mining* (New York: John Wiley & Sons, 1892): 581; International Textbook Company, 1924: A23, 53; *The Mining Catalog: 1925 Metal-Quarry Edition* (Keystone Consolidated Publishing Company Inc., 1925) 115; Peele, 1918: 2086.

[565] Croft, 1921: 18, 53; Horace Greeley, Leon Case, et. al.,"*Babcock and Wilcox Boiler," The Great Industries of the United States* (Hartford: J.B. Burr.; International Textbook Company, 1872, 1899) A18, 35; C.B. Linstrom and A.B. Clemens, *Steam Boilers and Equipment* (Scranton: International Textbook Co., 1928) 30; Peele, 1918: 2083; Thurston, 1901: 34; Tinney, 1906: 63.

Headframes

Nearly all the mechanical hoisting systems built in San Juan County included a headframe over the shaft. The purpose of the headframe was to support and guide the hoist cable and assist the transfer of rock from and supplies into the hoisting vehicle. Professionally educated engineers recognized six basic forms of headframes, including the tripod and tetrapod used with horse whims, as well as the two-post gallows, four and six-post derricks, and the A-frame.

The *two-post gallows* was one of the most common headframes, and engineers agreed that it was best for prospecting. The variety used by small operations usually consisted of two upright posts, cap timber, another cross-member several feet below, and diagonal back braces, all standing at most 25' high. The cap timber and lower cross-member held the sheave wheel in place. The gallows portion of the structure stood on one end of a timber foundation equal in length to the headframe's height. The diagonal backbraces extended from the posts down toward the hoist, where they were tied into the foundation footers. The foundation, made of parallel timbers held together with cross- members, rested on the surface of the ground and straddled the shaft collar. The four-post derrick erected for prospecting was similar in height, construction, and materials to two-post headframes; it featured four posts instead of two and stood on a timber foundation. The A-frame was based on the same design as the two-post gallows. The difference was that the A-frame featured fore and aft diagonal braces to buttress the structure in both directions. A-frames were not erected directly over inclined shafts and instead were placed between the hoist and shaft so that the angle of the cable extending upward from the hoist equaled that extending down the inclined shaft.

The common features shared by the above structures included small size, simplicity, minimization of materials, ease of erection, and portability. For comparison, a two-post gallows frame 20' high cost as little as $50 and a slightly larger structure $150, while a production-class A-frame cost $650 and a production-class, four-post derrick headframe up to $900.[566]

When designing sinking-class headframes, the mining engineer had to consider three basic stresses. The first was live load, created by the weight of a full hoist vehicle and cable. The second was braking load, a surge of force created when the hoistman quickly brought a vehicle to a halt in the shaft. The third was the horizontal pull of the hoist. To counter these forces, mining engineers often built their headframes with 8' x 8' timbers and installed diagonal back braces to counter the pull of the hoist. Usually, carpenters assembled the primary components with mortise-and-tenon joints, 1" diameter iron tie rods, and timber-bolts. Professionally trained mining engineers specified that diagonal back braces were most effective when they bisected a vertical angle and the diagonal pitch of the hoist cable. When a mining engineer attempted to find the mathematically perfect location for a hoist after erecting a headframe, he merely measured the distance from the shaft to the diagonal brace, doubled the length, and installed the

[566] Twitty, 1999: 215.

hoist. Many prospect operations followed this general guideline, but poorly educated engineers gave the diagonal braces either too much or too little angle.[567]

Unlike the simplicity of sinking-class headframes, production-class headframes were more complex, and designing them was rigorous. Mining engineers had to account for a wide variety of stresses, consider the structure's multiple functions, and coordinate the structure with other hoisting system components. They had to build a structure capable of withstanding vertical forces including an immense dead load, live load, and braking load. Engineers had to calculate horizontal forces including the powerful pull of the hoist and windshear, which could not be underestimated in San Juan County. Last, mining engineers had to plan for racking and swaying under loads and for vibration and shocks to the structure.[568]

Table E 2.2: Headframe Specifications: *Type, Material, Class*

Headframe Type	Material	Class	Capital Investment
Tripod	Hewn Logs	Sinking	Very Low
Tripod	Light Timber	Sinking	Very Low
Two Post (Gallows Frame): Small	Timber	Sinking	Low
Two Post (Gallows Frame): Large	Timber	Production	Low to Moderate
Two Post (Gallows Frame): Large	Steel	Production	Moderate to High
Four Post: Small	Light Timber	Sinking	Low
Four Post	Timber	Production	Moderate
Six Post	Timber	Production	Moderate to High
Four and Six Post	Steel	Production	High
A-Frame	Timber	Production	Moderate to High
A-Frame	Steel	Production	High

(Reproduced from Twitty, 1999: 281).

Building a headframe that could withstand the sum of the above forces was not enough at a producing mine. Mining engineers had to forecast how they thought the headframe would interact with the mine's production goals and how it would interface with the rest of the hoisting system. The depth of the shaft, the speed of the hoist, and the rail system at the mine directly influenced the height of the structure. Deep shafts served by fast hoists required tall headframes, usually higher than 50', to allow the hoistman room to stop the hoisting vehicle before slamming into the top. Highly productive mining operations often utilized vertical space and constructed multiple shaft landings. Some companies using skips built rock pockets into the headframe, which also required height.

Mining engineers found four basic headframe designs adequate for the needs of heavy ore production. These included the *four-post derrick*, the *six-post derrick*, an *A-frame* known also as the *California frame*, and a heavily braced, two-post structure known as the *Montana*

[567] Twitty, 1999: 215.

[568] Ihlseng, 1892: 91; International Textbook Company, 1899: A23, 105; International Textbook Company, 1906: A53, 31; Milo S. Ketchum, *The Design of Mine Structures* (New York: McGraw-Hill Book Co., 1912) 41; Peele, 1918: 926; Twitty, 1999: 274.

type. As the names suggest, engineers working in specific regions in the west favored certain headframe designs over others. While the above structures were intended to serve vertical shafts, two-post gallows headframes and a variety of A-frames up to 35' high were also erected to serve inclined shafts.[569]

Nearly all mining engineers built their headframes with heavy timbers assembled with mortise-and-tenon joints, timber-bolts, and iron tie rods. All four and six-post headframes featured stout backbracing anchored between the shaft and the hoist, and the entire structure stood on foundation footers straddling the shaft. The posts on A-frames were set at an exaggerated batter, meaning they splayed out to absorb all of the vertical and horizontal stresses, and as a result A-frames used in association with both vertical shafts and inclines rarely had backbraces.[570]

Production-class headframes, weighing dozens of tons, required sound and substantial foundations to remain stable. A preplanned and well-built foundation was one factor that set these structures apart from sinking-class headframes, and engineers used one of three basic designs. The first consisted of a squat timber cube featuring bottom sills, timber posts, and caps. The second type consisted of several log cribbing cells assembled with notches and forged iron spikes, and the third was a log or timber latticework consisting of open cubes between 4' and 6' high, capped with dimension timbers. The problem with the above foundations was that the perishable wood rotted when covered with waste rock, especially when the rock was highly mineralized. Well-financed companies substituted concrete or rock masonry to gain a lasting foundation.[571]

In the 1890s, the largest mining companies began experimenting with steel girders for headframes as an alternative to timber. According to many prominent mining engineers, steel was the ultimate building material because it did not decay, was strong, did not burn, and facilitated the erection of taller headframes. However, steel was significantly more expensive than timber, and as a result, few if any companies in the county put up such structures.

Mining operations that were active during and after the Great Depression had the same needs for headframes as their predecessors. Most Depression-era outfits attempted to reuse existing headframes to save capital, and in such cases, the outfit merely had to affect necessary repairs. If the mine lacked its original headframe, then the outfit had to erect another one, and the replacement structures differed according to the outfit's nature.

Large mining companies continued the practice of building four and six-post derricks and A-frames and still considered steel to be the ultimate material. But by the 1930s, a certain element of construction quality and craftsmanship had been lost. Workers no longer took the trouble to assemble the structure with mortise-and-tenon joints. Instead, they simply butted the timbers against each other or created shallow square notch joints and bolted the frame together.

Impoverished outfits with neither the funding nor the means to build substantial structures instead assembled small headframes designed to be functional while incorporating

[569] Twitty, 1999: 275.
[570] International Textbook Company, 1906: A53, 35; Ketchum, 1912: 7; Peele, 1918: 935.
[571] Twitty, 1999: 283.

little material. When possible, these mining companies relocated entire headframes. By nature, the headframes tended to be old sinking-class two-post gallows or four-post derrick structures because they were simple, easy to transport, and required no formal engineering.

One practice that many mining companies shared during the Great Depression was an extensive use of salvaged timbers. Stout timbers were a precious and costly commodity, and in hopes of saving capital, mining companies reused the heavy beams left by abandoned operations. As a result, headframes remaining from the 1930s and afterward may feature timbers differing in dimensions, weathering, and quality of wood. In addition, salvaged timbers frequently exhibit abandoned mortise-and-tenon joint sockets, and bolt and nail holes. The heavy use of such material for headframes, as well as for other structures, is typical of Depression-era structures.

Additional Surface Plant Components

The above descriptions of tunnel and shaft mines account for basic surface plant components. Productive mining companies often installed additional facilities that enhanced their ability to increase production and sustain work underground. The following components were characteristic of both tunnel and shaft mines.

Air Compressors

Blasting was of supreme importance to mining because it was the prime mover of rock underground. During much of the nineteenth century, miners traditionally drilled holes by hand, loaded them with explosives, and fired rounds. Hand-drilling proved slow, but no practical alternative existed to take its place until machinery manufacturers began selling mechanical rock drills during the 1870s. When drilling by hand, miners typically advanced tunnels and shafts only 1’ to 3’ per shift in hard rock. By contrast, the mechanical rock drills offered during the 1880s and 1890s permitted miners to bore greater numbers of deeper holes and advance a tunnel or shaft approximately 3’ to 7’ per shift. As drilling technology improved during the 1890s and 1900s, miners were able to make even greater progress, convincing engineers that the relatively high cost was justified. Some of the early drills were powered by steam plumbed to the point of work, but the majority were driven by compressed air, generated and distributed through an engineered system.[572]

The air compressor lay at the heart of the system, and while those manufactured between the 1880s and 1920s came in a variety of shapes and sizes, they all operated according to a basic premise. Compressors of this era consisted of at least one relatively large cylinder, much like a steam engine, which pushed air through valves into plumbing connected to an air receiving tank. The volume of air that a compressor delivered, measured as *cubic feet of air per minute* (cfm), depended on the cylinder’s diameter and stroke, and how fast the machine operated. The pressure capacity, measured as *pounds per square inch* (psi), depended on the above qualities,

[572] Halbert P. Gillette, *Rock Excavation: Methods and Cost* (New York: Myron C. Clark Publishing Company, 1907) 15; Hoover, 1909: 150; International Correspondence Schools, 1907: 13; Peele, 1918: 184, 213; Young, 1946: 87.

how stout the machine was, and on check-valves in the plumbing. Generally, high-pressure, high-volume compressors were large, strong, durable, complex, and therefore expensive.

The mechanical workings of the air compressors manufactured prior to around 1890 were relatively simple. The two most popular types were *steam-driven straight-line* and the *steam-driven duplex* models, and both were a basis for designs that served the mining industry well for over sixty years. The straight-line compressor, named after its physical configuration, was the least expensive, oldest, and most elemental of the two types of machines. Straight-line compressors were structurally based on the horizontal steam engine and featured a large compression cylinder at one end, a heavy cast-iron flywheel at the opposite end, and a steam cylinder situated in the middle, all bolted to a cast-iron bedplate. The steam cylinder powered the machine, and the flywheel provided momentum and smoothed the motion.

During the 1870s and early 1880s, mechanical engineers improved many of the inefficiencies attributed to early straight-line models. First, engineers modified the compression cylinder to make it double-acting, much like a butter churn. In this design, which became standard, the compression piston was at work in both directions of travel, being pushed one way by the steam piston and dragged back the other way by the spinning flywheel. In so doing the compression piston devoted 100 percent of its motion to compressing air.

During the early 1880s, mechanical engineers innovated several improvements. Engineers found that coupling the compression piston to the steam piston with a solid rod, so that both acted in tandem, proved highly inefficient. The steam piston was at its maximum pushing power when it was just beginning its stroke, and the compression piston, also beginning its stroke, offered the least resistance. When the steam piston had expended its energy and reached the end of its stroke, the compression piston offered the greatest resistance because the air in the cylinder had reached maximum compaction. Mechanical engineers recognized this wasteful imbalance and designed an intermediary crankshaft that reversed the relationship between the pistons. Despite the superior efficiency of this design, mining companies usually selected the simpler compressors with solid shafting because they cost less.

During the late 1880s and early 1890s, mining engineers fine-tuned compressed air technology used for mining. The most significant advance was a design that generated greater air pressure, which made drills run faster and improved the pressurization of the maze-like networks of plumbing. Machinery makers began offering straight-line and duplex compressors capable of achieving what the industry termed *multi-stage compression*. To increase pressure, mechanical engineers divided the compression between high and low-pressure cylinders in several stages, instead of in a single cylinder. They designed the low-pressure cylinder to be relatively large, forcing semi-compressed air into the small, high-pressure cylinder, which highly compressed the air and released it into a receiving tank.

Machinery makers designed multi-stage, straight-line compressors with two and even three compression cylinders coupled onto the steam-driven piston, and they produced duplex compressors with several multi-stage cylinder arrangements. The most common multistage duplex compressor was the *cross-compound* arrangement, in which one side of the machine featured the low-pressure cylinder, and the air passed from it through an intercooler to the high-

pressure cylinder on the other side. In general, companies with heavy air needs installed multi-stage compressors while operations with limited capital continued to rely on the less costly, conventional models.

Table E 2.3: Air Compressor Specifications: *Type, Timeframe, and Capital Investment*

Compressor Type	Age Range	Capital Investment
Upright: 2 Cylinders, Belt Driven	1900s-1940s	Low
Upright: 3 to 4 Cylinders, Integral Gasoline Piston	1930s-Present	Moderate
V Pattern	1930s-Present	Moderate to High
Straight-Line, Single Stage, Gasoline Engine Driven	1900s-1930s	Low
Straight-Line, Single Stage, Steam Driven	1880s-1920s	Moderate
Straight-Line, Two Stage, Steam Driven	1890s-1920s	High
Straight-Line, Triple Stage, Steam Driven	1890s-1920s	Very High
Straight-Line, Single Stage, Geared to Electric Motor	1900s-1920s	Moderate
Straight-Line, Various Stages, Geared to Electric Motor	1900s-1920s	High
Straight-Line, Single Stage, Belt Driven by Electric Motor	1900s-1940s	Low
Duplex, Single Stage, Steam Driven	1890s-1920s	Moderate
Duplex, Two Stage, Steam Driven	1890s-1920s	High
Duplex, Triple Stage, Steam Driven	1890s-1920s	Very High
Duplex, Two Stage, Belt Driven	1900s-1940s	Moderate
Duplex, Three Stage, Belt Driven	1900s-1940s	Moderate to High

(Adapted from Twitty, 2002: 306).

At the turn of the century, machinery makers began to offer air compressors that were smaller, more efficient, and provided better service than early models. They adapted several designs to be run by electric motors and gasoline engines, energy sources well-suited to remote mines. Gasoline and electric compressors underwent gradual acceptance, but proved their worth by the 1910s, and mining companies throughout San Juan County embraced them.

By the late 1890s, mining machinery makers offered three basic types of electric compressors, including a straight-line machine that was approximately the same size as traditional steam versions, a small straight-line unit, and a duplex compressor. Duplex models, conducive to multi-stage compression, were most popular among medium-sized and large mining companies, while moderately sized mining operations favored the small straight-line units. Due to limited air output compared with a relatively large floor space, the large, electric, straight-line compressors never became popular.

Compressor makers also developed economical gasoline units ideal for remote operations. The gasoline compressor, introduced in practical form in the late 1890s, consisted of a straight-line compression cylinder linked to a single-cylinder gas engine. Most mining

engineers considered gas compressors to be for sinking duty only. Large gasoline machines were capable of producing up to 300 cubic feet of air at 90 pounds per square inch, enough to run up to four small rock drills.[573]

The noisy gasoline machines had needs similar to their steam-driven cousins. Gasoline compressors required cooling, fuel, and a substantial foundation capable of withstanding intense vibration. They came from the factory either assembled or in large components for transportation into the backcountry. The cooling system often consisted of no more than a water tank, and the fuel system could have been simply a large sheet iron fuel tank connected to the engine by ¼" to ½" inch metal tubing. Motor-driven duplex and straight-line compressors dominated mining operations through the 1940s. Well-financed mining companies requiring high volumes of air at high pressures continued to favor belt-driven duplex compressors, while companies with slightly reduced air needs relied on relatively inexpensive, single-stage, belt-drive, straight-line compressors.

Despite common reliance on older designs, compressed air technology underwent dynamic changes after the 1910s. Mechanical engineers experimented with unconventional designs beginning in the 1900s, and during the 1910s several went commercial. The *upright two-cylinder compressor* was based on the automobile engine and featured similar valves and a crankshaft. Used on an experimental basis as early as the turn of the century, these units were inexpensive, adaptable to any form of power, and light. Further, machinery makers mounted them onto four-wheel trailers or simple wood frames for mobility. *V-cylinder compressors*, also known as *feather valve compressors*, adapted large-displacement truck engines and featured three to eight cylinders arranged in a "V" configuration. The new design relied on a grossly enlarged radiator for cooling and was powered by an electric motor directly coupled onto the crankshaft.

In most cases, when a mine was abandoned the compressor was removed, leaving only the foundation. However, as with hoists, based on that footprint, the researcher can often determine the exact type of compressor used. Following are descriptions of the foundations of common types of compressors. *Straight-line steam compressors* usually stood on foundations with a rectangular footprint and flat top studded with two rows of anchor bolts. In general, workers used masonry or concrete, although they bolted some machines less than 12' long to timbers. Foundations for large compressors often featured individual blocks for the steam and compression cylinders and a separate pedestal adjacent to one end for an outboard flywheel bearing.

Foundations for the large, early *duplex steam compressors* consisted of a pair of elongated rectangular pads spaced several feet apart. The pads were usually mirror opposites, and their anchor bolts were symmetrical in pattern. Workers almost always used masonry or concrete, but arranged individual stone blocks for the components of large versions. The steam and compression cylinders and flywheel were bolted to their own sets of blocks.

[573] Twitty, 1999: 126.

The foundations for the compact duplex compressors are easily identified today. The foundations are U-shaped, slightly rectangular, and several feet high. Units powered by a separate motor had a small pad for the motor at the open end of the U, while steam compressors lacked the additional pad.

Straight-line belt-driven compressors were bolted to foundations similar to those for their steam-driven counterparts. They also featured a separate pedestal at one end for the flywheel's outboard bearing, and a second, rectangular foundation for the drive motor.

Due to severe vibrations, *petroleum compressors* were usually bolted to stout, concrete foundations several feet high. The foundations are almost always rectangular, several feet wide, less than 9' long, with two rows of anchor bolts. *Upright compressors*, small in size, could have been bolted to either timber or concrete foundations rectangular in footprint. A pad for the engine or motor should be adjacent and aligned.

Foundations for *V-cylinder compressors* tend to be fairly distinct and often feature an adjacent mount for a motor or engine. Compressors that had several cylinders were bolted to rectangular foundations between 3' x 3' and 4' x 5' in area. Foundations for machines with numerous cylinders were several feet wide and up to 10' long. In construction, the foundations had a series of closely spaced timbers bolted to either an underlying concrete pad or buried timber footer.

Electricity

Mining engineers in the west began experimenting with electricity as early as 1881. At that time, electric technology was new and its practical application was limited primarily to lighting. During the 1880s, visionary inventors demonstrated that electricity was able to do mechanical work as well.[574]

During the late 1880s and early 1890s, well-capitalized companies in technologically advanced areas, the San Juan Mountains in particular, began to harness electricity for practical use. They made their first attempts in locations that featured a combination of water and topography that could generate hydro-power. In 1888, the Tomboy and Virginius mines at Telluride used electricity to run custom-made electric hoists and lighting. In 1890, power plants were built at Ames in San Miguel County and at Silverton. In 1891, Edward Stoiber erected a small plant for his Silver Lake Mine. Colorado, and especially the San Juan Mountains, acted as a proving ground for the application of electricity through the rest of the decade. Engineers foresaw electricity as an alternative to steam. Generating electricity at a central point and transmitting to remote mines eliminated the need to haul coal and steam equipment at great cost. Inherent limitations in electrical technology, however, slowed its initial use.

The earliest electrical circuits were energized with direct current (DC) with a unidirectional flow, although mining engineers also experimented with alternating, or oscillating, current (AC). Neither power source as they existed during early the 1890s was particularly well

[574] Eric Twitty, *"From Steam Engines to Electric Motors: Electrification in the Cripple Creek Mining District,"* The Mining History Journal (1998): 103.

suited for mining. AC current could be transmitted for miles with little energy loss, but AC motors were incapable of starting or stopping under load. Therefore, AC was unsuitable for running hoists, large shop appliances, or other machines that experienced sudden drag or required variable speed. AC electricity was effective, however, for running small air compressors, ventilation fans, and other constant-rotation machines that offered little resistance. DC electricity, on the other hand, had the capacity to start and stop machinery under load, but the electric current could not be transmitted at distance without suffering debilitating power loss. Therefore DC current had to be used adjacent to its point of generation. In addition, DC motors were incapable of running the massive production-class machines that mining companies had come to rely on for profitable ore extraction.[575]

Based on the above, contemporary electrical technology offered mining companies little incentive to retire their steam equipment. However, progressive engineers such as Edward Stoiber conducted extensive experimentation during the early 1890s to harness both DC and AC currents. Around 1900, electrical appliance manufacturers made several breakthroughs that rendered the power source useful for mining. Electricians developed the three-phase AC motor, which could start and stop under load while using current that could be transmitted long distances. They also invented DC/AC converters, which permitted the use of DC motors on the distribution end of an AC electric line. The net result was that electricity became an attractive power source to a broad range of consumers. Still, many mining companies were not yet willing to relinquish traditional steam technology completely. Voltage, amperage, and current had not yet been standardized among machinery manufacturers or various power generators. As such, the prevailing attitude was cautious.[576]

The rigors of mine hoisting proved to be a major obstacle, but by the turn of the century machinery manufacturers developed a variety of small AC and DC hoists that were reasonably reliable. The early electric models were similar in design to sinking-class geared steam hoists and were manufactured with motors wholesaled from electric appliance companies such as General Electric. Even though the electric hoists were able to start and stop under load, they remained slow with limited payload capacity.[577]

By the 1910s, engineering progressed to the point where mining companies could not deny that electric equipment performed as well as steam. When steam machines became worn, mining companies replaced them with electric models. One engineer asserted that where power was readily available, a steam-driven compressor cost up to $100 per horsepower per year to run while an electric model cost only $50. During the 1910s, engineers and manufacturers improved performance and reliability, and introduced double-drum units for balanced hoisting. By 1920, except for remote and poorly capitalized operations, most companies adopted electric power.[578]

Architecture

[575] International Textbook Company, 1899: A23, 5; Peele, 1918: 1126; Twitty, 1998.
[576] Twitty, 1999: 269.
[577] Twitty, 1999:270.
[578] Twitty, 1999:270.

Once a mining company had proven the existence of ore, investors expected the operation to perform throughout the year, until the ore had been exhausted. Complying with company wishes, engineers erected buildings to shelter surface plant components against the weather. They sheltered not only the mine crew, but machinery components from exposure to adverse weather. The engineer also had a tacit understanding that mine buildings possessed the ability to inspire investors. Large, well-built buildings such as those in Silver Lake Basin conveyed permanence, wealth, and industrial might.

Functional layout, design, and construction materials for mine buildings in San Juan County evolved between the 1870s and the 1920s. Most were vernacular expressions unique to each mining operation. Professional architects rarely designed these buildings, although professional and self-actualized engineers often proved capable builders despite formal training in architecture. They successfully adapted construction methods to the terrain, climate, transportation limitations, financial resources, and available materials of San Juan County. In many cases, engineers imitated mining industry architecture elsewhere and molded it to fulfill a particular need in a localized context.

Mining engineers considered four basic expenditures that influenced the type, size, and composition construction. These included the time necessary to design the building and the cost to purchase or fabricate basic construction materials. Third, materials had to be hauled to the site, and fourth, the cost of construction itself. Between the 1870s and the turn of the century, well-capitalized companies met the above considerations by erecting frame buildings sided with lumber, sometimes with some degree of pre-assembly or numbering of parts. Smaller or poorly funded operations substituted locally-available logs. Buildings erected by well-financed companies tended to be substantial and well-built, while those of operations with poor capitalization were crude, small, and rough.

The introduction of steel and iron materials to the mining industry in the 1890s changed some buildings. Steel makers began selling corrugated siding for commercial construction in the 1890s. While much siding was decorative, some varieties were designed with industrial applications in mind. Corrugated sheet metal particularly found favor with the mining industry and its use spread rapidly. Engineers increasingly utilized the material such that by the 1910s it had become ubiquitous siding for siding. The advantages of corrugated sheet metal were its affordability, light weight (and thus ease of shipping), ability to cover a substantial area, and rigidity. These qualities made corrugated sheet metal ideal where remoteness rendered lumber too costly.[579]

The other significant use of metal in mine buildings occurred during the 1900s when a few prominent companies began experimenting with girders for framing large buildings such as mills. The Gold Prince Mill, erected at Animas Forks in 1903, exemplified the practice. Architects began using steel framing to support commercial and industrial brick and stone masonry buildings as early as the 1880s, but mining companies in general found that wood

[579] Twitty, 1999: 304.

framing met their needs for less money. By the 1890s, architectural steelwork had improved and steel makers offered lightweight beams, which mining engineers adapted to the framing of large buildings. Further, engineers found that steel offered a sound structure resistant to high winds, but also often cost less than the thousands of board-feet of lumber required to erect the massive buildings.

The general types, forms, and designs of mine buildings followed a few patterns, regardless of the materials. Between the 1870s and 1910s, most engineers enclosed the primary surface plant components clustered around the shaft in a multi-purpose *shaft house*, and the plant components associated with a tunnel in a *tunnel house*. These buildings contained machinery, the shop, mine entrance, and workspace. Smaller shaft houses in San Juan County were often constructed of post-and-girt framing, gabled rafter roofs, and unsubstantial foundations. Larger shaft houses were based on custom-designed frames of heavy timbers capable of supporting the roof independent of the walls. Regardless of frame design, carpenters clad the walls with board-and-batten siding, several layers of boards, and, by the 1900s, corrugated metal siding. Even after electric lighting was available, engineers continued to design large multi-pane windows at regular intervals for daylight.

Most shaft houses conformed to a few standard footprints influenced by the arrangement of machinery. Overall, the buildings tended to be rectilinear to encompass the hoist, anchored some distance from the shaft, with lateral extensions for the shop, water tank, boilers, and either coal or cord wood storage. Professional engineers recommended that at least the boiler, and ideally the shop as well, be partitioned in separate rooms because they generated unpleasant soot and dust which took a toll on lubricated machinery.[580]

The roof profile of most shaft houses featured a louvered cupola enclosing the headframe's crown and a sloped extension descending toward the hoist to accommodate the hoist cable and headframe backbraces. Tall iron boiler smokestacks pierced the roof proximal to the hoist. The forge stovepipe extended through the roof near the shaft collar. The shaft house also sometimes featured other stove pipes at the hoistman's platform and carpentry shop. The tall smokestacks were usually guyed with baling wire against strong winds. The shaft houses at high elevations often had plank flooring to improve insulation. In some cases the shop and boiler areas, where workers dropped smoldering embers, hot pieces of metal, and nodules of fresh clinker were also floored with planking, despite fire hazard. Customarily the mining engineer designed the flooring flush with the top surfaces of the machine foundations, permitting steam and other pipes to be routed underneath.

By the late 1910s, the U.S. Bureau of Mines outlawed shaft houses made of flammable materials. The surface plants then changed to consist of a cluster of smaller buildings surrounding an exposed headframe. Instead of a shaft house, mines featured a *hoist house* for the hoist, boilers, and shop. At large operations, individual buildings housed some surface plant components separately. The shop had its own building, as with the *compressor house* and

[580] Twitty, 1999: 306.

electrical substation *transformer house*. The mine plant may have also featured a miner's *change house,* also known as a *dry*, a storage building, stable, and carpentry shop.

The difficult economic climate of the Great Depression changed general construction methods for mining architecture to some degree. Overall, the buildings became smaller, incorporated more salvaged materials, and were less well built than in previous decades. These trends continued through mining's decline in the 1960s. Mining companies with capital erected buildings that were spacious with lofty, gabled roofs when possible. Engineers continued to take advantage of natural light and provided broad, custom-made doors at key functional points. Engineers either floored principal structures with poured Portland cement, inexpensive due in part to the proliferation of trucking, or used wood planking. Preferred materials included lumber, sheet iron, and factory-made hardware. In most cases, mining engineers emphasized function and economy in their designs with no superfluous ornamentation. Poorly funded outfits could not afford quality materials or tools, experienced engineers, or skilled workers. Many favored single-slope shed roofing with salvaged irregular doors and windows. Overall, these buildings assumed an ad-hoc quality, but were ultimately well-built and offered shelter. Some buildings lacked formal framing or were simple balloon-frame construction. Builders used a patchwork of planks and sheet metal for siding, often layered to prevent wind damage.

Ore Storage

Although capitalists, engineers, and miners often held differing opinions in running a mine, all were in agreement that the primary goal was the production of ore. Those mines with any measurable output usually featured an ore storage facility to accommodate production, and two basic types of facilities typical of San Juan County's hardrock mines. *Ore bins* were functionally different from *ore sorting houses*, and mining companies based choice of structure on the type of ore being mined. Some ores were fairly consistent in quality and rock type and warranted storage in an ore bin. Low-grade and complex ore required sorting, separation from waste rock, and rudimentary concentration in an ore sorting house. Both types of structures required a means of inputting ore from the mine and a means of extracting it for shipment to a mill for finer concentration.

Mining engineers recognized three basic types of ore bins: the *flat-bottom bin*, *sloped-floor bin*, and hybrid *compromise bin*. Mining companies with regular ore production often erected large sloped-floor ore bins. The solidity of these structures inspired confidence. Well-built sloped-floor bins, which cost more than twice to build than flat-bottomed bins, typically consisted of a heavy post-and-girt frame sided on the interior with planking. The structures generally stood on foundations of heavy timber footers on terraces of waste rock. To ensure the structure's durability against the onslaught of sharp rock, laborers often armored bin floors with salvaged plate iron. Small mines used sloped-floor bins consisting of a single cell, while large mines erected structures with numerous cells to hold either different grades of ore, or batches of payrock produced by multiple companies of lessees working within the same mine.

Mining companies with limited financing and ore production erected flat-bottom bins because such structures were inexpensive. Rarely did these structures attain the proportions of their large sloped-floor cousins because the walls were not able to withstand the immense lateral pressures exerted by the ore. Flat-bottomed bins contended with pressure on all four walls, while sloped-floor bins directed the pressure against the front wall and diagonal floor. Flat-bottom bins also were seasonal because they could not be roofed.

Ore sorting houses were generally more complex and required greater capital and engineering to erect than ore bins. The primary functions of ore sorting houses were concentration and storage. In keeping with the gravity-flow engineering typical of mining, engineers usually designed sorting houses with multiple levels for input, processing, and storage. These structures usually featured a row of receiving bins or chutes on the top level, a sorting floor under the receiving bins, and a row of holding bins underneath the sorting floor. Receiving bins usually had sloped floors, and in most cases the holding bins did too. A cupola sheltered the top level, and the sorting floor was fully enclosed and heated with a wood stove. The holding bins at bottom were sloped, and the structure usually stood on a foundation of heavy timber pilings or log cribbing walls.[581]

The general path the ore followed began when miners underground characterized the nature of the ore they were extracting. They communicated their assessment via a labeled stake, a message on a discarded dynamite box panel, or a tag placed in the ore car. A trammer then hauled the loaded car out of the mine and pushed it into the sorting house. He emptied the contents into one of several bins, depending on how impure the ore was. High-grade ore went into a small special bin at one end of the structure. Run-of-mine ore, which was not particularly rich but required no sorting, went into another bin at the opposite end. Low-grade payrock combined with waste rock, known as mixed ore, went into one of several bins located in the center of the ore sorting house. When released from the car, the mixed ore slid onto a heavy grate known as a *grizzly*. The rich portions of the ore fractured into fines, while the large cobbles that remained intact after blasting and shoveling contained waste rock that needed to be cobbed, or knocked off by surface laborers. The valuable fines dropped through the grizzly directly into the holding bins at the bottom of the structure, while the cobbles rolled off the grizzlies and into chutes that fed onto sorting tables. There, laborers worked to separate the ore from waste.

Explosives Magazines

Explosives were fundamental to mining as the prime mover of rock. Mining companies had to store enough dynamite and blasting powder to carry them through the weeks spanning freight deliveries, and they often informally stacked 50 pound boxes, the standard shipping container, in heavily used mine buildings or underground workings. Worse, during cold months, much of the year at high altitude, miners stored boxes of dynamite near boilers, in blacksmith shops, and near hoists where it remained in a thawed and ready state. Such storage practices

[581] Twitty, 1999: 153.

were dangerous, and in response, some engineers instituted explosives magazines where storage could be carried out in a more controlled and orderly manner.

Well-built magazines came in a variety of forms and sizes, but all shared the common goal of concentrating and sheltering the mine's supply of explosives away from the main surface plant. Trained engineers felt that magazines should be bulletproof, fireproof, dry, and well-ventilated. Magazines should be constructed of brick or concrete, or if frame construction, the walls needed to be sand-filled and sheathed with metal. These features not only could protect explosives from physical threats, but regulate the interior environment. Extreme temperature fluctuations and pervasive moisture damaged fuse, blasting caps, blasting powder, and most forms of dynamite. This in turn directly impacted the miners' work environment, because degraded explosives created foul and poisonous gas byproducts that vitiated mine atmospheres. Mining engineers recognized proper magazine construction as comprised of stout masonry or concrete with a heavy arched roof and metal doors in steel jambs. Other magazines were similar to root cellars, consisting of a plank-lined chamber excavated out of a hillside, often 8' x 10' in area, and roofed with earth and rubble. Usually magazines were located away from the mine's surface plant. Regardless of degradation and obvious safety hazards, many small and medium-sized mining companies stored explosives in crude and even dangerous structures. Miners erected sheds sided only with corrugated sheet metal. In other cases, capital-poor operations took even less precaution and stored explosives in sheet metal boxes similar to doghouses, in earthen pits roofed with corrugated metal, or in abandoned prospect adits.

Aerial Tramways

San Juan County possesses extremely hostile terrain. Some of the county's most promising mines were also some of its most inaccessible. Sheer cliffs, excessively steep slopes, heavy snowpack, and ragged bedrock confounded numerous attempts to establish roads negotiable by wagon. Some locations were so difficult to reach that pack trains were the only viable means of transporting in materials and hauling out ore. Inadequate transportation had the potential to ruin otherwise profitable operations. Pack trains were costly, and approximately eleven burros or donkeys were required to carry out one ton of ore. The aerial tramway, for which San Juan County became known, was a productive solution to the transportation problem.[582]

Andrew S. Hallidie, a San Francisco engineer and mining machinery maker, was the first to develop a continuously operating tramway with a significant carrying capacity. In the late 1860s, he devised a system that consisted of a series of wooden towers, a continuous loop of wire rope, and loading and unloading terminals at both ends. A procession of ore buckets was fastened to the wire rope and traveled a circuit between the stations. The system operated under gravity, and as the loaded buckets gently descended downslope, they pulled the light empty ones back up to the mine. The wire rope passed around large sheave wheels in the terminals, and in

[582] Ihlseng, 1892: 137.

between coasted over idler wheels on timber cross-members, which were bolted to the towers. When empty buckets entered the top terminal, workers loaded them with payrock while the buckets were in motion. The buckets then passed around the sheave wheel and traveled down to the bottom terminal. When the buckets entered the bottom terminal, a guide rail upset them such that they dumped their contents into a receiving bin, and then returned to the top terminal. Hallidie's design changed little from the 1870s, when mining companies began experimenting with it, until the 1890s when other designs came to dominate.

Although the Hallidie design was the best contemporary tram design for moving large volumes of ore, it had limitations. Theodore Otto and Adolph Bleichert, two German engineers, developed an alternative system introduced to Europe in 1874. The *Bleichert Double Rope* tramway utilized a *track rope* spanning from tower to tower, and a separate *traction rope* that tugged the ore buckets around the circuit. The track rope was fixed in place and served as a flexible rail, which the buckets coasted over on special hangers fitted with guide wheels. The traction rope attached to the bucket hanger via a mechanical clamp known as a *grip*. Like Hallidie Single Rope tramways, Bleichert Double Rope tramways incorporated top and bottom terminals where the buckets were filled and emptied, usually aided by gravity.[583]

The principal difference lay with the grip, which was releasable and allowed workers to detach the buckets from the traction rope and stop their motion. The workers could thus manually push the buckets around the interior of the terminal on suspended rails and fill them at leisure without spillage. The double-rope system also permitted the entire tramway circuit to be extended up to four miles in length and at almost any pitch. Given this, even though Bleichert systems were up to fifty percent more expensive than Hallidie tramways, they proved better for heavy production because they had greater carrying capacities.

Mining companies began experimenting with Bleichert Double Rope systems in the 1880s, and due to superior performance, Bleichert systems eclipsed the less expensive Hallidie tramways by the 1890s. Still, some companies with limited production and moderate amounts of capital continued to install Hallidie systems after the turn of the century. Designing and building aerial tramways were beyond the skills of most engineers because the systems were complex and required advanced economic and engineering calculations. Installation usually required at least some direction from technicians dispatched by the tramway maker. Although mining companies purchased standardized tramway equipment from manufacturers, rarely were two systems alike in the county, in part because the physical and economic conditions of each mine were different.

Tramway systems were materials-intensive and required substantial structures. The basic components included a top terminal near the tunnel or shaft, a bottom terminal located adjacent to a road, railroad, or ore concentration mill, and a series of towers for the bucket line. Engineers developed four basic types of towers for both Bleichert and Hallidie systems. These included the *pyramid* tower, *braced hill tower*, *through tower*, and *composite tower*. The pyramid tower consisted of four upright legs that joined at the structure's crest. The through tower resembled an A-shaped headframe consisting of a wide, rectangular structure stabilized by fore and back

[583] Ihlseng, 1892: 138; International Textbook Company, 1905: 122; Lewis, 1946: 372; Peele, 1918: 1563; Robert A. Trennert, *"From Gold Ore to Bat Guano: Aerial Tramways in the West,"* The Mining History Journal (1997): 6.

braces, the tram buckets passing through the framing. Composite towers usually had a truncated pyramid base topped with a smaller frame supporting a cross-member. The braced hill tower was similar to the through tower, except it had exaggerated diagonal braces tying it into the hill slope. Towers for both Bleichert and Hallidie systems required stout cross-members that supported the wire ropes. Towers had to be far away enough so the buckets could swing in the wind and not strike the towers. Hallidie systems, with their single-wire rope and fixed buckets, needed only one cross-member with several idler wheels or rollers. Because the buckets suspended from a long hanger fixed onto the cable, the cross-member was bolted to the top of the tower. Bleichert systems, on the other hand, required a stout cross-member at the tower top to support the stationary track cable, and a second cross-member 3' to 7' below to accommodate the moving traction rope. The second cross-member almost always featured either idler wheels or a broad, steel roller.

Tramway terminal design challenged engineers with integrating the system with ore production. Terminals had to be physically arranged to permit the input and storage of tons of ore, facilitate the transfer of payrock into or out of the tram buckets, and resist the tremendous pull on the sheave wheel by the traction rope. In the case of Bleichert systems, terminals also anchored the track cables. Mining engineers designing small-capacity tramways attempted to solve all of the above problems within a single structure, while the terminals for large-capacity tramways required complex buildings.

Regardless of the type of tramway, the engineer had to design timber framing for the sheave wheel capable of resisting the tremendous horizontal forces of keeping the traction rope taut. The sheave in the top terminal usually fixed to a heavy timber framework anchored to bedrock and partially buried with waste rock ballast. In some designs, the wheel canted at the same angle as the pitch of the bucket line, so the cable did not derail, causing a potentially costly and fatal catastrophe. With Bleichert systems, framing usually surrounded the sheave for maximum strength, unlike Hallidie systems. Because the buckets were fixed to the traction cable, they had to pass around the wheel, which meant the wheel had to be exposed on all but the front side. Typical sheave wheels, 6' in diameter for small systems and 12' for large systems, featured a deep, toothed groove for the rope, fixed onto a heavy steel axle set in cast-iron bearings bolted to the timbers. Brake levers, usually installed in both terminals, were typically very long to provide leverage, located adjacent to or on a catwalk immediately over the wheel. The lever controlled heavy wooden shoes that pressed against a special flange fastened to the sheave wheel. At the bottom terminal, the sheave had to be moveable to take up slack in the bucket-line. In many cases, the wheel was fastened onto a heavy timber frame pulled backward by adjustable anchor cables or threaded steel rods.

Both Hallidie and Bleichert tramways were typically too large and expensive for smaller operations. Yet, rugged terrain and locations high on the sides of mountains presented no less of an access problem for these limited operations. In response, smaller companies erected *single-rope reversible* and *double-rope reversible* trams. Well-engineered single-rope trams consisted of simple components. A fixed line extended from an ore bin located high up at the mine down to another ore bin below. A hoist at the mine wound a second cable that pulled a bucket up, and

when the bucket was full, a worker lowered it via hand brake. Double-rope tramways, also known as *jig backs*, featured two fixed lines and two buckets that counter balanced. A worker lowered a full bucket down to the bottom terminal with a hand brake, and it pulled the lighter, empty one up to the top terminal. Lengthy double-rope tramways often featured a series of towers similar to those for Bleichert systems.

Ore Beneficiation: Smelting, Ore Concentration, and Amalgamation

Mining was the first stage in a long process to convert ore into refined metals for consumption. When extracted from the ground crude ore required treatment to separate the metal content from waste. The industry referred to the entire process as beneficiation, with numerous steps involved. The process was not straightforward because in San Juan County nearly all forms of ore were highly complex blends of silver, zinc, lead, copper, and gold, which strongly resisted treatment. This forced metallurgists to develop advanced chemical and mechanical processes. Simple pure ores, and some did exist, required few steps, while complex ore required time-intensive treatment. In overview, the process began with crushing and grinding the ore, followed by separating metalliferous material from waste through *concentration*. The resultant *concentrates* roasted and smelted in a furnace, which furthered separation and yielded a blend of metals known as *matte*. Advanced smelters located in Durango, Denver, Golden, Colorado Springs, and the Midwest refined matte into pure metals or *bullion*.

In San Juan County, a variety of facilities carried out one or all of the steps necessary to process crude ore. They operated either as independent mills or in conjunction with specific mines. *Smelters* were turnkey facilities that reduced crude ore to metals and matte. The Greene, Martha Rose, Walsh, and Kendrick-Gelder smelters operated sequentially in the county between 1874 and 1909. The Durango and Standard smelters operated in Durango between 1882 and 1931. Unlike smelters, *concentration mills* did not reduce ore to matte, but instead, merely separated waste from ore metal content. *Amalgamation mills*, rare in the county, crushed gold ore and relied on mercury to amalgamate with the gold.

Smelters

To produce metals, smelters incorporated mechanical, chemical, and roasting processes that a metallurgist tailored to the general character of the county's ore. Basic smelting began when wagons delivered crude ore to the facility, where workers dumped it into receiving bins at the smelter's head. The ore had to be broken into consistently sized cobbles either by hand or with a mechanical crusher before loading into the smelting furnace. If the ore contained high proportions of waste, then it was concentrated with mechanical methods prior to smelting.

The furnace was at the heart of a smelter facility, and two general types saw use in the county. The earliest, employed by the Rough and Ready and Little Dutch smelters, was a masonry structure with a chamber for ore, ducts to direct blasts of hot gases against the ore, and fireboxes with special ventilation to enhance fuel combustion. Troughs were supposed to collect

molten liquid as it ran off the ore and segregate the metal content from slag according to gravity. The exact design of these early smelters is unknown, because they largely failed.

The most successful furnaces, employed at the Martha Rose smelter, were cylindrical steel vessels 4' to 12' in diameter and lined with fire bricks. They stood on stout rock or brick masonry foundations and featured tap spouts and tuyeres, ports that admitted air blasts at graduated intervals. At center was a columnar charge of fuel, where workers dumped crude ore until the ore chamber was full. They usually admitted lead bullion, or lead or iron ore, first because the soft metal served as a flux, which, when molten, helped the rest of the ore to liquefy. After workers arranged layers of ore, sealed the spouts, and added more fuel, they started a blower that fed air to the smoldering fuel, bringing it to a great heat.[584]

As the lead or iron ore melted and the temperature increased, these liquid metals came in contact with harder metals and minerals, causing them to soften, melt, and trickle down into the base of the furnace. Over time, the lot of ore became molten and the heaviest material, usually the metals, settled to the bottom while the lighter waste floated on top. At this point, workers opened the upper slag spouts and tapped the liquid waste into slag carts, then did likewise for intermediate slag spouts. After they drew the waste off, the workers added more ore and fuel until the pool of liquid metal rose to the height of the lower slag spout. At this time, workers opened the lowest spout at the furnace base and tapped the molten metal into pots or molds until liquid slag appeared, indicating an end to the metal. Workers repeated the process, keeping the furnace in continuous operation for days or weeks.[585]

Because metallurgists used gravity to draw ore through the processing stages when possible, they usually sited smelters at the base of a slope. Smelting facilities usually required flat space, a source of abundant water, and well-graded roads. In addition to the furnace, smelters often featured ore bins, large fuel bins, water tanks, storage, assay office, and vault. Each smelter usually had more than one furnace to process batches of ore simultaneously if the material was simple, or in stages if the ore was complex. Some smelters also featured roasters and mechanized concentration mills to prepare the ore and enhance separation prior to smelting.

Concentration Mills

Only a few companies in San Juan County possessed enough capital and ore to warrant the erection of a dedicated smelter. Most companies shipped their ores to custom smelters, which extracted the metals for a fee. The shipping charges and smelting fees often constituted considerable overhead, and in response, well-capitalized mining companies attempted to save money by building concentration mills near their workings. Concentration mills relied on mechanical and chemical processes to reduce ore, separate the metalliferous materials, and prepare the resultant concentrates for shipment to a smelter for final treatment. In so doing, mining companies accomplished many intermediate steps that smelters charged for and did not

[584] Lynn Bailey, *Supplying the Mining World: the Mining Equipment Manufacturers of San Francisco 1850-1900* (Tucson: Western Lore Press, 1996) 80; Will Meyerriecks, *Drills and Mills: Precious Metal Mining and Milling Methods of the Frontier West* (Tampa: 2001) 173.
[585] Bailey, 2002: 82-3; Meyerriecks, 2001: 174.

have to ship heavy crude ore. Concentration mills were not equipped, however, to produce finished bullion.

Concentration mills were usually built over a series of terraces incised into a hillslope so gravity could draw the ore through the various processing stages. Mills existed in a variety of sizes, and large facilities usually required stone masonry or concrete terraces, while earthen terraces and substantial beamwork were sufficient for small facilities. Large mills were heavily equipped to process both high volumes of ore and complex ore that resisted simple treatment. To do so, they often provided primary, secondary, and even tertiary stages of crushing, screening, and concentration. The Silver Lake Mill even featured several parallel sequences of these processes. Small mills, by contrast, usually provided crushing and concentration in a single linear path.

Engineers and metallurgists tended to follow a general pattern when designing concentration mills. An ore bin stood at the mill's head and fed crude ore into a *primary crusher*, usually located on the mill's top platform. The crusher reduced the material to gravel and cobbles ranging from 1" to 4" in diameter, which descended to a *secondary crusher* located on the platform below. The secondary crusher pulverized the ore to sand and slurry, to pass through a screening system. Oversized material returned for secondary crushing while the remainder passed on to concentration at smaller mills, or tertiary crushing followed by concentration at larger mills. By 1900, engineers favored *trommel screens* or *shaking screens* to sort the sand. A trommel consisted of a concentric series of cylindrical screens that rotated, allowing fine material to drop through while oversized cobbles rolled out of an open end. A shaking screen was a stack of rectangular pans with screen floors.[586]

Machinery manufacturers offered a wide array of crushers and grinders, which metallurgists selected according to the ore's characteristics. Because no two mines featured the same ore and no two metallurgical assessments were alike, each mill was custom. However, engineers followed certain trends regarding the application of crushing machinery. Jaw crushers, also known as Blake crushers, provided primary crushing, while a few large operations employed gyratory crushers. Batteries of stamps were commonly employed for secondary crushing. A stamp battery consisted of a timber gallows frame with guides for heavy iron rods featuring cylindrical iron shoes. A cam lifted the rods in sequence and let them drop on the gravel being crushed. Crushing rolls often carried out secondary and tertiary crushing, and they consisted of a pair of heavy iron rollers similar to wheels in a stout timber frame. A narrow gap between the rollers drew in clasts of sand and gravel and fragmented them. Grinding pans and Huntington mills were used for tertiary crushing, and both featured a heavy cast-iron pan and iron shoes or rollers that dragged across the floor grinding the ore. When the ore was free-milling gold or silver, the metallurgist introduced mercury into the pan to amalgamate with the metals. *Tube mills* and *ball mills* offered the finest grinding. Each appliance consisted of a large cylinder that mill workers partially filled with sand, gravel, and water. The cylinder slowly rotated, and the iron rods in tube mills or iron balls in ball mills tumbled in the chamber,

[586] Peele, 1918: 1623, 1627; Tinney, 1906: 191.

reducing the material to slurry. Both grinding appliances rose to popularity around 1900 and by the 1930s were used in place of crushing rolls and stamp batteries. The end product of crushing and grinding were *fines* and *slurry*.[587]

Following another screening, ore descended to subsequent mill platforms for concentration Several devices proved efficient at separating out metals, and most metallurgists assembled a concentration sequence involving more than one appliance. The *jig* relied on water currents and agitation to separate heavy metalliferous material and classify particles by size and weight. The jig consisted of a wooden trough, often 4' x 9' in area and 4' high, divided into cells that opened onto a V-shaped floor featuring valves and drains. Plungers agitated the slurry of ground ore in the cells, causing the heavy or large fines to settle while a gentle current of water washed the waste away. Jigs were highly popular in the county from the late 1870s into the 1930s.

Vanners were a popular concentration appliance for silver ores between the 1880s and 1900s, until they were replaced by vibrating tables. A vanner featured a broad rubber belt on rollers mounted to an iron frame that vibrated. The belt assembly, around 5' x 15' in area, was suspended by an oscillating mechanism from a chassis bolted to a timber foundation. The belt moistened and as the machine vibrated, heavy metalliferous material settled against and stuck to the rubber while a jet of water washed off waste. As the belt wrapped down around one of the rollers, the metalliferous material dropped into a flume and proceeded for further concentration.[588]

Vibrating tables were one of the most effective classes of concentration appliances and rose to prominence around 1900. Arthur Wilfley designed the first model for his mill in Robinson, Colorado, in 1896. By the 1910s, metallurgists adapted the concept for nearly all types of metal ores. A vibrating table featured a tabletop, often 5' x 15' in area, clad with rubber or linoleum held down with fine riffles. The tabletop slanted on a mobile iron frame that rapidly oscillated, and the vigorous action caused heavy metalliferous material to settle against the higher riffles while the waste worked its way downward. Water playing across the tabletop washed the waste away. Edward Stoiber and his metallurgist Robert J. McCartney designed the Stoiber-McCartney table specifically for San Juan County ore.[589]

By the mid-1910s, *flotation cells* proved their worth operating according to principles that seemed to defy traditional concentration technology. The technology pioneered in the county in 1914 and concurrently elsewhere in the state, became rapidly common. Local metallurgist Louis Bastian designed his own version. Flotation cells consisted of a large rectangular tank divided into compartments filled with water and slurry. Oils or detergent compressed air while agitators worked the mixture into froth. In contrast to other devices, the froth carried metalliferous material upward while wastes settled to the bottom of the cells. Revolving paddles then swept the metalliferous material into troughs.

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[587] Peele, 1918: 1630.

[588] Lynn Bailey, *Shaft Furnaces and Beehive Kilns: A History of Smelting in the Far West, 1863-1900* (Tucson: Westernlore Press, 2002) 64, 112; Tinney, 1906: 204.

[589] Peele, 1918: 1680; Tinney, 1906: 204.

While vibrating tables and flotation cells proved effective for silver and industrial metal ores, they provided limited success for complex gold ores, including telluride. At the turn of the century, mining companies first in Cripple Creek and then in Boulder County began experimenting with *cyanidation*, pioneered in New Zealand. Cyanidation crushed and ground ore as above, concentrating it into slurry. A worker transferred the metalliferous material into *cyanide tanks*, large wooden vats that agitated the slurry in a dilute cyanide solution. The cyanide bonded with gold, the waste flumed out, and a worker tapped the solution into *precipitating boxes* where he introduced zinc, to which cyanide attracted over gold. The chemical reaction caused the precious metal to precipitate out. Cyanide mills featured one or a series of cyanide tanks, depending on the purity and volume of ore.

Most mill processes liquefied slurry with water to mobilize the material and allay dust. However, at the end of the process, concentrates had to dry for shipment. Engineers installed various dewatering devices ranging from conical and pyramidal settling boxes to Dorr thickeners. Mill workers introduced slurries into settling boxes where the fines accumulated and exited through spigots in the bottom. The Dorr thickener, devised for high volumes of material, featured a tank at least 20' in diameter with a conical floor. Radial arms rotated slowly within the slurry and forced the fines toward the tank's center, where the material passed through a large spigot.[590]

Gravity drew the metalliferous fines from one crushing and concentration stage to the next. However, each step also facilitated returning inferior material back for reprocessing, which often meant sending the material uphill. To accomplish this, metallurgists used either bucket-lines or spiral feeds. Bucket lines were a series of closely spaced sheet iron pans stitched to an endless canvas belt, via which buckets emptied into one another. Spiral feeds, effective for moving fines short distances, typically featured an auger that rotated in a sheet iron shroud. As the auger turned, it moved material upward and deposited it into a bin.

Concentration mills relied on the same sources of power as mine surface plants, although the transition from steam to electricity at mills occurred slightly earlier. Most mills relied on a single, large steam engine that drove various appliances through a system of overhead driveshafts and belts. The horizontal steam engine was most common, and small upright units powered additional appliances at large mills. By around 1900, with electricity commonly available in the county, engineers began using motors.

Amalgamation Stamp Mills

Two definitions apply to the term *stamp mill*. As noted above, concentration mills employed batteries of stamps to crush ore prior to other processing steps. In this case the term stamp mill refers to the stamp battery, a component of a concentration mill. Under the right mineralogical conditions, companies based an entire facility around a stamp battery to recover metals without smelting or advanced concentration. The ore had to feature relatively simple gold

[590] Peele, 1918: 1669.

or silver compounds and be easily crushed. A jaw crusher usually provided primary crushing, while stamps further reduced the ore. Amalgamating tables at the battery's toe, coated with mercury, recovered the gold or silver. Workers periodically scraped off the amalgam and heated the mass in a retort, which volatized the mercury and left the gold or silver.

Because stamp mills only required a fraction of the equipment installed at more complex concentration mills, they were smaller and simpler. Regardless, stamp mills shared a few fundamental aspects. First, due to the various stages of crushing and metals recovery, these facilities were also arranged on a series of platforms to use gravity to advantage. Second, stamp mills usually featured a receiving bin above the primary crusher to hold crude ore destined for processing. Third, the mid or lower platform housed the power source, often a horizontal steam engine and boiler. Last, the mill required a water source. Metallurgists often also installed tertiary crushing and a concentration appliance in some stamp mills to better prepare the ore for amalgamation. In such cases, the mill became an *amalgamation stamp mill*, such as the Intersection Mine in the Eureka district.

Arrastras

An arrastra was a simple and inexpensive, yet labor-intensive and inefficient means of recovering metals from ore. Arrastras primarily functioned during the first years of hardrock mining in San Juan County to treat simple gold ore. The county's first mine, the Little Giant, relied on an arrastra. While a few capital-starved outfits continued to employ the technology through the 1910s, the quick exhaustion of simple gold ore rendered these primitive treatment facilities obsolete by around 1875.

A typical arrastra featured a circular floor of carefully fitted stones, low sidewalls, and a capstan at center. They ranged in size from around 6' to 20' in diameter. A beam attached to the capstan's top, and as it rotated, the beam dragged between one and twelve muller stones across the floor, depending on the arrastra's size. Usually the stones, chained to the beam, were staggered so they covered the floor's entire surface area. The floor stones had to possess flat faces and tight joints, while the mullers featured convex bottoms and iron hooks hammered tight into drill holes. The traditional Spanish arrastra relied on slave labor as motive power, which draft animals replaced. With the improvement of technology, scarcity of labor, and desire for increased production, in a few cases engineers harnessed waterpower and steam engines. The simplest form of arrastra cost around $150 to build, much of which went to the labor for dressing and assembling the rockwork.[591]

To build an arrastra, a worker leveled a platform, excavated a pit at center, and installed the capstan, which had to be stout enough to resist great horizontal force. The worker paved the platform with a layer of fine clay and carefully fitted the floor stones together using more clay as mortar. With the floor complete, he erected the sidewall, which consisted either of more

[591] Meyerreicks, 2001: 194.

stonework or planks. During the twentieth century, concrete became a substitute for masonry. Once the beam and mullers were in place, the arrastra was ready for operation.[592]

Running an arrastra required more skill and experience with local ores than engineering or formal metallurgy. First, a worker scattered a *charge* of ore across the arrastra's floor, completely covering the stones, and then introduced a little water. Then, the motive power began rotating the beam, dragging the mullers over the fragmented ore, slowly grinding it into sand. The worker periodically added more water to convert the material into a slurry, and sprinkled mercury into the mixture. The mullers continued to reduce the ore into a combination of sand and fine particles known as *slimes*. The purpose of adding mercury was to create an amalgam with the metals as they became exposed by the continued fracturing of the ore. Fine particles offered a greater surface area, facilitating amalgamation. Here, experience with local ores came into play, as the arrastra operator added enough mercury to form an amalgam paste, but not in excess, at peril of creating a liquid difficult to recover. Generally, one ounce of mercury recovered an equal amount of gold, or one pound of silver. In some cases, the operator added lye to bind with oils and grease, which interfered with amalgamation.[593]

The next stage of arrastra ore processing was *cleanup*, where worthless *gangue* was removed and the amalgam recovered from the arrastra's interior. First, the operator drained the interior either by bailing, breaching the sidewall, or opening a port near the wall's base. The operator then shoveled the sand and slime out, leaving a mud and sand layer on the flooring stones. The operator carefully washed additional material out of the arrastra's interior, exposing as much of the amalgam smeared on the floor stones and deposited between the joints as possible. The operator next disassembled the floor stones, if small, and washed and scraped off the amalgam. Last, he filled a retort with the precious material and heated the vessel to volatize the mercury, leaving a sponge-like mass of metal. The retort vapors were usually routed through cool pipes to condense the mercury for reuse. Finally, the operator rebuilt the arrastra and repeated the process with another load of ore.[594]

[592] Young, 1987: 69-71.
[593] Meyerreicks, 2001: 143, 195; Young, 1987: 71.
[594] Ibid.

Section F: Property Types and Registration Requirements

INTRODUCTION

Section F describes the property types common to San Juan County's historic mining industry. The types are categorized by function: prospecting, mining, beneficiation of ores, and associated settlement. The objective is to standardize cultural resource management and historic preservation, and to contextualize information for education and interpretation. A list of common archaeological, engineering, and architectural features follows the property types. These descriptions were reproduced from the statewide Multiple Property Documentation Form, *The Mining Industry in Colorado* with author permission and as adapted to the resources of San Juan County. Registration requirements have been tailored to conditions specific to the county. The researcher should review the mining methods and equipment in Section E for additional background and terminology. The Periods of Significance and relevant National Register of Historic Places (NRHP) Areas of Significance are summarized below. A Period of Significance is defined as a discrete timeframe during which formative trends and events occurred. Although this discussion highlights general significance for some areas, individual nomination would in turn further compare and elaborate on the appropriate level of significance.

The following Property Types and Subtypes are developed in this section:

Placer Mine	Hardrock Prospect	Hardrock Mine	Aerial Tramway
Stream Placer	Prospect Complex	Shaft Mine	Single-Rope Reversible
Gulch Placer	Prospect Shaft	Tunnel Mine	Double-Rope Reversible
Hydraulic Placer	Prospect Adit		Hallidie Single-Rope
			Bleichert Double-Rope

Ore Concentration Facility	Smelter	Settlement and Residence	Rural Historic Mining Landscape
Concentration Mill		Prospector's Camp	
Amalgamation Stamp Mill		Workers' Housing	
Arrastra		Isolated Residence	
		Unincorporated Settlement	
		Townsite	

Regarding any nomination of any property type or subtype, the researcher should refer for additional information to the suite of publications published by the National Park Service's National Register of Historic Places program. Of particular interest may be the following National Register bulletins: *How to Apply the National Register of Criteria for Evaluation*; *How to Complete the National Register Registration Form*; *Guidelines for Evaluating and Registering Archeological Properties*; *Guidelines for Identifying, Evaluating and Registering Historic Mining Properties*; *Guidelines for Evaluating and Documenting Rural Historic Landscapes*;

Guidelines for Evaluating and Documenting Properties Associated with Significant Persons; and *Defining Boundaries for National Register Properties.*

OVERVIEW OF PERIODS AND AREAS OF SIGNIFICANCE

The Gold Rush, 1860 – 1861

The first Period of Significance began in 1860, when Charles Baker and party discovered gold in Baker's Park, and ended the following year with the dissolution of the ensuing rush. Exploration/Settlement is the most relevant Area of Significance and possesses aspects of statewide significance. The so-called San Juan Humbug was the earliest rush and resulted in a large incursion of new settlers into southwestern Colorado. While gold was the initial premise, the actual product was initial exploration and quantification of the San Juan mountain region. Later, this knowledge played a key role in permanent settlement, establishment of San Juan and adjoining counties, and growth of a nationally celebrated mining industry. Few historic resources clearly attributable to the Baker's Park rush survive. The dominant activities were simple placer mining and temporary settlement, thus the only resources that may remain are hand placers, prospectors' camps, and cabin sites. Much has been lost to natural decay and land use associated with 110 years of mining and settlement.

Return to the San Juans, 1870 – 1874

The second Period of Significance began in 1870, when the next wave of prospectors arrived to engage in exploration through 1874, by which date the foundation for the mining industry was firmly established. The relevant Areas of Significance are Exploration/Settlement, Industry, and Politics/Government. Dominant activities were prospecting, settlement, and initial development of mines. Associated resources include prospects, small mines, prospectors' camps, and cabin sites. Few historic resources survive, however.

Area of Significance: Exploration/Settlement

In terms of Exploration/Settlement, the county underwent an initial period of exploration, quantification, and development. The first prospectors arrived in the drainage in 1870, developing the Little Giant, the earliest mine, the following year. Its success stimulated further exploration for gold as well as silver after 1872, when it became increasingly apparent that the region possessed abundant silver veins, but fewer gold deposits. By 1874, prospectors established baseline knowledge regarding regional geography and natural resources and in turn a template for the county's pattern of settlement. In 1874, prospectors established camps in the northeast and at the mouths of California and Eureka gulches. These camps later became the towns of Mineral Point, Animas Forks, and Eureka. At the same time, community organizers formally platted Howardsville and Silverton, which grew into the county's population centers. Trends related to exploration and settlement are significant at the local level.

Area of Significance: Industry

In terms of Industry, basic requirements for a viable mining industry were established. First, outside investors began to take an interest in the San Juans, thus introducing capital. By funding the Little Giant Mine, the Greene Smelter, and other operations, the investors established an important precedent. Second, prospectors located and began developing veins, many of which became major producers in future years. In so doing, the prospectors formed a foundation for a mining industry. Finally, three smelters were erected during the Period, and mining in the San Juans was economically dependent on local ore treatment. While the smelters were failures at first, they pioneered the ore treatment industry. The historical trends related to industry were significant mostly on a local level.

Area of Significance: Politics/Government

In terms of the Politics/Government Area of Significance, the Animas River drainage hosted several forms of frontier government during the Period. In particular, prospectors organized the region's first mining districts, and a body of elected representatives drafted laws that regulated behavior. In the absence of formal recognition by the Territorial Legislature, and the unresolved issue of who owned the San Juans, the districts were the only form of government until 1874. At that time, the Territorial Legislature officially took possession of the Animas River drainage, created La Plata County, and designated Howardsville, and then Silverton, as county seat. The historical trends related to politics were significant largely on a local level.

Settlement and Establishment of Industry, 1875 – 1881

The third Period of Significance began in 1875 and ended in 1881, marking a major transition when the factors for a successful mining industry coalesced and fostered a major wave of prospecting and ore production in meaningful volumes. This period initiated enough momentum to secure the industry's future. The Greene Smelter, which began successful operations in 1875, contributed heavily as it provided needed local ore treatment capacity. Between 1875 and 1879, individuals and small outfits developed at least 345 prospects, forty-eight small mines, three medium-sized mines, one large mine, and two placer operations. The large number of prospects and high proportion of small mines highlights that the mining industry was nascent and growing. Prior to 1875, the number of prospects and mines was much smaller. A small mine is defined as an operation with shallow underground workings, a handful of workers, basic surface facilities, and limited output. A medium-sized mine was usually a company endeavor with between five and thirty workers, fairly extensive workings, and a surface plant with at least several buildings. A large mine had extensive workings, a surface plant with multiple components and some machinery, a workforce greater than fifty, and significant output. The period ended in 1881, a year before the Denver & Rio Grande Extension Railroad ushered in another major transition.

The dominant activities during the latter half of the 1870s were prospecting, settlement, and initial development of mines. The most relevant Areas of Significance are Exploration/Settlement, Industry, Commerce, Communication, Transportation, and Politics/Government. Associated resources are prospects, small mines, prospectors' camps, and cabin sites.

Area of Significance: Exploration/Settlement

In terms of Exploration/Settlement, the county's geography was still relatively unexplored when the period began. The areas around Animas Forks, Eureka, Howardsville, Mineral Point, and Silverton had been explored, but not the county's remote recesses and perimeter. During this period, prospectors finally penetrated most of the county and quantified its general geography, although it would be another ten years before the territory was thoroughly explored. Through examination, sampling, and claim development, prospectors defined the areas with the highest concentrations of veins and most of the principal ore bodies in those areas. This information guided investors willing to risk their capital.

Prospectors and community organizers also completed the template for the county's pattern of settlement. Howardsville and Silverton cemented their roles as the county's most important towns, with Silverton assuming the role of administrative, financial, and transportation center. Other towns took shape from prospectors' camps. Mineral Point was the northernmost commercial outpost for the Mineral Point district. Animas Forks and Eureka were the commercial centers for the Eureka district, and Animas Forks was also the eastern gateway into the county. Gladstone was the commercial and, for a brief time, ore treatment center for the Cement Creek drainage. Trends related to exploration and settlement were important on local and statewide levels of significance.

Area of Significance: Industry

A true mining industry finally took hold in the county. Coupled with the Greene Smelter, general investment and infrastructure improvement fostered transition from prospecting to mining, as measured by ore production. Capitalists organized companies that developed nascent prospects into substantial operations, in turn inspiring confidence among other investors. Collectively, the companies, regardless of size or productivity, improved the transportation system, reinforced the settlement pattern, contributed to the local economy, and increased the county's prominence statewide. The industry attracted the Denver & Rio Grande Railroad, whose directors established the town of Durango and financed a large smelter. These two factors increased the upward momentum of the mining industry and allowed it to blossom into a full boom. Trends related to industry were important on local and statewide levels of significance.

Area of Significance: Politics/Government

In terms of Politics/Government, the increase in population and growing prominence of the mining industry altered the political map of southwestern Colorado. The Territorial Legislature carved San Juan County out of northern La Plata County and designated Silverton as county seat. Community organizers established primitive municipal governments to administer to matters for the principal settlements. In the large towns, municipal governments were elected, while in the camps, these consisted of founding members or townsite company officials by default. Local governments conducted improvements, established guidelines for development, and promoted

communities. In general, these systems have persisted throughout the county's subsequent history.

Area of Significance: Communications

Commerce, related investment, and politics fostered a need for a communication system superior to word-of-mouth and out-of-date newspapers. As a result, entrepreneurs and the Postal Service established three modes of formal communication. The Postal Service subsidized post offices in Animas Forks, Eureka, Highland Mary, Howardsville, Mineral Point, Niegoldstown, Poughkeepsie, and Silverton. The agency also contracted with carriers who brought mail in all seasons, first from Del Norte and from Durango when the Denver & Rio Grande established its terminus there in 1880. Journalists began regularly printing newspapers in Silverton, and for brief periods in Animas Forks, Howardsville, and Poughkeepsie. Around the same time that Denver received its first telephone, so did Silverton. In 1881, the Colorado Telephone Company established a central office in Silverton and wired a line over Engineer Pass to Lake City. These two offices became nodes of a regional system built over the following several years. These three means of communication contributed to the growth of the mining industry, connected it with the outside world, and improved quality of life in the county.[1]

Area of Significance: Commerce

Regarding Commerce, San Juan County's mining industry and population grew large enough during this period to constitute an economic web with a local, statewide, and national role. In terms of investment, most individuals who developed prospects and small mines were of regional importance, some larger operations on a statewide scale, and a few based outside of Colorado. Their capital supported growth of the county, development of its mining industry, and associated communication, banking, and commercial systems. Prospecting and mining in the county's districts further contributed to regional, statewide, and national consumer markets. Mining companies diverted money into the local economy by paying wages to their workers, hiring consultants for various services, and purchasing small items from businesses in the major towns. Such expenditures directly fostered growth of the local economy. Companies acquired large machinery and other industrial goods from manufacturers in Denver and to a lesser degree outside of Colorado. The manufacturers in Denver in turn purchased their materials from sources within and outside of Colorado. The mining companies and prospectors in the county thus supported Colorado and other industrial economies. Miners and prospectors consumed food and other domestic goods purchased. Packing companies shipped preserved food from the Midwest and on west coast, while fresh food came from Colorado farms and ranches. Domestic goods came from manufacturing centers nationwide, primarily in the east.

Area of Significance: Transportation

[1] Nossaman, 1998: 38, 68.

An efficient transportation system was as important for mining and local ore treatment. At first, mining interests relied on burros and pack trails to import needed materials and export ore. Because this system limited the movement of freight, development was slow and productive mines were able to produce only the highest grades of ore, which were in short supply. Between 1875 and 1881, the San Juan County commission and local investors developed basic regional network of wagon roads. A network of feeder roads directed wagon traffic from all major drainages to transportation, milling, and commercial centers in the Animas River valley. Trunk lines connected the valley with Otto Mears' toll road system to the east at Lake City and all-season roads in the lowlands to the south. Wagons decreased the cost of freight and increased the tonnages of ore that could be shipped, thus allowing mining companies to increase production. The increased production in turn encouraged activity and investment and fostered further industry expansion.

The Early 1880s Boom, 1882 – 1885

The fourth Period of Significance began in 1882 and ended in 1886, during which time the mining industry reached a boom state and boosted San Juan County as one of Colorado's most important industrial regions. The transportation and smelting network that the Denver & Rio Grande Railroad established in 1882 created the conditions for the boom. In particular, decreased freight costs, local smelting and ore concentration at reasonable rates, and an increase in the amount and variety of goods available in the county were key contributing factors. The net result was that the cost of production fell for mining companies with the shipment of higher tonnages of ore, medium-grade payrock now rendered profitable to produce, and quality of life improved. The number of mines that produced ore between 1882 and 1885 nearly doubled from the previous peak of the late 1870s. Similarly, population rose from around 1,100 people in 1880 to 2,000 in 1885. Ore production increased exponentially from a total of $40,000 for silver, gold, and lead in 1880 to almost $1 million in 1885. However, countywide problems began to materialize in 1885 and reflected in 1887 production figures, a total of $607,000 for all metals. The downward trend indicated that the mining industry was passing into a slump.[2]

During this period, San Juan County hosted events and trends significant on local, state, and national levels. Mine development, ore production, and community organization dominated, with relevant Areas of Significance including Industry, Engineering, Commerce, Communication, Community Planning and Development, Transportation, and Politics/Government.

Area of Significance: Industry

Mining reached one of its greatest production peaks between 1875 and 1881, a key indicator of a discrete Period of Significance. While mining comprised the underpinning of Euro-American settlement in San Juan County, the industry's ability to attract the railroad and Durango Smelter changed the entire region. Denver & Rio Grande officials graded the railroad and built the

[2] Henderson, 1926: 216; Schulze, 1977: 1880-3; Schulze, 1977: 1885-1891.

smelter due to the business potential offered by the mining industry, which conversely caused the mining industry to boom. As during the late 1870s, companies continued to improve the transportation system, reinforce the existing settlement pattern, contribute to the local economy, and increase the county's prominence. Productive mines generated so much ore that they fostered a wave of local ore buying and treatment facilities, which complimented the final processing offered by the Durango Smelter. By providing a market for ore from small mines, the facilities fostered an overall increase in production.

Area of Significance: Engineering
The mining industry depended on effective milling methods for treating ore and separating metals content from waste. Determining effective methods was complicated by the complexity of the ore, which also differed in character from mine to mine. During the 1870s and early 1880s, a number of firms built smelters and concentration mills. Nearly all failed, eroding confidence in the county's mining industry. This period eventually saw expert metallurgists puzzle out the problems and devise successful methods for specific areas in the county. While many failures still followed, successful mills set a lasting precedent that ultimately saved the industry.

Area of Significance: Communications
Communications remained important during this period, and their function and role as outlined previously continued. The mining industry, population, and business sector all supported the communication systems developed previously, as well as expansion of the telephone network and construction of a telegraph line to Durango.

Area of Significance: Commerce
Commerce increased and became more influential as the county's economy grew in wealth and complexity.

Area of Significance: Community Planning and Development
During the late 1870s, the county's pattern of settlement materialized as a function of exploration and prospecting, thus partially in flux. The arrival of the railroad, resultant boom, and development of the Red Mountain district (Ouray County) cemented nascent patterns, which changed little for the next twenty-five years. The county's most important towns thrived in the Animas River valley, including, west to east: Silverton, Howardsville, Middleton, Eureka, and Animas Forks. Secondary towns appeared in minor drainages and included Chattanooga at the head of Mineral Creek and Gladstone in Cement Creek. The hamlets of Poughkeepsie and Mineral Point occupied the county's northeastern reaches.

These settlements assumed particular roles in response to conditions created by the boom. Silverton fulfilled many functions, broadly as the principal point of entry into the county and gateway into the Red Mountain district. The town was also the exchange point where people and goods flowed into the county and ore flowed out. Given this, Silverton was the county's commercial, communications, financial, transportation, social, and administrative hub.

Howardsville served a similar function for the Las Animas and southern Eureka districts, in addition to serving as source for most of the county's meat and dairy products. Middleton was a working community for the mines around Minnie and Maggie gulches. Eureka served the commercial needs of the central Eureka district. Animas Forks was larger than Eureka because it was the eastern gateway into the county, a commercial center for the northern Eureka district, and a base for local miners. Chattanooga was the commercial point for the upper Mineral Creek drainage and entry into the Red Mountain district. Gladstone was center to a tiny mining industry, and Poughkeepsie and Mineral Point were primarily prospectors' camps that offered a few services.

All the county's settlements experienced significant growth during the boom. The degree to which a municipal planning process, or divisions among class and ethnicity, guided growth remains unknown. Animas Forks, Chattanooga, Gladstone, Mineral Point, and Poughkeepsie followed growth patterns typical of mining camps. Specifically, collections of prospectors' cabins served as nuclei, a few businesses followed, and additional residents congregated around the businesses. The only constant was an attempt to develop some semblance of a "main street. By contrast, Eureka, Howardsville, and Silverton were formally platted with lots, blocks, and streets on a defined grid. While these towns were the most prominent communities, other settlement subsisted. Most mines and prospects were too far for a reasonable commute by foot, so miners and prospectors lived at their points of work. The residences at large mines often were boardinghouses, while cabins sufficed at smaller operations. Broadly speaking, worker residences scattered amid mines was a settlement pattern typical of the entire Rocky Mountain region. The location of the mine and the suitability of adjacent sites were the primary governing factors.

Area of Significance: Transportation

Investors, in conjunction with the county commission, improved the road network essential for mining. In addition, the county paid to build a road from Chattanooga over Red Mountain Pass and into the Red Mountain Mining District. The purpose was to increase the county's relationship with the district and secure a role as gateway community over rival Ouray. The arrival of the railroad was a critical transportation event during this period, dramatically lowering the costs of mining and living, increasing tonnages of ore that companies could ship, providing a direct link with the Durango Smelter, making a wider variety of goods available at lower prices, and improving the overall quality of life. The railroad was a principal agent that allowed the mining industry to boom.

Area of Significance: Politics/Government

Regarding Politics/Government, trends in county and local government continued. In addition, the success of industry increased the political standing and power of investors and government representatives, which they used to influence state and federal policy. For example, because the county's mining industry depended on silver, legislators and politically connected investors fought change to the federal policy on silver acquisition.

The Value of Silver is Restored, 1890 – 1893

This period began in 1890 and ended in 1893. An increase in the value of silver in 1890 brought the mining industry out of the major recession of the latter half of the 1880s caused by a variety of factors. First, miners exhausted most of the county's shallow ore veins, forcing mines to close because veins had little left to offer. Second, substantial veins contained large ore reserves, but the character of the ore became complex, low in grade, and difficult to treat with depth. Most of this ore was thus unprofitable with existing technology. Third, the price of silver and industrial metals declined during the latter half of the 1880s. As prices fell, mining companies found that the cost of extracting available ore exceeded returns and suspended operations. The lack of production and troublesome ore in turn impacted the milling sector, spread throughout the local economy, and affected business and population. The federal government increased the price of silver by means of the 1890 Sherman Silver Purchase Act, stimulating a countywide revival and reversing some of the problems created by the recession. However, the revival was not immediate and required a year to fully take hold. The value of silver began to ebb again and the Sherman act was repealed in 1893.

During this period, San Juan County hosted events and trends significant on local, state, and national levels. The relevant Areas of Significance include Industry, Engineering, Commerce, Communication, Community Planning and Development, Transportation, and Politics/Government. The dominant activities were mining, ore treatment, ongoing residence, community building, and construction of infrastructure.

Area of Significance: Industry

The mining industry continued as the main stimulus for Euro-American presence in San Juan County, as well as the foundation for the economy and institutions on which business and population depended. San Juan County's industry was also the principal supporter of the railroad and Durango Smelter. By providing these entities income, the county's mining industry contributed to the success of mining elsewhere in the San Juans. The railroad and Durango Smelter provided needed transportation and cost-effective ore treatment.

Area of Significance: Engineering

Engineering was critical on a local level during this period, with several sub-areas worthy of consideration. Regarding milling and ore treatment, the mining industry depended increasingly on effective methods for treating complex, low-grade ore. Finding effective methods required calculation, knowledge of metallurgy, and trial and error. Successful mills served as templates. Failed mills exemplified conventional practices and types of appliances that not applicable to regional ore.

The second sub-area is electricity. The mining industry relied primarily on steam and draft animals for power due to the cost of hauling in steam equipment and fuel, except for those extremely well-funded operations. This limited remote outfits to only small tonnages of high-grade ore. However, electricity had the potential to revolutionize mining. In theory, mining

companies merely had to haul motors into the backcountry and transmit power over wires from a convenient generation point. During the early 1890s through the turn of the century, electrical technology was in an experimental state not yet fully adaptable to the needs of mining. Direct current (DC) motors could start and stop under load, as required for many mining applications, but could not be transmitted far without suffering significant power losses. Current thus had to be used close to the point of generation. For remote mines, hauling in a generator, its power source, and motors provided little advantage over steam equipment. Alternating current (AC), by contrast, could be transmitted far, but AC motors were unable to start and stop under load and were therefore impractical for machinery such as hoists and large air compressors. Despite these drawbacks, a few highly progressive mining experts in the county harnessed electricity in an attempt to lower operating costs. Stoiber built one of the earliest AC systems in the mining industry to run mill machinery at Silver Lake Mine. John Terry installed a DC system at the Sunnyside Midway Mill in Eureka Gulch, and in so doing minimized the amount of fuel coal that had to be regularly carried up. Edward M. Brown did likewise at the San Juan Chief near Mineral Point. These successful applications contributed to the development of electrical technology and its application to mining, rendering the San Juans a center of electrical technology.

The third sub-area is aerial tramways. In the San Juans, where topography is extreme, transporting ore from mine to mill was slow and costly. As illustrated by the Little Giant Mine in Arrastra Gulch, aerial tramways offered a solution because ore could be lowered down to a mill or shipping point, regardless of terrain or weather. In general, the greater mining industry adopted the technology gradually because of its high initial cost and exacting engineering. By the early 1890s, companies realized that the expense would quickly be offset by reduced shipping costs and increased production. During this period four companies successfully experimented with the technology. Thomas Trippe operated a tramway at the Titusville in 1889, the San Bernardino company in 1890, Rasmus Hanson in 1891, and the Victoria company in 1893. These tramways exemplified the efficiency of this transportation solution. Within a few years, many companies followed, and the San Juans became a center of tramway engineering.

Areas of Significance: Communications, Commerce, and Politics/Government

Communications, commerce, and politics/government remained significant as the types of systems and their roles defined above continued.

Area of Significance: Community Planning and Development

Community Planning and Development remained significant for specific settlements. During the first half of the 1880s, the county's general pattern of settlement matured. The pattern then contracted as a result of the late 1880s recession, and all settlements shrank while a few neared abandonment. By the early 1890s, the pattern stabilized and principal towns thrived. However, because the towns did not grow much, there was little additional municipal planning. Of note, Animas Forks, the commercial center of the northern Eureka district, declined. When the town

burned in 1891, most remaining residents and businesses left. Chattanooga and Gladstone revived on minor scales, while Poughkeepsie was abandoned.

Area of Significance: Transportation
Regarding transportation, mining companies and the county commission continued to improve the road network requisite for mining. The railroad remained a principal agent allowing the mining industry to revive.

The Silver Crash, 1894 – 1897
The sixth Period of Significance began in 1894 and ended in 1897. The Silver Crash of 1893 caused the value of silver to topple to its lowest point since Colorado achieved statehood. The price collapse at first wrecked mining in the west and in turn contributed to one of the worst economic depressions to strike the nation. Colorado and San Juan County suffered deeply and underwent major transitions. Colorado entered a depression, but the county adjusted and ultimately faired better than most of the state's other mining regions. Although fewer mines were active than during the early 1890s, the production of gold, silver, and lead increased.

First, the owners of several of the county's largest mines pursued the strategy of producing and milling ore in economies of scale. Through heavy capital investment, advanced technology, and carefully designed mills, the companies lowered operating costs enough to render low-grade ore profitable to produce. This type of ore was the most abundant resource in the county but had been ignored in favor of higher grades of material. When economic conditions forced the matter, well-financed outfits realized they either had to cease operating or find a way to profit from the low-grade ore. They succeeded, and their significant yield made up the bulk of the county's overall production.

Secondly, some investors used the poor economic climate to purchase proven mines offered for sale. At the same time, a few owners unwilling to allow their properties to remain idle attempted to reopen. Both groups invested capital in development and machinery to lower operating costs and increase output, which also contributed to the county's production figures. Nearly all county mining districts saw several such ventures, although while county production figures were substantial, this did not reflect a vibrant mining industry. Most mines remained idle or operated at reduced capacity.

The last factor was a strong interest in gold. With the price of silver at an all-time low, mining outfits focused on ore with high gold content because that metal held a constant value. Most mines that generated substantial tonnages of ore prioritized gold and considered silver to be secondary profit. Because nearly all ore in the county featured gold and silver in combination, the pursuit of gold resulted in the production of silver as well. The interest in gold fostered the first true rush that the county witnessed in years. When gold ore was discovered in the Bear Creek drainage in 1893, it created a considerable excitement. The town of Sylvanite, also known as Bear Creek, and a handful of profitable mines resulted, but were short-lived. The period ended in 1897, when economic recovery drew the mining industry into one of its most important eras.

During the sixth Period, San Juan County hosted events and trends that were important on local, state, and national levels. The applicable Areas of Significance include Industry, Engineering, Commerce, Communication, Community Planning and Development, Transportation, and Politics/Government. The dominant activities were mining, ore treatment, ongoing residence, community building, and construction of infrastructure. .

Area of Significance: Industry

The mining industry continued as foundational for the population, economy, and other institutions, largely as a function of large productive mines since most small operations were idle. The railroad and Durango Smelter also remained central to the central San Juans during the post-Silver Crash depression because they provided the only cost-effective transportation and ore treatment. Without them, the regional mining industry might not have survived. Owners of the large mines pioneered and demonstrated how production and milling in economies of scale could offset the low value of silver and render low-grade ore profitable. This required major capital investment to employ mechanization and automation to lower operating costs and maximize output. Few companies were able to employ this strategy because capital was scarce, but by the late 1890s,the practice swept Colorado's mining industry and helped it to restore the economy. According to some industry experts, San Juan County was the birthplace of the economies-of-scale strategy.[3]

Area of Significance: Engineering

Engineering was significant on local and national levels during this period. The sub-areas of milling, electricity, and tramways, were vital to production in economies of scale, the strategy for which hinged on exploiting low-grade ore as a commodity, only possible through efficient ore treatment. Successful companies overcame problems that had vexed mill operators for nearly two decades, devising effective concentration methods through calculation, knowledge of metallurgy, invention, and an understanding of how to adapt existing equipment. Electricity facilitated savings on energy costs. These companies improved generation and transmission technology in addition to electrical application to mining. Similar evolutions impacted aerial tramway engineering, which large companies increasingly relied on to reduce the costs of transporting ore to their mills and supplies up to the mines. Some of Colorado's longest systems included those built for the Iowa, Siler Lake, and other local operations. Application of engineering technologies and machinery on a massive scale enabled production, transportation, and concentration of ore in unprecedented volumes. In turn, machinery was refined and applied to increasingly specific functions and integrated into complex systems through engineering, coordination, planning, and management.

Areas of Significance: Communications, Commerce, and Politics/Government

[3] Burbank and Luedke, 1969: 4; Ransome, 1901: 23; *Silverton Standard* (11 Jan 1902).

Communications, Commerce, and Politics/Government remained significant during this period in roles defined above.

Area of Significance: Community Planning and Development
The trends discussed continued to apply, although the southeastern county received its first and only settlement in response to the minor gold rush at the end of 1893. Bear Creek, formally known as Sylvanite, remained viable into the mid-1890s.

Area of Significance: Transportation
Regarding transportation, mining companies and the county commission continued to improve the road network, as Otto Mears built the Silverton Northern Railroad from Silverton to Eureka, lowering the cost of transportation for companies in the eastern portion of the county. Aerial tramways began their ascent to prominence during the period. The Silver Lake Mines Company and other large organizations erected tramways as a solution to transportation problems posed by remote locations and difficult terrain. Tramways provided an effective alternative to labor and pack animals, moving materials and ore over hostile terrain in all weather. Although the initial cost was high, tramways allowed many companies to develop advanced mines, achieve high volumes of production, and become profitable.

The Great Mining Revival, 1898 – 1910
The seventh Period of Significance began in 1898, when conditions fostered a revival of mining on a scale not yet seen in the county. Production peaked quickly, tapered toward 1906, and dropped off at the end 1907 due to a national recession and collapse of metals prices. The revival, however, lasted through 1910 when activity and production declined significantly.

Although popular histories romanticize the county's early 1880s boom, the 1898 revival was also critical to shaping county and statewide trends. During the revival, nearly all quantifiable indictors for mining in the county reached an apex. The population increased from 1,600 in 1890 to 2,300 in 1900, further ascending to 3,000 in 1910. The county featured more medium-sized and large mines than any time before or after the revival, as well as a spike in prospecting. In total, the mines produced around $700,000 in silver, as much in lead, and over $1 million in gold annually during the first years of the revival, although less afterward. The county also saw its first meaningful zinc recovery in 1904, and thereafter the metal became an important resource.[4] Production figures must be considered in the context of low metals values. Silver fetched around $.60 per ounce, 30 to 35 percent less than during the peak years, and yet the dollar amount exported remained high. The mining industry thus arguably produced greater tonnages of ore and waste rock than at any other time in its history. Ore production and milling in economies of scale, major development both above and below ground, heavy mechanization, and widespread investment were hallmarks of the revival.

[4] Schulze, 1977: 1890-7; Schulze, 1977: 1900-10; Schulze, 1977: 1910-18; Henderson, 1926: 216 for production figures.

During this period, San Juan County hosted events and trends significant on local, state, and national levels. The most relevant Areas of Significance include Industry, Engineering, Transportation, Commerce, Communication, Community Planning and Development, Social History, and Politics/Government. A large proportion of historic resources date to this period, during which the dominant activities were mining, ore treatment, ongoing residence, community building, and construction of infrastructure.

Area of Significance: Industry

The mining industry continued to provide the Durango Smelter and railroad with the majority of their income as they were instrumental in facilitating the revival. A greater number of large mines contributed to innovation in production and milling in economies of scale. With capital available again during the late 1890s, companies invested in infrastructure, development, and workforce. Although the economies-of-scale strategy was a statewide movement, the large companies in the San Juans participated to a greater proportionate degree. Extreme topography, harsh environment, and complex ore required adaptation of mechanization and methods to the region. The county's mining industry contributed heavily to Colorado's economy during the revival. Contributions to total state metals output ranged from 3 percent in 1901 to 8 percent in 1907.[5] The revival included small operations, prospects, businesses, and infrastructure, in addition to the large mines.

Area of Significance: Engineering

During the seventh period, the mining industry was significant in the area of Engineering on a national level. In an attempt to lower operating costs, increase production, and recover higher yields of metals from low-grade ore, the mining industry innovated some of its greatest engineering contributions. Large companies participated in the development of complex systems such as electric grids, compressed air, interconnected mine workings, and ore concentration processes. Tramways saw extensive development as the county became known as a center of tramway engineering. Through the successful design and construction of numerous systems, the county's industry contributed to improvement of tramway technology. The large companies also advanced the field of industrial systems management to coordinate their infrastructures, underground workings, and milling. The industry adopted machinery on an unprecedented scale and made its use commonplace. The mining industry forwarded the understanding of metallurgy. Mill design and machinery were much more efficient and applied to larger plants than ever. The county was home to some of Colorado's biggest mills, including the Silver Lake, Gold King, and Gold Prince. The industry also experimented with new apparatuses and processes, such as vibrating tables and magnetic separators for zinc, adopted nationally.

Area of Significance: Transportation

[5] Henderson, 1926: 97.

Regarding transportation, the county's ground system reached build-out during this period. The Gold King owners and Otto Mears completed the last additions to the county's railroad network, the former grading the Silverton, Gladstone & Northerly Railroad from Silverton up Cement Creek to Gladstone. Direct rail improved access in the Cement Creek drainage and enhanced the effect of the revival there. Mears extended the Silverton Northern Railroad in two directions, first from Howardsville up Cunningham Gulch to the Green Mountain Mine, improving the flow of machinery and supplies into and ore out of the valley. The other was from Eureka up to Animas Forks, instrumental in the construction of the Gold Prince operation and lowering transportation costs for other outfits. The county's road network drew considerable attention, as companies continued to improve existing arteries and graded new roads to individual mines. Roads played a critical role in widespread adoption of machinery by allowing wagons to haul larger and heavier loads. Finally, the industry relied on aerial tramways as a solution to ground transportation problems of remote mines. Tramways allowed companies to develop small mines into significant operations. The net result was an increase in the county's overall ore production.

Area of Significance: Communication, Commerce, and Politics/Government
Communications, commerce, and politics/government remained significant areas, with the trends discussed above amplified by the revival.

Area of Significance: Community Planning and Development
Community Planning and Development was significant on a local level as the revival drew a higher population and greater number of industrial operations throughout the county. Those towns that survived the 1890s enjoyed growth. The degree to which a municipal planning process, or divisions among class and ethnicity, guided the growth remains unknown. Animas Forks, Chattanooga, Gladstone, Mineral Point, and Poughkeepsie followed patterns that were typical of mining camps with worker housing and businesses including a mercantile, saloon, butcher, and assay shop as foundations. Additional residents congregated around this core. The larger towns of Eureka, Howardsville, and Silverton grew in accordance with their platted grids.

Area of Significance: Social History
Regarding social history, on a local level the heavy demand for mine labor impacted the county's demography significantly. Women were present since the mid-1870s, but during the revival their numbers increased. Women constituted around 20 percent of the population in 1880 and 25 percent by 1890. Most lived in Silverton, less in the other principal settlements, and few amid the mines. Contemporary Victorian values discouraged women from the male-dominated workplace. By 1900, women constituted slightly more than 30 percent of the population, however, and they could be found among the large mines where both single and married individuals worked for wages or helped their husbands. It became not uncommon to find women cooks, hostlers, maids, and even boardinghouse managers. Lena Stoiber exemplified the involvement of women in the mining industry, managing labor for nearly all of Silver Lake Basin. In the towns, women had greater latitude for employment options and ran or worked in restaurants, bakeries, hotels,

boardinghouses, mercantiles, tailor shops, and schools. In summary, the revival facilitated a softening of gender barriers, greater acceptance of women, and opportunity for their employment. These trends were not limited to San Juan County.[6]

Labor demand created by the revival fostered a shift in the county's ethnic diversity. In 1880 and 1890, approximately 35 percent of residents had immigrated from England, Ireland, Scotland, Germany, and other northern European countries. A few were Italian and French. By 1900, almost 50 percent of the residents were immigrants, with Italians and Slavs heavily represented. Italian miners in particular helped the Western Federation of Miners maintain a strong presence locally. The diversification of the population was part of a larger trend in Colorado's mining industry.[7]

During the revival, the county's industry participated in broad trends significant on state and national levels. Specifically, the cycles of boom and bust fostered the development of mobile, diverse, and adaptable society. Each boom, and especially the revival, drew laborers from a variety of backgrounds, and the busts propelled them to other areas and economic sectors. This contrasted sharply with traditional agrarian occupations.

The development of corporate mining during the revival sharply exacerbated the growing trend of a class-based social structure. At large mines workforces stratified into unskilled labor, skilled labor, several tiers of administrative personnel, and owners and investors. Labor had little mobility to ascend into higher positions, in part because increased mechanization required that supervisors and mangers possess formal education and training. Because large mines collectively employed the highest numbers of workers, they contributed heavily to the class-based social system.

The World War I Revival, 1915 – 1921

The eighth Period of Significance spans the years 1915 to 1921, when demand for and value of silver and industrial metals increased together, fostering a revival of mining. World War I was the root cause as European nations sought economic security in silver and consumed industrial metals for wartime production. The value of and demand for silver and industrial metals increased dramatically, stimulating mining. Prior to the revival, a few large mines contributed most of the county's output, while smaller operations were idle. During the revival, large mines conversely declined in production, offset by an increase in the small and medium-sized operations. The revival was relatively short-lived and plagued by factors that suppressed the full effect of the price increases and high demand for metals. The influenza epidemic, wartime administration of railroads, associated freight rate increases, and dwindling ore reserves prevented many companies from profiting. On the other hand, the introduction of flotation

[6] Susan Armitage and Elizabeth Jameson, *The Women's West* (Norman, OK: University of Oklahoma Press, 1987) 150, 181; Joseph Conlin, *Bacon, Beans, and Galantines: Food and Foodways on the Western Mining Frontier* (Reno: University of Nevada Press, 1986) 158; Sandra L. Myres, *Westering Women and the Frontier Experience, 1800-1915* (Albuquerque: University of New Mexico Press, 1999) 243; Reyher, 2000: 51; Schulze, 1977: 1900-14; Sally Zanjani, *A Mine of Her Own: Women Prospectors in the American West, 1850-1950* (Lincoln, NE: University of Nebraska Press, 2002) 29, 72, 108, 264, 306.

[7] Schulze, 1977: 1900-14; Duane A. Smith, "*The San Juaner, A Computerized Portrait,*" *The Colorado Magazine* 2.2 (1975): 140-1.

concentration and improvements to other milling technologies allowed some companies to produce ore previously too complex or low in grade.

In 1921, most of the county's mines closed, which brought the eighth period to an end. The national economy regressed into a post-war depression, so demand for and value of industrial metals fell sharply. Silver continued to fetch around $1.00 per ounce because the Pittman Act was in place, but this was insufficient to offset the problems with industrial metals. The sour economy discouraged investors from financing development and improvements, compounding the situation. Companies grappled with a decline in the amount and quality of available ore, increased operating costs, and dissipation of skilled labor.

Even though the World War I revival was minimized, it still exhibited events and trends significant on local, state, and national levels. The dominant activities were mining, ore treatment, ongoing residence, community building, and construction of infrastructure. The most relevant Areas of Significance include Industry, Engineering, Transportation, Commerce, Communication, Community Planning and Development, Social History, and Politics/Government. Many historic resources are likely to date to this period.

Area of Significance: Industry

The mining industry continued to be the economic foundation on which the population depended. The industry continued to support the railroad and Durango Smelter, without which it, might not have survived. The large mines contributed to ongoing development of production and milling in economies of scale. The extreme topography, harsh environment, and complex ore required a greater degree of mechanization than elsewhere in the state. The strategy fostered innovations in the field of ore treatment, in particular flotation and the recovery of zinc. The county industry contributed heavily to Colorado's economy during the revival. Contributions to the state's total metals output ranged from 4 percent in 1916 to 15 percent in 1920.[8] The revival included all sizes of operations. On local and statewide levels, the industry participated in the tungsten rise of the mid-1910s. Tungsten allowed steel makers to produce hardened alloys outstanding for durable hardware and weapons, material which came under heavy demand for the first time due to World War I. Colorado offered some of the richest known deposits, which drew investment, improved the state's profile in the greater mining industry, and fostered geological and mineralogical studies. San Juan County, and especially the Cement Creek area, participated in the tungsten interest.

Area of Significance: Engineering

The mining industry continued to be significant on local, state, and national levels. In an attempt to lower operating costs, increase production, and recover a higher yield of metals from low-grade ore, the local industry stimulated technological advancement. In the field of ore concentration, metallurgist Louis Bastian innovated the flotation process at the Gold King Mill in

[8] Henderson, 1926: 97.

1914.[9] In the absence of this technology, production was limited to specific types and grades of ore, while complex payrock remained fallow. San Juan County was notorious for its complex ore, and mines there offered an opportunity to test flotation and validate the extent of its effectiveness. During the mid-1910s, at least nine prominent mills experimented with flotation, collectively serving as a proving ground for the technology. Flotation became a commonplace process across the west by the 1920s.

The mining industry continued to experiment with other concentration apparatuses and processes such as vibrating tables and magnetic separators for zinc. During the mid-1910s, Arthur Redman Wilfley pioneered multi-deck vibrating tables at the Iowa and Mears-Wilfley mills. Commercial models were later released, allowing other companies to improve efficiency at their mills. At least the Sunnyside, Silver Ledge, and Kittimac used electrostatic and magnetic separators to recover zinc. Proving successful, the separators saw widespread use, and zinc became an important mill product.

In the arena of ore production, mining companies contributed to the practice of adaptive use as operating costs increased and available capital fell during the 1910s. Companies adapted existing resources to meet needs instead of purchasing new materials. Innovation and expertise in engineering were required to adapt salvaged materials, saving capital and permitting companies to produce in economies of scale. In the county, companies realigned entire tramways, refitted concentration mills, and reused machinery and construction materials.

Area of Significance: Transportation

Regarding transportation, the Denver & Rio Grande Extension remained the principal carrier of ore and concentrates from the county and Red Mountain district to the Durango Smelter and goods needed for industry and residence into the county. The Silverton, Silverton Northern, and Silverton, Gladstone & Northerly railroads also continued vital service of collecting ore and concentrates and distributing fuel coal and supplies to consumers. The county's road network served a similar function. Aerial tramways continued to be significant on a local level by allowing remote mines to maintain high levels of production.

Area of Significance: Communication, Commerce, and Social History

Communications, commerce, and social history remained significant during this period.

Area of Significance: Community Planning and Development

The principal towns survived the early 1910s slump and continued the trends discussed above. The settlement pattern saw a few changes as smaller towns either contracted or were abandoned. Silverton continued to serve as the commercial, communication, financial, transportation, and cultural center. Howardsville was the commercial hub of the Las Animas district. Eureka continued as a milling town when ASARCo built the Sunnyside Mill and was the principal commercial center for the district. Middleton remained a community of workers employed at the

[9] Colorado Mine Inspectors' Reports: Gold King; Henderson, 1926: 50; *Mineral Resources*, 1914: 299.

Kittimac, Hamlet, and nearby mines, and provided for their basic needs. Gladstone and Silver Ledge shrank to the size of Middleton. Animas Forks, Mineral Point, and Poughkeepsie were abandoned.

Area of Significance: Politics/Government
Trends in local government continued. The electorate further contributed to national policy on silver mining subsidies. When World War I stimulated an increase in silver prices, Congress drafted the Pittman Act in 1918 to lock the price at $1.00 per ounce. Opponents objected on grounds that the Act merely subsidized silver mining, but it became law, in turn stimulating mining throughout the west with accompanying increase in jobs and revived regional economies.

Great Depression Era Revival, 1933 – 1939

This Period of Significance began in 1933, when President Franklin Delano Roosevelt increased the value of gold, stimulating mining. Roosevelt signed into law the Gold Reserve and Silver Purchase acts the following year, formalizing increases in the values of gold and silver. The acts initiated a revival of mining across the west. period ended in 1939, when the county revival and mining slowed. The county's statistics and historical trends reflect what we can refer to as the Depression-era mining revival. The revival, which spanned 1933 through 1939, saw a spike of mining ventures in the county. The number of active mines tripled from 1920 or the period following World War II: twenty-eight small mines, eight medium-sized operations, six large producers, and several placer mines. Although the spike was minor compared to previous peaks of activity, it was significant in the context of the Great Depression. In the county, as elsewhere, the economy was dismal, financial insecurity high, unemployment increased, and sources of income few. Residents realized that the mines offered the only source of income in the county, gleaning ore for mere subsistence earning. By settling for whatever payrock existing mines offered, most residents were able to stay in the county.

While not lucrative or even stable, the mining industry participated in events and trends significant on local, state, and national levels. Dominant activities were mining, ore treatment, ongoing residence, community building, and construction of infrastructure. The most relevant Areas of Significance include Industry, Engineering, Transportation, Commerce, Communication, Social History, and Politics/Government.

Area of Significance: Industry
The mining industry continued as the economic foundation on which the population depended. The county's industry also contributed to regional and statewide economies, both of which were depressed.

Area of Significance: Engineering
Regarding engineering, the Shenandoah-Dives Mining Company developed one of the most advanced and efficient mines in the state, if not the west. The operation featured dozens of miles of underground workings that tapped low-grade ore veins and connected to the old workings of

earlier mines. Precision and expertise were required to complete such a network. The mine capitalized on ore production as workers generated enormous volumes of payrock sent down a tramway to the Mayflower Mill. The tramway and mill were so efficient at exploiting economies of scale that the company was able to profit even though metals values were low. By contrast, other mining companies explored adaptive use of existing properties. Capital was scarce, and companies salvaged materials and equipment. This practice required innovation, planning, a general understanding of structures and mechanical systems.

Area of Significance: Transportation
The Denver & Rio Grande Extension was the principal carrier of ore and concentrates from the county to distant smelters and goods needed for industry and residence into the county. Without the railroad, mining may have stopped. Aerial tramways remained locally significant as previously noted.

Area of Significance: Communication
Communications systems remained locally significant as noted above. .

Area of Significance: Commerce
The flow of goods and capital through the county and to outside economies was significant on the local level in the context of the Great Depression.

Area of Significance: Social History
The Great Depression forced people into a greater degree of self-reliance than before, and these qualities are prevalent in American culture today. Isolated regions dependent on single industries, like San Juan County, reinforced this trait because when their industries faltered, the residents had to either leave or become self-sufficient. When the residents eventually did move on, they spread the tendency to be self-reliant to other groups of people through cultural diffusion. The way in which the Great Depression manifested in the county also contributed to the trend of a mobile, diverse, and adaptable society. The boom and bust cycles of mining, exacerbated by the Depression, forced county residents to move in search of employment and adapt to changing conditions. The movement of people ensured that the population remained diverse.

Area of Significance: Politics/Government
The trends regarding county and local government continued from the previous periods, in addition to the ramifications of implementing national policy on pricing silver and gold. Western legislators supported the Gold Reserve and Silver Purchase acts in response to industrial interests as well as constituents in their voting districts.

Post World War II Recovery, 1946 – 1954

The tenth Period of Significance began in 1946, when post-ward conditions fostered a final widespread surge of activity among the county's mines. Although gold and silver were the most desirable components of ore, industrial metals including lead, zinc, and copper became mainstays. The demand for and value of these metals doubled from wartime levels and were higher than any previous time in national history. These factors, combined with low production costs and improved milling technology, rendered uneconomical grades of ore profitable to produce. The period ended in 1954, when county production abruptly dropped, and many mines closed. The Shenandoah-Dives Mining Company closed in 1953, but other outfits continued to send ore to the company's Mayflower Mill for custom treatment. Later in the year, however, the company closed the mill as well, leaving most independent outfits with no local facility to process ore. In response, most outfits ceased production. Although limited mining continued in the county, the industry never recovered.

During the post-war recovery, the mining industry participated in events and trends that significant on local and state levels. Dominant activities were limited to mining and ore treatment. The relevant Areas of Significance include Industry, Transportation, Commerce, Communication, and Politics/Government.

Area of Significance: Industry

The mining industry continued to be the economic foundation for the county's population, allowing residents to stay rather than gravitate to urban centers. The county industry also contributed to regional and state economies through ore production and consumption of goods and services.

Area of Significance: Transportation

The county mining industry depended on trucks to haul ore to the Mayflower Mill and concentrates from the mill to the railroad at Silverton for shipment to distant smelters. The industry also made extensive use of trucks to haul in machinery and supplies. The traffic prompted improvement of the road network and arteries connecting with Durango and Ouray.

Areas of Significance: Communication and Commerce

Communications and commerce remained significant in the systems and roles defined previously, allowing capital flow to support rural populations in southwestern Colorado during the post-war years.

PROPERTY TYPES AND REGISTRATION REQUIREMENTS

PROPERTY TYPE: PLACER MINE

Placer mine operations featured interests ranging from those of individuals to capitalized companies processing stream gravel and soil to collect particles of gold. A fundamental difference exists between *placer workings* and *placer mines*. At one time, the Animas River

featured thousands of feet of continuous placer workings that manifested as tailings piles, pits, and infrastructure features. Some of these may still be evident. A placer mine, by contrast, was a specific property, usually defined by claim boundaries, which an individual or company worked for gold. Extensive placer workings may actually include several individual placer mines that blend together. Archival research and the physical examination of extensive workings may be necessary to identify specific mines in heavily worked areas.

Placer Mine Subtypes

Stream Placer: Both organized companies and individual miners created stream placers when they worked a streambed for gold. Streams are small waterways that usually flowed year round across broad, gently sloped drainage floors. Individual miners often dug pits down to bedrock in streambeds and used any combination of gold pans, cradles, and small sluices to recover gold from excavated gravel. Organized companies often installed lengthy sluices and created trenches or other large excavations when removing gravel. Pits, trenches, piles of gravel and stream cobbles, and braided stream channels often denote placer mines today. If the stream flowed all year, miners usually piled tailings along the stream banks to maintain the waterway. Companies with lengthy sluices may have left rock piles and posts that supported the sluices and small, adjacent platforms that served as workstations. At substantial mines, companies often engineered networks of ditches and added other aspects of infrastructure such as residential buildings and blacksmith shops, sometimes represented today by earthen platforms.

Gulch Placer: Companies and individual miners created gulch placers when they worked a gulch, or narrow drainage, for gold. Because gulches tended to be confined and steep, miners had to pile tailings in a linear fashion along one or both sides, and over time, erosion reduced the piles to short linear segments, isolated mounds, and hummocky deposits. As erosion redeposited the tailings along the gulch floor, the associated stream channel often became braided. Extensive gulch placers operated by organized companies may offer the same infrastructure features as stream placers.

Hydraulic Placer: Because hydraulic mining operations used jets of water to mobilize high volumes of gravel in economies of scale, most extant sites tend to be expansive with broad deposits of tailings, deep incisions and gullies, and abrupt, precipitous cut-banks. Hydraulic mining required an infrastructure to deliver water both for the monitors and for washing gravel through sluices. Ditches, pipelines, and flumes often directed water from regional drainages to a reservoir upslope from the site. Pipelines then carried the water under pressure to the monitors, and ditches and flumes directed the runoff through the workings into sluices, where workers recovered gold. To support industrial activity, hydraulic mines also usually included a shop, other buildings, supports for pipelines, and roads. If the mine was more than one mile from the nearest settlement, the mining company often provided residences for workers on site. In general, engineering and archaeological features are prevalent at hydraulic mine sites.

Placer Mine Significance

Placer mining was of local significance to San Juan County in 1860 and 1861. The discovery of placer gold in Arrastra and Cunningham gulches, and along the Animas River from Silverton to Eureka, brought the first large numbers of Euro-Americans to the region. They were also the first Euro-Americans to penetrate the deep San Juans and document their findings. Early miners established a baseline understanding of the county's physical attributes and geography, thereby drawing attention to the region. Coupled with their discovery of gold, exploration became the foundation that lured prospectors during the early 1870s. This second wave was the beginning of permanent settlement and a nascent mining industry. Placer mines that date to the early 1860s are thus associated with Exploration/Settlement.

Placer mining was also of local significance during the revival of the late 1890s and 1900s. During this time, several companies developed large hydraulic placers in the Eureka area. These provided jobs, contributed to the local economy, and added to the county's overall gold output. Placer mines active during this timeframe were important in the areas of Industry and Economics. During the Great Depression, placer mining provided income and subsistence for unemployed workers. Placers worked during the Great Depression are associated with Commerce and Social History.

Steam and Gulch Placers: As a property subtype, stream and gulch placers were similar types of operations and share aspects of significance. They were locally important primarily during two Periods of Significance. The first is during 1860 and 1861, and the second is 1933 to 1939 for the reasons noted above.

Hydraulic Placer: Hydraulic mining was active primarily during the late 1890s and early 1900s. The Eureka district and Animas River were the only portions of the county with the necessary sedimentology for hydraulic mining. Although hydraulic mining was not widely practiced, it was locally significant in the areas of Economics, Industry, and Engineering. In economic terms, hydraulic placers provided jobs, contributed to the local economy, and added to the county's overall gold output. In terms of Industry, hydraulic placers were part of the county's industrial fabric. Regarding engineering, hydraulic mines required complex water distribution systems and the defensible allocation and use of water rights.

Placer Mine Registration Requirements

Steam and Gulch Placers: The eligibility of stream and gulch placers is predicated on meeting at least one of the NRHP criteria and adequate integrity to convey their significance. Placer mines eligible under Criterion A must be associated with at least one Area of Significance noted above, events and trends important in the development of the county. Placers may be eligible under Criterion B provided they reflect the direct and active contribution in the life of an important person or persons. To be eligible under Criterion C, a resource must clearly represent the stream or gulch type of placer mine and possess enough integrity to convey the historic placer operation. Character-defining features will likely include excavations, tailings piles, work stations, and

infrastructure. Intact buildings and structure are rare and thus manifestly strengthen site eligibility. Stream placers may further be contributing elements of historic mining landscapes or larger districts.

Stream and gulch placers may be eligible under Criterion D, especially when studies of the infrastructure features of large mines, including networks of ditches, sluice beds, and work areas, may enhance current understanding of engineering applied to placer mining. If the resource possesses building platforms, testing and excavation of buried archaeological deposits may reveal information regarding workers' lifestyles and social structures of the workforce, as well as the functions of ancillary buildings.

Stream and gulch placers must retain aspects of physical integrity relative to its Period of Significance. Because structures may have been removed or destroyed subsequent to their productive period, integrity will relate to the property's ability to convey its significance or "recognizability" (see the National Register Bulletin: *Guidelines for Evaluating and Registering Archeological Properties*). For instance, material evidence may represent the work areas, engineering features, and structures or remnants of structures related to the historic mining operation. Eligibility of setting, feeling, and association is particularly crucial to the eligibility of these resources.

Hydraulic Placer: The eligibility of hydraulic placers is predicated on meeting at least one of the NRHP Criteria and adequate integrity to convey their significance. Hydraulic placers eligible under Criterion A must be associated with at least one Area of Significance noted above, events and trends important to the county. Hydraulic placers may be eligible under Criterion B because they were usually designed and subsequently supervised by mining engineers. To be eligible under Criterion C, a resource must clearly represent a hydraulic placer mine with integrity from the turn of the century. Character-defining features will likely include systems of water allocation and distribution, hydraulic workings methods, and the locations of sluices. In general, hydraulic mines were uncommon in the county and extant resources are therefore rare today. For this reason, examples are significant representations of formally engineered placer operations. Hydraulic placers may further be contributing elements of historic mining landscapes or larger districts.

Hydraulic mines may be eligible under Criterion D, especially when studies of infrastructure features, including water allocation and distributions systems, sluice beds, and work areas may enhance current understanding of engineering adapted to hydraulic mining. Testing and excavation of buried archaeological deposits may reveal information regarding workers' lifestyles as well as the functional layout of the operation.

Hydraulic placer mines must retain aspects of physical integrity relative to its Period of Significance. Because structures may have been removed or destroyed subsequent to their productive period, integrity will relate to the property's ability to convey its significance or "recognizability" (see the National Register Bulletin: *Guidelines for Evaluating and Registering Archeological Properties*). For instance, material evidence may include remnants of engineering features such as cut-banks, ditches, flumes, pipelines, sluice beds, penstocks, and reservoirs.

Integrity of design, setting, feeling, and association is particularly crucial to the eligibility of these resources.

Features Common to Placer Mines

Boom Dam: A dam intended to impound water for booming operations. Boom dams often featured a spillway or other form of breach that directed water into a boom ditch or drainage.
Boom Ditch: A ditch that directed water from a boom dam directly into placer workings.
Building Platform: A flat area that supported a building.
Building Ruin: The collapsed remains of a building.
Collection Ditch: A ditch that collected runoff from a placer mine for secondary uses or to impound sediments. A collection ditch should be located downstream from a placer mine.
Cut-Bank: The headwall of an excavation.
Dam: A water impoundment structure. Some dams for placer mines are earthen while others may consist of log cribbing filled with earth.
Ditch: An excavation that carried water to or from a placer mine. Ditches often tapped streams in adjacent drainages and featured a gentle gradient.
Flume: A wooden structure that carried water to or from a placer mine, or carried a stream around a placer mine.
Flume Remnant: The structural remnants of a flume.
Monitor Station: A platform, tongue of earth, or perch where a hydraulic monitor was stationed. Monitor stations were usually circular, cleared of rocks, and had a footing near center for the nozzle. The stations were strategically located amid hydraulic workings.
Penstock: A pipeline that carried water under great pressure for hydraulic mining. The penstock descended steeply from a pressure box down to the hydraulic workings, where feed pipes connected with hydraulic monitors. The penstock had gradual reductions in diameter, which increased the velocity and pressure of the water within.
Placer Pit: An excavation circular or ovoid in footprint where miners sought deep gravel.
Placer Trench: A linear excavation where miners sought deep gravel.
Placer Tailings: The hallmark of placer mining, tailings usually consist of ovoid or linear piles of gravel and rounded river cobbles.
Pressure Box: A wooden or masonry structure, usually far upslope from a hydraulic mine, that directed water into a penstock featuring a steep descent. A ditch or pipeline carried water to the pressure box from a stream or reservoir. The pressure box's elevation and the penstock's descent provided enough pressure for hydraulic mining.
Pressure Box Platform: Pressure boxes stood on earthen platforms cut out of the ground below a ditch or reservoir. A penstock, or its bed, will descend from the platform, which may feature stone masonry or timber footers.
Refuse Dump: A collection of industrial and structural debris cast off during operations.
Reservoir: A void behind a dam for water storage.

Shop Platform: Most company placer mines had simple blacksmith shops were tools and maintained and hardware manufactured. Shops stood on platforms of earth or tailings, which usually represent the building's footprint. An artifact assemblage of shop refuse including anthracite coal, hardware, and forge-cut iron scraps is a defining characteristic.
Shop Ruin: A collapsed shop.
Shop Refuse Dump: Blacksmiths threw shop refuse outside their buildings. When work was sustained, the volume of material became high enough to qualify as a dump. The artifact assemblage includes anthracite coal, forge-cut iron scraps, hardware, and forge clinker, a scorious residue generated by burning coal.
Sluice: A sluice was an indispensable structure for placer mining. It was a lengthy wooden flume with plank walls and a floor featuring riffles. A water current carried gravel through the sluice and the riffles caught the gold. Such a function required that the sluice be located on the floor of placer workings. Sluices ranged in size from 2' wide x 2' deep, to 6' wide x 6' deep. Piles of rocks and timber piers supported sluices.
Sluice Remnant: The remnants of a sluice, usually denoted by piers, posts, rock supports, and planks.
Supply Ditch: A ditch that delivered water to a placer mine.
Work Station: A platform alongside a sluice where workers supervised operations and maintained the sluice.

PROPERTY TYPE: HARDROCK PROSPECT

A prospect is a manifestation of an effort to locate profitable ore, and resources range in scale from shallow pits to extensive underground operations. A lack of significant production, the absence of ore storage facilities, minimal property development, and little capital investment were characteristic of development. Although most prospects tended to be simple, shallow, and lacked machinery, some were fairly advanced and possessed surface plants that required formal engineering and equipment. When a prospect was abandoned, equipment and structures may have been removed. The researcher is likely to encounter prospect sites with varying degrees of archaeological, engineering, and architectural integrity. Substantial operations were usually centered on an adit or a shaft with an associated waste rock dump of some volume, representing deep workings. While most prospects were labor-intensive, deep operations sometimes employed power appliances. Buildings, machinery, and other facilities usually shared the same orientation as the shaft or adit and were clustered together around the opening. Because equipment for deep prospecting was intended to be portable, items were usually removed when a site was abandoned, leaving primarily archaeological evidence such as building platforms, machine foundations, and artifacts. Prospect sites can be grouped into three general subtypes:

Hardrock Prospect Subtypes

Prospect Complex: When prospectors attempted to locate mineral formations, they often excavated groups of pits and trenches to expose bedrock. If the prospectors uncovered a promising lead, they drove adits and shafts to explore and sample the formation at depth. Collectively, the groups of pits, trenches, adits, and shafts can be termed prospect complexes. Pits and trenches will be surfacial, shafts and adits should be shallow, and the sum represents mineral sampling and a search for ore. It should be noted, however, that some prospectors drove shallow adits and shafts merely to fulfill assessment obligations to retain title to their mining claims. Experienced prospectors often followed an organized, strategic pattern when excavating their workings, which may become apparent when the features of a prospect complex are mapped.

If a prospector invested an appreciable amount of time in a complex, also necessary to drive an adit or a shaft, he usually constructed a few infrastructure components to support his work. One of the most common was a field forge where the prospector maintained his tools and fabricated basic hardware. Field forges were usually in the open and made with dry-laid rock masonry or small logs. Another was a residence, often either a simple log cabin or wall tent, unless a settlement lay nearby. Shafts required a hoist, and prospectors favored hand windlasses for their portability and low cost. A hand windlass was a wooden spool with a crank handle set in a frame over the shaft collar. Adits required wheelbarrows or ore cars to haul rock out. Because prospectors usually removed their equipment when they abandoned a site, archaeological features and excavations tend to represent prospect complexes.

Prospect Shaft: When prospectors discovered a mineral formation of promise, they often elected to sink a shaft to explore and sample it at depth. Initially, the prospectors would have installed a hand windlass to raise rock out of the shaft, and this primitive type of hoist had a depth capacity of around 100'. If they determined to continue sinking, the prospectors were forced to install a mechanical hoist and either sought capital or sold their property to an organized prospect outfit. Prospectors may have installed a horse whim, which was inexpensive and provided adequate depth capacity for further underground exploration. However, whims were slow and limited in performance such that many organized outfits installed power hoisting systems driven by steam or petroleum engines by the turn of the century.

When a shaft was deep enough to warrant a power hoist, the outfit usually erected other facilities as well. Blacksmiths maintained tools and fabricated hardware in shops, miners shuttled waste rock away from the shaft in ore cars on tracks, and portable boilers provided steam power. Surface plant components were usually clustered around the shaft, and a residence stood nearby if the shaft was in a remote location. All buildings and equipment met what the greater mining industry recognized as temporary-class criteria, which it defined as low in cost, portable, impermanent, and easy to construct. By definition, prospect shafts lacked evidence of ore storage or processing facilities.

If the shaft failed to encounter ore in profitable volumes, the outfit abandoned the site and usually removed all items of value. Given this, archaeological features and artifacts tend to represent prospect shaft sites today. The decay of timbering caused most shaft collars to collapse,

leaving areas of subsidence that can appear similar to large prospect pits. For a site to be defined as a shaft, the volume of waste rock should exceed the area of subsidence.

Prospect Adit: When prospectors discovered a mineral formation of promise, they often drove an adit to explore and sample it at depth. An adit was a horizontal entry underground usually 3' x 6' or less, and prospectors chose an adit over a shaft because an adit required less capital and effort. Prospect adits often featured surface plants equipped with little more than a blacksmith shop and a means of hauling waste rock out of the workings. Wheelbarrows were the simplest and least expensive device, and if the prospectors determined to continue driving, they may have used an ore car on a track. As the adit's length exceeded the penetration of fresh air, prospectors may have installed a hand-powered blower, a bellows, or a windsock to force air underground through tubing.

Surface plant components were usually clustered around the adit portal, and a residence usually stood nearby if the adit was in a remote location. By definition, prospect adits lacked evidence of ore storage or processing facilities. If the adit failed to encounter ore in profitable volumes, the outfit abandoned the site and usually removed all items of value. The decay of timbering caused most adit portals to collapse, leaving areas of subsidence that can appear similar to lengthy trenches. For a site to be defined as an adit, the volume of waste rock should exceed the area of subsidence.

Hardrock Prospect Significance

Because profitable ore could only be found through prospecting, this activity was a cornerstone of San Juan County's development. Small parties of prospectors began subsurface exploration in 1870 and were rewarded with the discovery of the Little Giant and other lodes. During the mid-1870s, prospectors arrived in significant numbers, explored the county's geography, defined its centers of mineralization, and found many of the significant veins. Their informal camps also became the seeds for the county's principal settlements. Arrival of the railroad in 1882 incited a wave of prospecting that lasted until around 1885. Between 1870 and 1885, most of the important ore formations were discovered, and the principal mines were started. Specific Areas of Significance apply to prospecting and extant associated resources, including prospect complexes, adits, and shafts.

In terms of *Exploration/Settlement*, prospectors and their outfits laid the groundwork for the establishment of a regional mining industry. They were usually the first to conduct extensive physical and mineralogical exploration, relaying information critical to subsequent mining interests. Prospectors were the first Euro-Americans to inhabit the region.

Regarding *Engineering*, simple prospect shafts and adits represent the application of systematic, strategic sampling, a hallmark of experienced prospectors, to prove the existence of ore. When developing deep prospects, organized outfits adapted known technology, machinery, and methods to primitive environmental conditions characterized by difficult terrain and climate and unknown geological conditions. Prospects also adapted conventional geological knowledge

and technology to predict the occurrence of mineral formations and ore. In so doing, they collectively contributed to understanding of the county's structural geology and mineralogy.

Regarding *Social History*, prospectors were an unusual segment of society with particularly adventuresome, independent, curious, robust, and survivalist qualities. Most possessed some formal education, learning further about geology and mineralogy through experience. Prospecting brought unconventional individuals to San Juan County, and they imparted their values and behaviors to the mining industry.

Regarding *Politics/Government*, prospectors organized the earliest mining districts in the San Juan Mountains, setting precedent for districts elsewhere in the mountains during the 1870s. Mining districts constituted an important frontier government that brought order to mining and settlers. These districts contributed to the formal division of southwestern Colorado into counties. In response to the surge of prospecting and mining in the Animas River drainage, the territorial legislature designated La Plata County in 1874. With regional growth, the legislature then carved San Juan County out of La Plata.

Hardrock Prospect Registration Requirements

Hardrock Prospects:

The eligibility of hardrock prospect complexes is predicated on meeting at least one of the NRHP Criteria and adequate integrity to convey their significance. Hardrock prospects eligible under Criterion A must be associated with at least one Area of Significance noted above, events and trends important to the county. Hardrock prospects may be eligible under Criterion B provided they reflect the direct and active contribution in the life of an important person or persons. To be eligible under Criterion C, a resource must clearly represent an organized prospect effort, wherein the assemblage of excavations reflects a systematic pattern with evidence of support facilities such as the blacksmith shop, if any existed. Prospect complexes may also be eligible under Criterion C if the resource possesses intact architectural or engineering features reflecting a type, period, or method of construction associated with prospecting. Hardrock prospects may further be contributing elements of historic mining landscapes or larger districts.

Hardrock prospects may be eligible under Criterion D, especially when charting the distribution of excavation types and sizes may reveal patterns. These patterns may reflect planning, sampling methods, and strategy specific to an area's geology or timeframe. Regional differences may also be determined by comparing prospect complexes. The methods and planning that prospectors employed is a central research topic. If the resource possesses building platforms, testing and excavation of buried archaeological deposits may reveal information regarding prospectors' lifestyles and social structures, which are not well documented. Meanwhile, prospect complexes featuring random excavation will reveal few buried archaeological deposits.

Hardrock prospects must retain aspects of physical integrity relative to its Period of Significance. Because these prospects featured few, if any, buildings or structures, integrity will

often relate to the property's ability to convey its archaeological significance or "recognizability" (see the National Register Bulletin: *Guidelines for Evaluating and Registering Archeological Properties*). Integrity of design, setting, feeling, and association is particularly crucial to the eligibility of these resources.

Prospect Shaft and Prospect Adit: Because prospect shafts and adits shared the same function, registration requirements are similar. The eligibility of both prospect shafts and adits is predicated on meeting at least one of the NRHP Criteria and adequate integrity to convey their significance. Prospects shafts and adits eligible under Criterion A must be associated with at least one Area of Significance noted above, events and trends important to the county. They may be eligible under Criterion B provided they reflect the direct and active contribution in the life of an important person or persons. To be eligible under Criterion C, a resource must clearly represent a typical shaft or adit operation. Character-defining features of prospect shafts may include the shaft, hoisting system, blacksmith shop, and other facilities or their remnants. In terms of prospect adits, features may include the adit portal, transportation system, blacksmith shop, and other facilities or their remnants. Because equipment and buildings may have been removed subsequent to productive operation, extant buildings, structures, and equipment or evidence of deep prospecting will contribute strongly to a site's eligibility. Prospect shafts and adits may further be contributing elements of historic mining landscapes or larger districts.
Prospects shafts and adits may be eligible under Criterion D, especially if a site possesses intact structures or buildings, and detailed examination may reveal how prospect outfits adapted conventional mining architecture and engineering to the environmental and geological conditions of the San Juan Mountains. Accessible and intact underground workings are especially significant, because few formal studies have been carried out regarding the underground work environment, engineering, equipment, and practices of drilling, blasting, and removing rock. Further, if workers lived on site, the residential area may offer meaningful buried archaeological deposits, such as privy pits. Testing and excavation may uncover artifacts capable of enhancing current understanding of the workers employed at prospect operations and how they lived.

As a property subtype, prospect shafts and adits are somewhat common, but examples retaining high degrees of integrity are rarer. Prospects shafts and adits must retain aspects of physical integrity relative to their Period of Significance. Because these prospects featured few, if any, buildings or structures, integrity will often relate to the property's ability to convey its archaeological significance or "recognizability" (see the National Register Bulletin: *Guidelines for Evaluating and Registering Archeological Properties*). Integrity of design, setting, feeling, and association is particularly crucial to the eligibility of these resources.

Features Common to Hardrock Prospect Resources

Boiler: A boiler was a vessel that generated the steam which powered machinery. Most boilers at prospect sites will be temporary-class upright, locomotive, or Pennsylvania types.

Boiler Foundation: Because portable boilers were self-contained and free-standing, prospect outfits usually stood them on platforms located near the hoist. Occasionally, however, workers erected rock or brick foundations or pads to support the boiler. The artifact assemblage around a foundation or platform can help the researcher identify it as that for a boiler. The assemblage should include clinker, which was a scorious, dark residue, as well as unburned bituminous coal, ash, water-level sight-glass fragments, boiler grate fragments, and pipe fittings. Some prospect outfits installed upright boilers on square or circular dry-laid rock pads or excavated a shallow pit underneath the boiler to allow ashes from the firebox to drop through. The pad's size should approximate the boiler's diameter. Pennsylvania boilers and locomotive boilers stood on skids, which usually required no support. However, where the ground was soft or uneven, workers often laid parallel rock alignments to prevent the boiler from settling. In the absence of rock supports, the skids occasionally became embedded in the ground and left two parallel depressions the length and width of the boiler. For locomotive boilers without skids, which were rare, workers erected a rock or brick pylon to support the high rear, and laid a rock or brick pad that supported the firebox end.

Claim Marker: Prospectors erected claim markers at the corners of their claims. Some were 300 by 1,500 feet in area, and others were 500' x 1500' in area. Markers ranged from cairns to blazes on trees to up-ended boulders. When a surveyor mapped and registered a claim, he usually etched the mineral survey number into a corner rock.

Claim Stake: A claim stake was the universally recognized form of claim marker. Claim stakes were usually 4" x 4" posts 4' high, although prospectors often substituted logs.

Draft Animal Track: Horse whims required a circular track around the apparatus so the draft animal could wind the cable drum. The tracks tended to be around 20' in diameter and cleared of major obstacles. Prospectors often graded semi-circular platforms adjacent to a shaft for a track.

Forge: Nearly all prospect operations of substance featured a forge where a blacksmith heated steel implements. Most forges were vernacular in construction in that they were assembled with local materials. Prospectors built walls 3' x 3' in plan and 2' high with rocks or small logs, inserted a tuyere, and filled the interior with sorted gravel. In some cases, prospect outfits imported factory-made iron pan forges to their sites.

Forge Remnant: Forges collapsed over time and may manifest as a mound of gravel and remnants of the walls, usually impregnated with coal and forge clinker. When coal burned at high temperatures, it left a scorious, dark residue known as *clinker*.

Headframe: A frame made of timber or logs that stood over a shaft. Headframes associated with horse whims were often large tripods or tetrapods. Power hoisting systems usually employed two-post gallows headframes.

Headframe Ruin: The collapsed remnants of a headframe.

Headframe Foundation: Headframe foundations usually manifest as parallel timbers that flank a shaft and extend toward the area where a hoist was located.

Hoist: Hoists at prospects were usually horse whims, steam, petroleum, or small electric models.

Hoist Foundation: Nearly all mechanical hoists were anchored to foundations to keep them in place, and a foundation's footprint can reflect the type of hoist. Foundations are common at

prospect shaft sites and can usually be found aligned with and at least 20' from the shaft. Because of the ease of construction and low cost, prospectors usually assembled hoist foundations with timbers, and occasionally with stone or concrete. Timber foundations decay and become buried over time, and often manifest today as rectangular groups of four to six anchor bolts projecting out of a hoist house platform.

Horse whims were usually bolted to timber foundations 2' x 2' in area at the bottom of a shallow pit. The trench for the cable and linkages often extends from the pit to the shaft.

Foundations for single-drum steam hoists are usually rectangular, flat, and feature at least four anchor bolts. They can range in size from 6' x 6' to as little as 2' x 3' in area. Foundations for single-drum electric hoists appear very similar to those for steam hoists. Steam hoists often left behind plumbing and gaskets, and the site should possess evidence of an associated boiler. The use of electric hoists often generated electrical insulators and wires.

Foundations for gasoline hoists are fairly distinct. Their footprint is that of an elongated rectangle at least 2' x 6' in area oriented toward and aligned with the shaft. Due to the engine's severe vibrations, prospectors often bolted hoists to concrete foundations at least one foot high. Gasoline hoist foundations usually feature at least two rows of three anchor bolts, with the rear two closer together than the rest. Gasoline hoists can leave distinct artifact assemblages including thin wires, spark plugs, small pipes, and fine machine parts.

Hoist House: Hoist houses, usually at least 20' from the shaft, enclosed a hoist, its power source, and often a blacksmith shop. Most prospect outfits followed a form conventional to the mining industry, a rectangular footprint and a front-gabled or shed roof. Hoist houses were vernacular in that they had no recognized architectural style, consisted of available materials, and were built as needed by the outfit.

Hoist House Platform: Hoist houses stood on platforms of leveled earth or waste rock at least 20' from, and aligned with, the shaft. Often, a platform is all that represents a hoist house, and it usually reflects the building's size and footprint. Evidence of a hoist and a shop is usually present.

Hoist House Ruin: The collapsed remnants of a hoist house.

Horse Whim: A horse whim was the most primitive type of mechanical hoist, and it was powered by a draft animal. Two types of whims were popular at different times (discussed above), and the researcher should specify the type of whim when recording a site. The *horizontal reel whim* consisted of a horizontally oriented cable reel at least 3 feet in diameter, fitted with a harness beam on top. The *geared whim* was compact and featured a vertical cable drum in a frame. A capstan, geared to the drum, featured a harness beam on top.

Horse Whim Pit: Prospectors often placed horse whims in shallow pits so the hoisting cable could pass through a trench to the headframe and pose no obstacle to the encircling draft animal. They often lined the pits with planks or logs to retain soil. Over time, the lining collapsed, leaving a concave depression where the whim was anchored, and a linear depression extending to the shaft. The pit should be at the center of a draft animal track.

Mine Rail Line: A track for ore cars.

Mine Rail Line Remnant: When prospectors dismantled a track, they often left in situ ties, impressions of ties, and sections of rails.
Pack Trail: A path, usually less than 8' wide, provided access to prospect workings.
Prospect Adit: A horizontal entry underground denoted by a waste rock dump. An adit tended to be short and less than 3' x 6', while a tunnel was larger. When collapsed, adits appear as trenches.
Prospect Pit: A circular or ovoid excavation surrounded by a small volume of waste rock.
Prospect Shaft: A vertical or inclined opening underground of shallow depth. When intact, shafts tend to be rectangular, and either 4' x 6' or 4' x 8' in interior dimension. When collapsed, shafts manifest as circular areas of subsidence.
Prospect Trench: A linear excavation flanked by a small volume of waste rock.
Shop: A building that enclosed blacksmith facilities where a worker fabricated and maintained tools and hardware. Simple shops usually featured a forge, a workbench, and possible hand-powered appliances such as a drill-press. Most prospect outfits followed a form conventional to the mining industry, rectangular footprint and gabled roof. Shops were vernacular, consisting of available materials, and built as needed by the outfit. In general, logs were commonly used prior to 1890, and lumber as early as 1880.
Shop Platform: Shops usually stood on earthen platforms near the entry underground. The platforms may feature forge remnants and almost always possess artifacts such as forge-cut iron scraps, anthracite coal, and clinker, which is a scorious, ashy residue created by burning coal.
Shop Ruin: The collapsed remnants of a shop.
Waste Rock Dump: The waste material removed from underground workings.

PROPERTY TYPE: HARDROCK MINE

Hardrock mines were underground operations that produced ore, but were not necessarily profitable. High operating costs, mismanagement, and ineffective technologies often consumed the income generated from production. Company mines ranged in scale from small and labor intensive to extensive, mechanized operations. Most shared basic characteristics, such as ore storage facilities, support buildings and structures, waste rock dumps often at least 125' x 125' in area, and roads for the transportation of materials and ore.

Although small mines were similar in composition to advanced prospects, in that surface plants included facilities to accommodate ore production. Ore bins permitted companies to store payrock between shipments, and companies that mined complex ore often erected ore sorting houses where workers manually separated waste and ore according to quality. Large mines differed greatly from prospects in that their surface plants supported intensive work underground. To facilitate ore extraction and materials handling large companies usually employed machinery and erected substantial buildings. Some companies further attempted to produce ore in economies of scale while minimizing energy consumption and costly labor, relying on advanced machinery and efficient ore handling systems. Shaft operations featured

power-driven hoisting systems that raised high tonnages of payrock from deep workings. Both tunnel and shaft operations employed compressed air systems, which permitted miners to bore blast holes with mechanical rock drills. Those companies that were either highly productive or in remote locations sometimes featured their own concentration mills to separate metalliferous material from waste.

The shop was a key facility differentiating large and small operations. The mechanical systems typical of large mines created heavy demand for advanced metalwork and carpentry. To meet these needs, substantial mining companies erected spacious shops equipped with power-driven appliances. Where possible, companies located the shop adjacent to the mine opening to minimize undue handling of heavy materials. Many shops featured a basic array of power appliances, including drill presses, lathes, trip hammers, and pipe cutters. The turn of the century saw a number of companies employ electric motors to power their shop appliances, by contrast to the upright steam engines of previous years. Most power appliances had to be anchored to foundations, which ranged from timbers to concrete pads.

The need for efficient transportation gave rise to another new type of facility. To overcome the challenges of winter weather and hostile terrain, many companies in the county built aerial tramways that descended from the mine to a shipping point or a concentration mill. Smaller operations installed simple single-rope reversible systems. Moderately-financed companies strung double-rope reversible systems, consisting of two-track cables and a pair of tram buckets linked by a cable loop. The Bleichert double-rope system, with its continuous loop of buckets, was the most efficient and costly, limiting the system to heavily capitalized companies.

In many cases, surface plants erected by highly productive companies required elaborate complexes. For efficient servicing, minimized plumbing, and better engineering, these companies generally clustered mechanical components and shops in either large tunnel houses or shaft houses. Ancillary facilities, such as separate shops, electrical transformers, explosives magazines, offices, and quarters for draft animals were independent. In general, the surface plants of substantial operations featured a primary shaft or tunnel house surrounded by several smaller buildings.

Hardrock Mine Subtypes

Shaft Mine: Shaft mines produced ore from vertical or inclined underground entries. Companies frequently arranged critical surface plant components around the shaft collar. Large shaft mines possessed complex, mechanized surface plants with multiple structures and buildings, while small operations were simple and featured facilities similar to those at deep prospects. The presence of an ore bin or sorting house, or the evidence thereof, can distinguish a mine from a deep prospect. Small to moderate shaft mines with diminished integrity are relatively common resources, while sites retaining high integrity and large, complex shaft mines are rarer.

Tunnel Mine: Tunnel mines produced ore through a horizontal tunnel. Companies usually arranged critical surface plant components around the tunnel portal. Large tunnel mines

possessed complex, mechanized surface plants with multiple buildings and structures. Small operations were simple and may have featured facilities similar to those at deep prospects. The presence of an ore bin or sorting house, or the evidence thereof, can distinguish a mine from a deep prospect. Small and moderate tunnel mines with diminished integrity are relatively common resources, while sites retaining high integrity and large, complex tunnel mines are rarer.

Hardrock Mine Significance

Hardrock mining in the county began in 1870 with the discovery of the Little Giant and other gold veins in Arrastra Gulch and spread throughout the Animas River valley by 1875. Through 1880, mining took form as an industry and slowly gained momentum. The successful operation of the Greene and Crooke smelters facilitated this growth. The industry further mushroomed when the railroad arrived in 1882, lowering the costs of mining, transporting ore to the large smelter at Durango, and improving the quality of life.

The industry declined sharply in 1885, reviving in 1890 with passage of the Sherman Silver Purchase Act. However, the price of silver collapsed at the end of 1893 when the Act was repealed. One result was a deep, nationwide economic depression and the other closure of silver mines across the west. In San Juan County, mining continued because the industry adapted. Attention shifted to gold and high grades of silver with mining companies developing the strategy of production in economies of scale. Because of this, the county's output remained substantial while much of the state suffered. When the general economy improved in the late 1890s, a revival swept Colorado and San Juan County. Companies across the state adopted the strategy of economies of scale, generating more tonnage of ore and higher yields than any time in the past. This trend lasted until 1910, when mining declined again. Increased demand and metals prices stimulated by World War I caused yet another revival in the county, which lasted through 1921.

The industry struggled into the Great Depression. Federal programs to increase the value of gold in 1933 and passage of the Gold Reserve and Silver Purchase acts the following year gave the industry renewed energy as well as job creation. World War II, and its drain on labor and resources, ended the Depression-era revival, although the industry recovered immediately after the war. This post-war revival ended in 1954 with closure of the Mayflower Mill.

Mining was consistently significant on a local level regardless of boom and bust cycles, but the industry was also often reflected state and national trends throughout the years discussed in Section E. Specific Areas of Significance may apply. *Exploration/Settlement* was relevant to the years preceding 1885. Mining companies, often on the heels of prospectors, brought social, economic, governmental, and transportation systems to this remote area. In short, regarding *Industry*, mining was the origin of settlement in the county. As the primary industry, mining also gave rise to developments in technology, engineering, and architecture related to ore production and milling, for which the county became known nationally among professional mining circles.

Regarding significance in the areas of Economics and Commerce, via investment, communication systems, banking, and acquisition and shipment of supplies, mining contributed to regional, state, and national economic systems, attracting prominent capitalists nationally.

Mining fostered a local economy by paying wages to workers, hiring consultants for services, and purchasing goods from sources mostly in major towns. Machinery manufacturers in Denver purchased material from sources within and outside of Colorado. Between the 1880s and 1930s, Denver hosted prominent mine-supply industries. The thousands of workers employed by the county's mining companies consumed food and domestic goods from a variety of sources. Employees thereby not only supported a complex national food transportation network, but the development of farming and ranching in Colorado. Finally, productive mining companies contributed to the area of Economics through the conversion of mineral resources into wealth, which infused the local economy with fresh capital that in turn fostered Commerce. The local level of significance continued through all Periods of Significance after 1861. Meanwhile, the county's total output was a major contribution to Colorado's wealth beginning in 1882.

Regarding Politics/Government, mining was integrally tied to and a direct function of political systems on statewide, national, and international levels. Political processes greatly influenced silver mining because the value of the metal was, at times, juxtaposed with government policy. The Bland-Allison Act of 1878 and the Sherman Silver Purchase Act of 1890 instituted price supports and acquisition quotas for silver. In response, mining companies across the west prospected for and produced the metal. Government repeal of the Sherman Silver Purchase Act and subsequent collapse of silver's value brought silver mining and prospecting to a temporary halt. Passage of the Pittman Act in 1918 increased the value again and stimulated mining, and in turn repeal of the Act in 1922 wrecked the industry. Federal programs related to the international conflict and defense influenced the production of many industrial metals, including zinc, copper, and lead. While few individual mine sites can be directly tied to specific political acts and policies, as a whole, the county's mining industry and interests contributed heavily to state and national trends and policies.

Regarding *Social History*, participants in the county's hardrock mining industry participated in the development and evolution of a class-based social structure. Beginning in the late 1870s, with active production mine owners and investors began an ascent to wealth while laborers formed a working class dependent on wages. Through the 1910s, two general categories of capitalists acquired productive properties and financed exploration. The first consisted of local investors of limited means and the second a wealthy elite based in Denver, the Midwest, and east. Profits reinforced existing fortunes and contributed to the formation of a middle class. In turn, because mining depended on wage laborers, companies facilitated a robust local working class. Industrial operations created an employment market that drew workers from throughout Colorado and other states. Cycles of boom and bust required that workers be mobile, by contrast with agrarian sectors. Furthermore, boom tended to draw laborers from a variety of ethnic backgrounds and traditions. The result was a mobile, adaptable, and diverse society. The mining industry can reveal much about themes of class, ethnic heritage, gender, and demography.

Regarding *Engineering*, San Juan County's mining industry innovated technological and engineering developments not only adopted by the greater mining world, but also in other industries and public sectors. Some county mines were among the earliest in Colorado to employ mechanical rock drills. The county was a center for tramway engineering and featured some of

the longest and most complex systems prior to 1920. A consortium of companies and the town of Silverton contributed to the development of electrical technology in general and specifically as applied to mining. In response to the extreme environment of the San Juan Mountains, engineers structurally designed buildings capable of withstanding tremendous natural forces, such as snow load, gale-force winds, and avalanche. The county was further a cradle for the strategy of producing low-grade ore in economies of scale through advanced engineering. Large companies pioneered the practice during the early 1890s and continued to refine it, rendering previously uneconomical ores profitable to produce and extending the viability of individual mines and even entire mining districts. Given that most county mines represented points along a spectrum of engineering and technology, no single operation may encapsulate all the above trends.

Hardrock Mine Registration Requirements

Shaft and tunnel mines range from small and simple to large and complex. As small mines are common resources, Barbara Wyatt's 2009 National Register White Paper "Evaluating Common Resources for National Register of Historic Places Eligibility should guide their evaluation. Large mines are much less common and may have contributed to the development of engineering or technological innovations. The eligibility of hardrock mines is predicated on meeting at least one of the NRHP Criteria and adequate integrity to convey their significance. Hardrock mines eligible under Criterion A must be associated with at least one Area of Significance noted above, events and trends important to the county. Hardrock mines may be eligible under Criterion B provided they reflect the direct and active contribution in the life of an important person or persons. To be eligible under Criterion C, a resource must clearly represent a tunnel or shaft mine. Because equipment and buildings may have removed when mines were abandoned, archaeological features may represent the operation. A site should reflect material evidence clearly conveying the mine's functional layout and surface plant design or individual components. Intact buildings, structures, and machinery are rare examples of the adaptation of engineering, technology, and architecture to mining. Some may reflect adaptation to the difficult environmental conditions high-altitude mining. Character-defining features of shaft mines may include remnants of the hoisting system, blacksmith shop, buildings, ore bin, or other facilities. Features of tunnel operation may include remnants of the tunnel house or shop, ore bin, machinery, or ancillary facilities. Hardrock mines may also be eligible under Criterion C if the resource possesses intact architectural or engineering features reflecting a type, period, or method of construction associated with mining. Hardrock mines may further be contributing elements of historic mining landscapes or larger districts.

If a site possesses structures and buildings, detailed examination may reveal how mining companies adapted conventional mining architecture and engineering to high-altitude conditions. Individual systems often lend themselves to detailed studies, and examples include compressed air, steam, hoisting, and ore sorting. Accessible and intact underground workings are an important source of information because few formal studies have been carried out regarding the underground work environment, engineering, equipment, and practices. Currently, historical

references are the principal body of information that researchers rely on for studying aspects of mining. Documentation of underground workings will contribute material fact to this arena of inquiry.

Hardrock mines may be eligible under Criterion D, especially when buried archaeological deposits, such as privy pits, thick boiler clinker dumps, and refuse layers in waste rock dumps may be present. Deposits amid a mine surface plant may include artifacts capable of enhancing current understanding of daily worker behavior, diet, and residence. In general, large mine sites tend to possess at least one of the features noted above. Small mine sites, by contrast, may lack buried deposits of substance or intact buildings and systems.

Integrity of design, setting, feeling, and association is particularly crucial to the eligibility of these resources. For a resource to retain integrity of *design*, material evidence, including archaeological features, must convey the mine's organization and engineering. In many cases, mines developed episodically, with new operators changing and adapting surface facilities as needed. In such cases, a resource reflects the evolution of surface facilities over time. To retain integrity of *setting*, the surrounding area must not have changed a great degree from its Period of Significance. In terms of *feeling*, the resource should convey the sense of historic mining operations. Integrity of *association* exists where buildings, structures, machinery, or other features convey a strong sense of connectedness between the property and a contemporary observer's ability to discern the historic mining operation.

Features Common to Hardrock Mine Resources

Mine sites may possess an array of archaeological, engineering, and architectural features representing the surface plant. To help researchers identify and understand the features, their types are listed below according to the common systems that historically comprised surface plants. Because mines shared many of the same facilities as prospects, the features in common are not repeated below. Instead, the researcher should refer to Prospect Site Feature Types for additional context.

General Feature Types

Adit: A horizontal opening usually less than 3' x 6'. Collapsed adits manifest as linear areas of subsidence. Tunnels were larger horizontal openings greater than 3' x 6'.

Building Platform: A flat area upon which a building stood. If possible, the type of building should be specified in the feature description.

Cribbing: A latticework of logs usually intended to be filled with waste rock or earth. Some cribbing structures served as retaining walls for platforms and waste rock dumps, and others were foundations.

Explosives Magazine: Organized mining outfits erected magazines to store explosives away from a mine's surface plant. Some magazines were dugouts, some were stout stone structures, while others were no more than small sheds much like dog houses.

Machine Foundation: A timber, masonry, or concrete foundation for an unknown type of machine.

Mine Track: A rail line that facilitated the movement of ore cars around a mine.
Mine Track Remnant: When a rail line was dismantled, workers often left ties, impressions from ties, portions of rails, and the rail bed.
Pipeline: An assembly of pipes usually intended to carry water. Pipelines should not be confused with compressed air mains, which extended from a compressor into the underground workings.
Pipeline Remnant: When disassembled, pipelines left evidence such as linear depressions, series of footers, and lengths of pipe.
Privy: Most mines of substance featured a privy for the crew's personal use. Privies usually are small frame buildings with a door in the front and a bench inside with one or several cutouts for toilet seats. The buildings were vernacular in construction and stood on foundations of logs, lumber, or rocks over a pit.
Privy Pit: A privy pit was the waste receptacle underneath a privy building. When a pit was full, workers relocated the building, sometimes threw refuse into the depression, and covered it with a cap of earth or waste rock. Pits tend to manifest today as depressions less than 5' in diameter, often with artifacts and other materials in their walls and bottoms.
Refuse Dump: A collection of hardware, structural materials, and other cast-off items.
Road: Roads were graded for wagons and trucks and were usually at least 8' wide.
Shaft: A vertical or inclined opening underground usually at least 4' x 8' in area. Some shafts were divided into compartments. The largest compartment was the *hoisting compartment* and the smaller (usually less than 3' wide) was the *utility compartment*. Highly productive mines may have featured shafts with two hoisting compartments and one utility compartment. Evidence of a double-drum hoist should be associated with a three-compartment shaft. Collapsed shafts manifest as funnels of subsidence.
Shaft House: A shaft house was a large building that enclosed the shaft collar, the hoisting system, and usually a shop. Large shaft houses may have also encompassed an air compressor. Mine tracks extended away from the shaft and passed out of the building. Like typical mine buildings, shaft houses were vernacular in design and construction. They had no recognized architectural style, were assembled from available materials, and were built for function. Although each was unique, they were based on a handful of forms conventional to the mining industry. The most basic was rectangular in footprint with a front-gabled or shed roof and a cupola for the headframe. Large shaft houses may have been L-shaped, cross in plan, or possessed multiple extensions. The roof was highest over the headframe and sloped down toward the hoist. Logs were commonly used for small buildings prior to 1890, and lumber for large shaft houses as early as 1880.
Shaft House Platform: Shaft houses usually stood on leveled platforms of earth or waste rock. When dismantled, shaft houses left distinct footprints surrounding evidence of the hoist, boiler, and shop. Differences in soil types and consistencies can reflect a shaft house's footprint. Large shaft houses often stood on rock foundations that can define the structure's perimeter.
Shaft House Ruin: The collapsed remains of a shaft house.
Stable: Prior to the 1920s, mining companies relied on draft animals for both underground and surface transportation. The companies erected stables to house the animals, and the buildings

were often crude, low, and erected on poorly leveled ground. Distinguishing characteristics include wide doorways, feed mangers, and oat boxes.

Stable Ruin: The collapsed remnants of a stable.

Timber Dressing Station: Timber dressing stations were work areas where miners reduced logs into timbers for underground support. Most stations were outdoors near the mine opening, and they tend to be represented by collections of raw logs and numerous cut wood scraps. Some were within the shaft house or tunnel house.

Timber Stockpile: A stockpile of mine timbers, often located near the mine opening. Mine timbers are usually 6' to 7' long and notched at both ends.

Trestle: A structure that supported a mine rail line, walkway, or pipeline. Workers often built small trestles on the flanks of waste rock dumps to support dead-end rail lines.

Trestle Remnant: Posts, single piers, or partial stringers left from a trestle.

Tunnel: A tunnel was a horizontal entry underground 3' x 6' (interior dimensions) or larger. Collapsed tunnels often manifest as linear areas of subsidence, possibly with pipes or rails projecting outward.

Tunnel House: A tunnel house was a building that enclosed the tunnel portal, a shop, and a ventilation blower. A mine track, and sometimes a trench or flume to divert drainage water, passed through the building. Large tunnel houses may have also encompassed an air compressor and timber dressing station. Like other mine buildings, tunnel houses were vernacular in design and construction. They had no recognized architectural style, were assembled from available materials, and were built for function. Although each was unique, they were based on a handful of forms conventional to the mining industry. The most basic was a rectangular footprint with a gabled or shed roof. Large tunnel houses may have been L-shaped or possessed several extensions for the shop and machinery. In general, logs were commonly used prior to 1890, and lumber as early as 1880.

Tunnel House Platform: Tunnel houses commonly stood on cut-and-fill platforms graded at the tunnel portal. Large versions often had rock or concrete foundations. The platform or foundation, as well as differences in soil types and consistencies, can reflect the building's footprint. Artifacts and machine foundations can reveal the types of facilities that the building enclosed.

Tunnel House Ruin: The collapsed remains of a tunnel house.

Utility Pole: A pole that supported an electrical or communication line.

Ventilation Blower: Many operations employed ventilation blowers to force fresh air underground. They usually located the blower adjacent to the mine opening and attached an assemblage of ventilation tubes that extended underground. Large blowers had to be anchored to foundations, and most were belt-driven by an adjacent motor or steam engine.

Ventilation Blower Foundation: Blower foundations usually consisted of timbers, were 3' x 4' in area or less, and featured four anchor bolts. The foundations were embedded in the ground adjacent to the mine opening. A motor or small steam engine that powered the blower was usually bolted to an adjacent foundation.

Compressed Air System Feature Types

Air Compressor: An air compressor was a machine that compressed air that was piped underground to power rock drills. Mining companies employed a variety of types that rose and fell in popularity between the 1870s and 1940s.
Air Compressor Foundation: Because of their great weight and powerful motion, air compressors had to be anchored to solid foundations. Workers often constructed timber foundations for small compressors and used either rock or brick masonry, or concrete for large models. Based on a foundation's footprint, the researcher can often determine the exact type of compressor.
Compressed Air Main: A pipeline that carried compressed air from a compressor into the underground workings.
Compressor House: Limited primarily to large mines, a compressor houses enclosed an air compressor and its receiving tank. If the compressor was steam-driven, then the building also usually enclosed the boiler. The buildings were vernacular in design and appearance.
Compressor House Platform: Compressor houses stood on platforms graded with waste rock or cut-and-fill methods. The platform should feature a compressor foundation, a motor mount or boiler setting ruin, and an artifact assemblage consisting of machine parts and pipe fittings.
Compressor House Ruin: The collapsed remains of a compressor house.

Hoisting System Feature Types
Headframe: Mining operations erected four general types of headframes to meet the needs of ore production. The first is an enlarged version of the two-post gallows discussed above with Prospect Shafts. The second was the *four-post derrick*, which consisted of four posts joined with cross-braces and diagonal beams, all supported by two back braces. The third is the *six-post derrick*, which featured six posts instead of four. The last is a large *A frame*. Production-class headframes were more than 30' high and stood on well-built timber foundations.
Headframe Foundation: Production-class headframes required solid foundations surrounding the shaft. The foundations were usually buried with waste rock ballast for stability and hence were embedded in the ground. Several structures were common. One was a squat timber frame, and the other was carefully leveled log cribbing. Concrete was occasionally used. The headframe was fastened to timber footers extending toward the hoist. The foundation's length usually equaled the headframe's height.
Headframe Ruin: The collapsed remnants of a headframe.
Hoist: To meet the needs of ore production, mining companies engaged in production almost always employed power hoists.
Hoist Foundation: Few shaft mines retain their hoists and instead feature foundations, which are distinct today.
Hoist House: See Prospect Site Feature Types.
Hoist House Platform: See Prospect Site Feature Types.
Hoist House Ruin: See Prospect Site Feature Types.

Power System Feature Types

Boiler: Many small, marginal mining operations employed portable boilers to power hoists and minor pieces of equipment, as did prospect outfits. However, mining companies wishing for a permanent, efficient source of steam usually installed return-tube boilers.

Boiler Foundation: Boilers were usually dismantled when a mine closed, and in some cases, the masonry setting was removed as well. Distinct pads and footers may remain, and the type of boiler can be determined from this foundation. Artifacts such as ash, clinker, and scorched rocks and bricks are usually associated with boiler foundations.

Portable boilers left the most elementary foundations. Vertical boilers stood on dry-laid brick or stone pads, and workers arranged rock alignments for the skids of locomotive units. Some locomotive boilers lacked skids and instead were supported by simple rock or brick pylons, discussed above under prospects. Typical return-tube boiler foundations were, flat, rectangular, and around 10' x 22' in area. Workers usually used rocks, although well-funded companies substituted bricks. In many cases a foundation may still retain the *bridge-wall*, which was a low row of bricks that forced flue gases against the boiler's belly. When visible, the bridge-wall crosses the foundation near its center.

Boiler Setting Ruin: When workers dismantled return-tube boilers, they almost always left the masonry foundation in situ. Collapsed settings range in appearance from mostly intact walls to mere piles of rubble. With some examination, the researcher may be able to determine the boiler type and location of the firebox. If the walls are intact, a ruin may feature the masonry bolts that anchored the façade, and the posts that supported the boiler shell. Most setting ruins also feature a bridge-wall, which was a low brick divider in the setting's interior. The wall usually stood between the firebox and the smoke chamber, and it forced flue gases up against the boiler's belly. Most return-tube boiler settings consisted of common bricks or rocks, and they featured cleaning ports near ground-level. Well-capitalized companies often lined fireboxes with fire bricks.

Boiler Clinker Dump: When workers shoveled residue out of a boiler's firebox, they usually dumped the material on the waste rock dump near the boiler. Boiler clinker dumps tend to be distinct and consist primarily of boiler clinkers, which are dark, scorious, ashy clasts created by burning coal. Boiler clinker dumps also usually include charred slate fragments, unburned bituminous coal, and structural and industrial hardware.

Motor: The common motor consisted of a cylindrical body, a belt pulley, and electrical wiring. Most motors were less than 4' x 5' in area.

Motor Foundation: Due to great weight and stresses created by motion, workers anchored motors to stout concrete foundations usually less than 4' x 5' in area. Foundations tend to be slightly rectangular, feature four to six anchor bolts, and are aligned with the machine that the motor powered.

Transformer House: Companies that employed electricity for lighting and power often erected transformer houses to shelter electrical equipment. They usually located the buildings away from the rest of the surface plant in case of fire. Transformer houses are relatively small, rarely exceeding 30' x 30' in area, and usually feature brackets and mounts on posts for the

transformers, as well as ports in the walls and numerous insulators for wires. Construction is vernacular, and form may be shed or gabled.
Transformer House Platform: Workers usually erected transformer houses on cut-and-fill platforms that possess telltale artifact assemblages of electrical items. Examples include cast iron transformer cases, porcelain or slate switch panel fragments, fuses, porcelain insulators, high-voltage porcelain insulators, glass insulators, and wires.
Transformer House Ruin: The collapsed remnants of a transformer house.

Ore Storage and Processing Features
Ore Bin: Mining outfits erected ore bins to contain payrock for shipment. Ore bins could be of the sloped-floor variety or open, flat-bottom structures.
Ore Bin Platform or Foundation: A platform or foundation that supported an ore bin. Open, flat-bottom bins usually stood on a platform located on the flank of a waste rock dump so workers could dump payrock from an ore car. Sloped-floor bins usually stood on a combination of a platform, which supported the bin's head, and log or timber pilings that supported the remainder.
Ore Bin Ruin: The collapsed or partial remnants of an ore bin.
Ore Chute: A chute that directed payrock into an ore bin or into a vehicle.
Ore Chute Remnant: The collapsed remnants of an ore chute.
Ore Sorting House: Ore sorting houses were complex structures that featured an ore bin at bottom, an overlying sorting room, and bins or chutes at top to receive raw ore.
Ore Sorting House Platform or Foundation: Platforms and foundations for sorting houses usually appear similar to those built for ore bins. The difference can manifest as discrete piles of large waste cobbles flanking the foundation. The piles are often different in appearance from the rest of the mine's common waste rock, and often consist of rough cobbles uniform in size.
Ore Sorting House Ruin: The collapsed remnants of a sorting house.

Shop Feature Systems
Backing Block: Some shops featured backing blocks to help workers sharpen the drill steels used by rock drills. A backing block consisted of an iron rod 4" x 4" or less in cross-section and up to 8' long embedded in the shop floor near the forge. The block's surface featured a series of deep divots where the blacksmith rested the drill-steel's butt, and he leaned the drill steel's neck against an anvil to brace the item for sharpening. Many mining outfits substituted a railroad rail for the iron rod.
Drill-Steel Sharpening Machine: During the 1910s, well-funded mining companies began adopting compressed air-powered machines to automate the process of sharpening drill-steels. Most sharpeners were upright units 2' x 3' in area, 3' to 5' high, and featured an assemblage of clamps and power hammers mounted on a cast iron pedestal. Sharpeners were always located in a shop.
Drill-Steel Sharpening Machine Foundation: Because drill-steel sharpening machines destroyed unpadded concrete foundations over time, they were usually bolted to foundations consisting of

timbers or timber footers over concrete. Sharpener foundations are always located in a shop or on a shop platform, are usually 2' x 3' in area, and possess four to five anchor bolts.

Forge: Almost every mine shop featured a forge where blacksmiths heated iron. Several types of forges were popular, and most were 3' x 3' in area and 2' high. The *gravel-filled rock forge* consisted of dry-laid rock walls, the *wood box forge* had plank walls, and both were filled with gravel. The free standing *iron pan forge* featured an iron pan supported by iron legs. Companies that required high volumes of work also installed cylindrical and square iron box forges usually 4' x 4' in area.

Forge Remnant: Over time, rock and wood box forges decay, leaving mounds of gravel that often feature anthracite coal, clinker, and forge-cut iron scraps.

Lathe Foundation: Some mechanized shops featured a lathe to facilitate metal- and wood work. Lathes were usually bolted to parallel timbers around 2' x 8' in area or less.

Power Hammer Foundation: Mechanized mining companies installed power hammers to expedite metalwork. Many power hammers consisted of obsolete rockdrills bolted to timber posts, and they pounded items clamped to underlying tables. When removed, power hammers may be denoted by a heavy timber post up to 6' high and an adjacent timber stump where the table was located.

Shop: Nearly every mine had a shop for the manufacture and repair of tools, hardware, and machinery. Shops included blacksmith facilities at the least, some were equipped with power-driven appliances for advanced work, and many were equipped for basic carpentry. To minimize handling of heavy iron, mining companies built their shops near the mine opening. Shop buildings followed several basic vernacular forms in construction, appearance, and design. Most were custom facilities, built as needed with available materials, and planned according to a company's interpretation of function and efficiency. Prior to the 1890s, shops tended to be simple, rectangular, and had blacksmithing equipment in a major portion and a carpentry area in the rest. Many were of log construction, but mining companies preferred frame construction. During the 1890s, shops increased in size to accommodate more appliances, and by the 1900s, corrugated sheet iron grew in popularly for siding and roofs.

Shop Platform: Shops almost always stood on platforms of leveled earth or waste rock. When the building was removed, a distinct platform usually remained. An artifact assemblage including forge clinker, pieces of hardware, forge-cut iron scraps, cut pipe scraps, and cut wood scraps can help identify a shop platform.

Shop Ruin: The collapsed remains of a shop.

Shop Refuse Dump: A concentration of shop refuse generated by sustained blacksmithing and metalwork. The artifact assemblage is distinct and consists of forge clinker, forge-cut iron scraps, cut pipe scraps, and pieces of hardware. Carpentry shops left an abundance of cut wood scraps, sawdust, and hardware.

PROPERTY TYPE: AERIAL TRAMWAY

Aerial tramways were mechanized transportation systems that allowed companies to develop mines in some of the most difficult physical environments. Engineered with precision and built to exacting specifications, tramways bore ore from mine to receiving point over difficult terrain and in all weather. Although these systems required an initial investment of capital and labor, they ultimately lowered transportation costs. This asset factored heavily into San Juan County's mining industry's increased productivity from the 1890s through the 1930s. Tramways, especially advanced systems, facilitated production in economies of scale, and mining companies were able to generate higher volumes of low-grade ore from inaccessible deposits than was otherwise possible. Due to companies' broad success with these systems, they built more locally than most other mining regions nationwide. Coupled with the sophistication of systems like the Silver Lake and Sunnyside, San Juan County emerged as a recognized center of tramway engineering.

The county's mining industry favored four types of tramways, each related to variables of capital, production, and the skills of engineer and crew. The tramways, further described as Property Subtypes below, are the: single-rope reversible, double-rope reversible, Hallidie single-rope, and Bleichert double-rope. Although the types varied in scale, capacity, and cost, all shared a basic template. Tram buckets rode cables between an upper terminal at the mine and a lower terminal at a receiving point. Miners input ore into a bin at the upper terminal and transferred it into the tramway buckets, which carried the material to the lower terminal. There, workers emptied the buckets into another bin, sent the empty vehicles back up to the mine, and repeated the process. In the case of smaller operations, the lower terminal was often a shipping point where wagons carted the ore for the last leg of its journey to a mill or the railroad. At larger operations the terminal was often attached to a mill, and the tramway provided an important all-season link to the mine. When possible, tramways should be recorded with their associated mines or terminus stations. They can be recorded as independent resources, however, when other elements of a comprehensive system have been lost.

Aerial Tramway Subtypes

Single-Rope Reversible System: The single-rope reversible system was the simplest and least costly tramway. The builder had to be skilled in field engineering but did not need formal training in mechanical systems. Single-rope tramways were the first systems built in the San Juan Mountains, beginning with the Little Giant in 1871, and saw use through the 1950s. Their light duty and short range limited them to smaller outfits.

The single-rope tramway consisted of little more than a fixed cable descending from an ore bin down to another bin at the bottom terminal. A bucket, suspended from a pulley, rode the cable back and forth. When the bucket was empty, a worker winched it up to the mine with a second cable, and when the bucket was full, he lowered it via a hand brake. On some tramways, the winch was at the bottom terminal and the rope passed around a wheel at the top for mechanical advantage. The terminals consisted of little more than the two bins, possibly covered by roofs, with anchors for the cable. The top bin featured a mount for the winch and a chute for

loading the bucket. The bottom bin had a plank platform so a worker could dump the ore. Winches ranged from hand-turned units to steam or gasoline hoists. As a resource type, extant single-rope reversible tramways are uncommon. Resources with intact engineering features, such as hardware and structures, are rare and may be significant examples of their type.

Double-Rope Reversible System: The double-rope reversible tramway operated much like the single-rope system, but its dual ore buckets increased carrying capacity. It remains uncertain when double-rope tramways were first introduced to the county, but they were in use by the 1890s. Also known as a *jig back tramway*, the double-rope system featured two buckets that rode over stationary track cables in a balanced fashion. At the mine a worker lowered a full bucket down to the bottom terminal with a hand brake, and it pulled the lighter, empty vehicle up to the top terminal. The cable connecting the buckets wrapped around a sheave wheel anchored to a heavy timber frame in the upper terminal. The wheel featured a flange for the brake shoe. Towers of frame construction were sometimes necessary to support the track cables on lengthy spans. As with the single-rope system, terminals consisted of little more than bins. However, each terminal had two bins with chutes, one for each bucket.

The system was inexpensive and within the technological grasp of experienced miners, making it ideal for companies with limited capital. Although the mining outfit only had to pay for hardware and installation, terminals required design and planning, even if informally and in the field. Often, terminals were vernacular in design and construction. The builder adapted the general double-rope template to the mine's surface plant and environment. Hardware may have been factory-made for the purpose, adapted from other uses, or salvaged from idle mines. Construction materials were either ordered according to the tramway's custom specifications or scavenged from elsewhere. As a resource type, extant double-rope reversible tramways are uncommon. Those resources with intact engineering features, such as hardware and structures, are rare and may be significant examples of their type. Archaeological potential may exist at other sites.

Hallidie Single-Rope System: The Hallidie system derived its name from the endless cable loop extending between top and bottom terminals. The loop rotated around sheave wheels in the terminals, carrying numerous buckets around the circuit. The system was mechanized in conjunction with a gravity operation, moving ore in a constant flow. With a series of frame towers supporting the cable and buckets, the tramway could be extended for thousands of feet over varied terrain, allowing a company to link an inaccessible mine with a shipping point or mill.

The buckets affixed to the cable were in constant motion, thus the design characteristics specific to the Hallidie system. The sheave wheel had to be firmly anchored within a stout frame in both terminals to resist powerful horizontal stress, but clearance around the wheel was required for the buckets. Thus, the wheel rotated on a long axle vulnerable to wrenching and distortion. When empty buckets entered the top terminal, workers loaded them with payrock while the buckets were in motion. The buckets then passed around the sheave, traveled down to

the bottom terminal, and dumped their contents into a receiving bin. The towers featured pulleys or idler wheels to support the cable between spans, and a single cross-member at the tower crown provided a sufficient mount.

Hallidie systems saw limited use in the county because they were expensive, required exacting engineering, and were supplanted by the superior Bleichert design by the early 1890s. Hallidie systems combined vernacular and professional design and construction. Rarely were experienced miners, and even formally trained mining engineers, able to design and install a Hallidie system unassisted. Instead, a mining company often consulted a tramway manufacturer, who adapted system requirements to the specifics of the mine and its environment. The strict tolerances of the system's components, such as terminal structures and tower alignments, required integration and design by an engineer specialized in tramways. But these engineers were limited in some cases by the available construction materials, talent of local contractors, and budget of the mining company. As a resource type, extant Hallidie tramways are rare. Those resources with intact engineering features, such as towers and aspects of the terminals, are significant examples of their type. Archaeological potential may exist at other sites.

Bleichert Double-Rope System: The Bleichert tramway was based on the Hallidie design, but offered several important improvements. As the name implies, the Bleichert double-rope system featured two sets of cables to Hallidie's one. A stationary track cable linked the top and bottom terminals, as supported by a series of towers like the Hallidie system. A separate cable loop known as a traction rope pulled the buckets along a continuous circuit. The system was mechanized, usually operated under gravity, and moved ore in a constant flow. Unlike Hallidie tramways, the buckets were not permanently fixed to the traction rope and instead had a releasable grip. When buckets arrived in the top terminal, workers detached them, stopped their motion, pushed the buckets around the terminal interior on suspended rails, and filled them at leisure without spillage. When in motion, the traction cable tugged the buckets, which rolled along the fixed track cable on hangers with pulleys.

Because of the two cables, Bleichert systems had several performance advantages. They could work at almost any pitch, be up to four miles in length, and carry high tonnages of ore. Although Bleichert systems were more expensive than Hallidie tramways, they were more advantageous for heavy production for these reasons. The two cable sets and detachable grips resulted in design characteristics specific to Bleichert systems. The sheave wheel was enclosed on all sides in a heavy timber frame that could stand independently from the rest of the terminal's support structure. The loading area within the terminal was open, and a steel hanging rail for the buckets bolted to overhead stringers. The towers featured a single cross-member at top for the track cables and another cross-member 4' to 8' below for the traction cable's pulleys or idler wheels. Bleichert systems were the most widely used mechanical tramway in the county, even though they were expensive and required exacting engineering. Bleichert systems combined vernacular and professional design and construction in the same way as Hallidie tramways discussed above. As a resource type, extant Bleichert tramways are rare. Those resources with

intact engineering features, such as towers and aspects of the terminals, may be significant examples of their type. Archaeological potential may exist at other sites.

Aerial Tramway Significance

Broadly speaking, tramways saw use throughout most of San Juan County's productive hardrock mining era. Dempsey Reese and partners erected the first locally and in greater southwestern Colorado in 1871 for the Little Giant Mine. Outfits continued to employ tramways on a limited scale as late as the 1960s. As a resource type tramways were significant during narrower timeframes as defined by the above-described Periods of Significance. Tramways began to play a key role in the county's mining industry in 1890, when systems at the Titusville and other mines demonstrated the value of the technology. Tramway installation increased exponentially over the next ten years and contributed materially to the mining industry's ongoing success. Tramways were in common use throughout the county by the early 1900s. The systems facilitated development of inaccessible properties and production of low-grade ore in economies of scale. When the industry declined sharply in 1921, so did the centrality of tramways. Tramways again became significant during the Depression era mining revival. However, by the 1940s, truck transportation replaced tramways at many large operations.

Specific Areas of Significance may apply tramway resources during discrete Periods of Significance. Regarding Industry and Transportation, tramways influenced the physical footprint of the mining industry as well as its rate of production. As a general transportation system, tramways allowed companies to develop properties and extract ore from otherwise inaccessible locations. Although development and production are related, development was an initial phase in advance of actual ore production, and more mines were developed in the county than yielded ore. Property development was a major source of employment, and expenditures stimulated the economy. Ore production, essential to industry success, was greatly enhanced by tramways. Further, tramways facilitated development of some remote mines into the county's largest producers, exemplified by the Silver Lake and Sunnyside mines. Tramways were instrumental in the production of low-grade ore in economies of scale, shuttling huge tonnages at little cost. In part due to tramways, previously uneconomical grades of ore became profitable to produce. By extracting and moving high volume of ore, tramways extended the lives of individual mines. In summary, tramways were central to the county positioning among Colorado's most productive regions during the Periods of Significance noted above.

Tramways were also significant in the area of Engineering as the county was recognized as a center for tramway use featuring some of the longest, most advanced, and innovative systems in the west. Individual systems such as the Silver Lake and Gold Prince particularly contributed to the field of tramway engineering, while other large systems served as proving grounds for engineers to solve problems such as linking segments, angling around or over mountains, developing hardware, and assembling functional systems amidst difficult environmental conditions. On a broader level, tramway systems of various sizes globally contributed to mechanical engineering as a general field. Engineers adapted large-scale design

templates, mechanical principles, types of structures, and standardized hardware to the unique conditions of mining in the San Juan Mountains.

Finally, tramways contributed to the field of systems engineering, especially in the mining industry. The operation of a mine, production of ore, transportation of material to a mill or shipping point, and processing was a large-scale comprehensive system. Tramways provided the critical link of transportation as coordinated within a holistic operation. In a fundamental physical sense, the tramway interfaced with a mine's activity requirements as related to input of supplies and output of ore. Overall, the system had to function efficiently in a continuous flow of materials. Variables included design, carrying capacity, speed of operation, and communications between the top and bottom terminals. Systems management also included economic factors. The engineer had to consider construction and maintenance costs as juxtaposed with resultant benefits.

Aerial Tramway Registration Requirements

Aerial tramways range from small simple single-rope iterations to large Bleichert systems of documented significance. The eligibility of aerial tramways is predicated on meeting at least one of the NRHP Criteria and adequate integrity to convey their significance. Aerial tramways eligible under Criterion A must be associated with at least one Area of Significance noted above, events and trends important to the county.

Tramways may be eligible under Criterion B provided they reflect the direct and active on-site contribution in the life of an important person or persons. Some tramways, especially large systems, can be traced to particular engineers and construction contractors.

To be eligible under Criterion C, a resource must clearly represent a type of aerial tramway. Because equipment and buildings may have removed when mines were abandoned, archaeological features may represent the system. A site should posses material evidence clearly conveying the system design, end points, or individual components, such as tower locations. Intact buildings, structures, and hardware are rare examples of the adaptation of engineering, technology, and architecture to mining. Some may reflect adaptation of tramway engineering to the difficult environmental conditions high-altitude mining. Character-defining features of tramways may include foundations or platforms for towers and terminals representing the tramway alignment in total. If the terminals were components of larger buildings, such as an ore sorting house at the mine or a mill at the bottom end, the terminal itself need not be fully distinguishable if that larger building is no longer extant. Material evidence of the larger building, however, should be present. Extant short single and double-rope reversible tramways may lack integrity, while larger systems often possess more compelling extant archaeological, architectural or engineering features clearly conveying aspects of the system in total. In summary, tramways may be eligible under Criterion C if the resource possesses intact architectural or advanced engineering features reflecting a type, period, or method of

construction associated with mining. Tramways may further be contributing elements of historic mining landscapes or larger districts.

Tramways may be eligible under Criterion D, especially when system hardware, structures, buildings, or their remnants may reveal aspects of tramway engineering. Single and double-rope systems may provide information about small-scale ad hoc engineering and the skills of untrained but experienced miners. Large systems may provide general information regarding professional mechanical engineering and its adaptation to local operations. Large systems may enhance current understanding of contemporary construction practices, coordination of materials, and operations in high-altitude conditions.

Integrity of design, setting, feeling, materials, and association is particularly relevant to the eligibility of these resources. For a resource to retain integrity of *design*, material evidence, including archaeological features, must convey the tramway's alignment and engineering. In many cases, tramways developed episodically, with new operators changing and adapting facilities as needed. In such cases, a resource reflects the evolution of surface facilities over time. To retain integrity of *setting*, the surrounding area must not have changed a great degree from its Period of Significance. In terms of *feeling*, the resource should convey the sense of historic mining operations. Integrity of *association* exists where buildings, structures, machinery, or other features convey a strong sense of connectedness between the property and a contemporary observer's ability to discern the historic mining operation.

Features Common to Aerial Tramways

Ore Bin: Top terminals had bins for the input of crude ore onto the system and more bins to receive it at the bottom terminals. The bins were sloped floor types described above with mines.
Ore Bin Platform or Foundation: See mine Property Types above for a description.
Sheave Frame: All tramway types except for single-rope reversible systems had sheave wheels in the terminals for the traction cables. The sheaves were large-diameter iron wheels that spun on axles bolted to stout timber frames. On double-rope and Bleichert systems, the frame encompassed the wheel, while it left clearance around wheels for Hallidie systems. The frames were usually rectangular, cubic, with several layers of stringers tied with vertical posts. Diagonal buttresses braced the frame against horizontal forces.
Terminal Frame: Formally designed terminals had independent frames that supported the building and its components, often separately from the sheave frame. The frames were vernacular in design in that they were adapted to the conditions, needs, and performance of the system, and its integration with the mine. Frames for Bleichert systems had hanging rails for the tram buckets bolted to the ceiling beams. The foundation was of concrete or timbers anchored to bedrock, and may have featured guides to direct the track cables to their anchors.
Terminal Building: The terminal building, usually custom-designed, encompassed the tram mechanism, braking station, and open floor where workers loaded or emptied tram buckets. Buildings were vernacular in construction, adapted to the environment, topography, and location at the mine. Form varied, but materials were usually lumber framing with corrugated sheet iron.

Tension Station: Lengthy Bleichert tramways consisted of multiple segments that operated independently. Tension stations joined the segments and served several functions. They allowed buckets to move uninterrupted from one segment to another, allowed the overall system to change pitch, and had anchors for the track cables. The stations consisted of timber frames on concrete or rock masonry foundations. Galleries through the structure provided passages for the buckets.
Tension Station Foundation: When dismantled, stations left symmetrical patterns of concrete, rock masonry, and timber footers for the frame. Tram hardware and debris usually lies scattered around.
Tram Tower: Towers supported cables between long spans.
Tram Tower Platform: Towers usually stood on earthen platforms cut out of a surrounding slope. Platforms for small towers were simple flat areas, while those for large towers may have featured rock retaining walls. Heavy structural materials and tram hardware may lie downslope.
Turning Station Foundation: Turning stations allowed lengthy tramways to curve around obstacles such as mountains. Also known angle stations, the structures were a union between two independent segments, and in this regard, were similar to tension stations. Turning stations, however, also required the supervision of workers, sometimes to manually switch buckets from one line to another. Thus, turning stations were usually enclosed by a frame superstructure. The stations were custom-designed.

PROPERTY TYPE: ORE CONCENTRATION FACILITY

One of the main objectives of mining is to reduce ore into its constituent metals. In historic mining operations in San Juan County, the process began with crushing and grinding the ore, followed by separating metalliferous material from waste in a stage known as concentration. The resultant concentrates were sent to a smelter for roasting and melting in furnaces. The smelter yielded an unrefined blend of metals known as matte, and advanced plants located in cities along Colorado's piedmont and in the Midwest refined the matte into pure metals. In general, ores of purity or simplicity required fewer processing steps while complex, refractory ores required time-intensive treatment and numerous steps. In the county, a variety of facilities carried out these processes, operating either as independent mills or in conjunction with specific mines.

Some mining companies erected *concentration mills* to complete the crushing and concentration steps ordinarily carried out by smelters. This saved companies costs in two areas. First, the companies did not incur the high costs of shipping waste-laden ore, and second, they avoided paying fees charged by smelters for complete treatment. Concentration mills, also known as *reduction mills*, produced only concentrates and no refined metals. They processed ores featuring gold, silver, tungsten, and industrial metals. The mills ranged in scale from small facilities to sprawling industrial complexes, and metallurgists based treatment processes on specific types of ore. San Juan County hosted three general categories of concentration mills.

The first and most prominent was the concentration mill, the second was the amalgamation stamp mill, and the third, rarely used after the 1870s, was the arrastra.

Ore Concentration Facility Subtypes

Concentration Mill: A concentration mill was a facility that employed primarily mechanical and occasionally chemical means to separate metalliferous materials from waste. The recovered material was known as concentrates and manifested as mineralized, metalliferous sand and rock dust. Concentration mills existed in a variety of scales and were usually built over a series of terraces incised into a hillslope so that gravity could draw ore through the processing stages. Small mills usually featured only several stages of crushing and concentration, while large mills were heavily equipped to process both great volumes of ore and complex material that resisted treatment.

Engineers usually followed a general template when designing concentration mills. An ore bin stood at the mill's head and fed crude ore into a primary crusher, usually located on the mill's top platform. The resultant gravel descended to a secondary crusher located on the platform below, from where it passed through a screening system. Oversized material returned for secondary crushing and material that passed the screen went on for concentration at small mills or tertiary crushing at large mills. Following another screening, the ore descended to subsequent mill platforms for concentration.

On the concentration platforms, apparatuses such as jigs, vanners, vibrating tables, and settling tanks separated waste known as gangue from the metalliferous material. Depending on the size of the mill and the complexity and volume of the ore, the apparatuses achieved separation in numerous steps. The lowest platforms usually featured the mill's power source and a drier to evaporate moisture from finished concentrates.

Often when a mill was abandoned, structures and machinery were removed, leaving stair-step platforms, machine foundations, and hardware. Tailings left from ore processing were usually flumed to an area downslope from the mill and today may manifest as substantial deposits of finely ground sand and rock flour. In San Juan County, many mills were no more than costly failures, which the absence of tailings often reflects. Every mining district in the county except for Poughkeepsie featured at least several mills. However, due to salvage efforts, tailings removal, alteration, and especially natural decay, very few mill sites remain intact. Archaeological sites may be particularly significant representations of the county's historic concentration industry.

Amalgamation Stamp Mill: Two definitions apply to the term *stamp mill*. Often, concentration mills employed batteries of stamps to provide secondary crushing prior to the separation of waste. In this case the term stamp mill refers to the stamp battery, a component of a concentration mill. However, unusually simple gold ore lent itself to pulverization in a stamp battery prior to being exposed to mercury to recover the metal. A jaw crusher usually provided primary crushing, the stamps carried out the rest of the physical reduction, and the resultant

slurry washed over amalgamating tables at the battery's toe. The tables were coated with mercury, which amalgamated with the gold and allowed the spent tailings to continue out of the mill. Workers periodically scraped off the amalgam and heated the mass in a retort, which volatized the mercury, leaving impure gold to refine. These treatment facilities are generally termed *amalgamation stamp mills*.

Because amalgamation stamp mills featured a fraction of the equipment installed at more complex concentration mills, they tended to be smaller and simpler. Regardless, amalgamation stamp mills shared with concentration mills a few fundamental characteristics. First, because they relied on gravity to draw ore through stages of crushing and metals recovery, metallurgists usually erected stamp mill facilities over terraces cut out of a slope. Second, amalgamation stamp mills usually featured a receiving bin above the primary crusher to hold crude ore destined for processing. Third, the mid-level or lower platform featured the power source, often a horizontal steam engine and boiler. Last, the mill required a water source. It should be noted that engineers installed tertiary crushing and possibly concentration appliances in some amalgamation stamp mills, which better prepared the ore and recovered any gold that escaped amalgamation.

Arrastra: An arrastra was a simple, but inefficient apparatus for recovering metals from ore. An arrastra consisted of a circular stone floor usually less than 30' in diameter with low sidewalls and a capstan at center. A draft animal, tethered to a harness beam fastened to the capstan, walked a path around the stone floor. Drag-stones, chained to the harness beam, ground the ore on the stone floor, where it amalgamated with mercury that a worker introduced. Some outfits substituted water power for draft animals.

Ore Concentration Facility Significance

Ore concentration mills played a key role in the long-term success of hardrock mining in the county because they reduced crude ore into a profitable commodity. Without a local means for treating ore, mining companies would have been limited only to those grades of payrock that were profitable enough to ship to distant smelters, and such material was in limited supply. From the 1880s through the 1920s, the industry repeatedly improved the methods for recovering metals from the county's notoriously difficult and complex ores. As a result, the mills rendered low grades of ore profitable and allowed mining companies to shift from producing silver and gold to lead, zinc, and copper. This greatly prolonged mining, helped the industry adapt to changing metals markets, and directly supported the county's international reputation as a center of innovation and technology. Without effective mills, the mining industry might have failed. Historic concentration processes were characterized by three principal categories of facilities.

Concentration Mill: Concentration mills can be associated with several Areas of Significance beginning in the late 1870s and continuing through the 1950s. Regarding Engineering, the county's complex ores defied conventional metallurgical methods proven to be effective in other regions. To render complex ore economically viable, local metallurgists made improvements to

the Stoiber-McCartney vibrating table and Bastian flotation cell in addition to creating new inventions, such as Arthur Redman Wilfley's sand pump and multi-deck vibrating table. These advances proliferated throughout the west.

The county's troublesome ore also provided metallurgists opportunities to refine the entire treatment process. In 1883, David Brunton adapted current practices in the North Star Mill, the first fully successful concentration mill in the county. Edward Stoiber did likewise in 1890, pioneering the treatment of previously unprofitable grades of ore. The Silver Ledge and Sunnyside mills became sites for testing new zinc separation machinery, while flotation was adopted earlier in the county than elsewhere. Each time, metallurgists elsewhere successfully imitated concepts developed in San Juan County. Concentration was the forefront of a movement away from simple and labor-intensive methods to advanced and highly mechanized processes permitting the separation of multiple metals using economies of scale. This involved the coordination of testing and treatment methods, complex mechanical systems, and hundreds of workers in massive facilities. Evolution in economies of scale proved crucial for the state and national mining industry because it rendered previously uneconomical ores profitable, extending the viability of individual mines as well as entire mining districts. Properties associated with these advances may be further eligible in the areas of Industry or Science.

Other Areas of Significance involve themes of Economics, Commerce, and Social History. These areas are relevant to mills as to mines, since the two property types were integrally tied (see above Property Type: Hardrock Mine).

Amalgamation Stamp Mill: These ore treatment facilities were the earliest mechanized type of mill in the county, as well as in greater southwestern Colorado. The Little Giant Mill, the first in the San Juans, was an amalgamation stamp facility erected in 1873. A few other amalgamation stamp mills operated locally during the mid-1870s but few were built subsequently. Thus, the period of significance generally comprised 1873 through 1880. During the 1870s, miners exhausted most simple gold ore that could be easily processed in amalgamation stamp mills, such that they lost favor to concentration mills and smelters.

Regarding significance in the area of Industry, amalgamation stamp mills were instrumental to the success of the county's early hardrock mining industry, if not subsequently as local ore proved unsuitable for amalgamation. During the early 1870s, the county lacked ore treatment facilities, and shipping crude ore to extant mills, mostly on the Front Range, was prohibitively expensive. Local mills emerged as the only profitable means of treating gold ore mined locally. By treating ore at acceptable rates, the mills allowed mining to realize its potential as an industry. As such, amalgamation stamp mills were also significant in the area of Exploration/Settlement for their association with the mining frontier. The industry grew, fostering settlement and facilitating emergence of political, economic, and social systems.

Arrastra: These primitive facilities were the first type of ore treatment mill in the county, as well as in southwestern Colorado. The Little Giant arrastra, built in 1870, was the first in the deep San Juans, and it was followed by several more during the next several years. A few other

arrastras operated in the county during the mid-1870s but were rarely built afterward. Thus, the timeframe of importance was from 1870 until 1880 (Periods of Significance two and three). During the 1870s, miners exhausted most of the simple gold ore that could be easily processed in arrastras, and they lost favor to concentration mills and smelters.

Arrastras share the same function and narrow timeframe of significance as amalgamation stamp mills. Their Areas of Significance are similar, as well, except for a fundamental difference. In the Area of *Exploration/Settlement*, arrastras allowed prospectors and small outfits to test ore and then produce gold in remote and unproven regions. When results were positive, investment, organized companies, and better mills followed, and they became the beginning of industry and settlement.

Ore Concentration Facility Registration Requirements

Ore concentration facilities form a spectrum ranging from small and simple arrastras to large and complex concentration mills. Small and simple mills tended not to participate in important engineering and technological advances, but often provided the vital service of ore treatment in particular districts. By contrast, large complex mills often hosted development of engineering and technology, in addition to providing essential local service. Because concentration mills, amalgamation stamp mills, and arrastras were very different facilities, registration requirements will be discussed individually below.

Ore Concentration Mills:

The eligibility of ore concentration mills is predicated on meeting at least one of the NRHP Criteria and adequate integrity to convey their significance. Ore concentration mills eligible under Criterion A must be associated with at least one Area of Significance noted above, events and trends important to the county. Ore concentration mills may be eligible under Criterion B provided they reflect the direct and active on-site contribution in the life of an important person or persons. Some mills, especially large complexes, can be traced to particular engineers and metallurgists. To be eligible under Criterion C, a resource must clearly represent a type of ore concentration mill. Because equipment and buildings may have removed when mills were abandoned, archaeological features may represent the complex. A site should posses material evidence clearly conveying the system design and engineering, such as terraces, aspects of infrastructure and support facilities. The general ore treatment process should be identifiable. Intact structures and equipment strengthen site eligibility. Buildings may represent the adaptation of design, materials, and construction methods to the conditions of a high-altitude environment. Treatment appliances, or direct evidence thereof, can reflect the adaptation of conventional metallurgy to the complex ore of the San Juan Mountains. In summary, mills may be eligible under Criterion C if the resource possesses intact architectural or advanced engineering features reflecting a type, period, or method of construction associated with mining. Mills may further be contributing elements of historic mining landscapes or larger districts. Mill sites may provide context or constitute discrete landscapes in themselves, especially when tailings dumps are present.

Concentration mills may be eligible under Criterion D, especially in the following cases. Buried archaeological deposits such as privy pits, thick boiler clinker dumps, and refuse layers in tailings dumps may include artifacts capable of yielding information that augments current understanding of workplace behavior and diet. If workers lived on site, residential deposits may further illuminate that social history. Secondly, an assemblage of structures, foundations, or machinery related to the ore treatment process may reveal how metallurgists designed or chose concentration processes for complex ore. Thirdly, extant infrastructure may demonstrate how engineers designed water, power, ore input, and tailings disposal systems. By contrast, small mill sites may lack buried deposits of substance.

Mills were prime targets for salvage of structural materials and machinery when abandoned. The general mill complex, its building locations, flow-path for ore, and infrastructure should be identifiable. The particular crushing and concentration processes can be extrapolated from common features, listed below. Integrity of design, setting, feeling, materials, and association is particularly relevant to the eligibility of these resources. For a resource to retain integrity of *design*, material evidence, including archaeological features, must convey the arrangement of buildings, infrastructure, and general flow-path for ore treatment. In many cases, companies retrofitted mills to improve processing. In such cases, a resource reflects the evolution of facilities over time. To retain integrity of *setting*, the surrounding area must not have changed a great degree from its Period of Significance. In terms of *feeling*, the resource should convey the sense of historic ore treatment operations. Integrity of *association* exists where a site's features convey a strong sense of connectedness between the property and a contemporary observer's ability to discern the historic milling operation.

Amalgamation Stamp Mills:

The eligibility of amalgamation stamp mills is predicated on meeting at least one of the NRHP Criteria and adequate integrity to convey their significance. Amalgamation stamp mills eligible under Criterion A must be associated with at least one Area of Significance noted above, events and trends important to the county. Amalgamation stamp mills may be eligible under Criterion B provided they reflect the direct and active on-site contribution in the life of an important person or persons. Some mills, especially large complexes, can be traced to particular engineers and metallurgists. To be eligible under Criterion C, a resource must clearly represent an amalgamation stamp mill. Because equipment and buildings may have removed when mills were abandoned, archaeological features may represent the complex. A site should posses material evidence clearly conveying the system design and engineering, such as terraces, aspects of infrastructure and support facilities. The primary crusher, stamp battery frame or foundation, and amalgamation tables should be identifiable. Intact structures and equipment strengthen site eligibility. Buildings may represent the adaptation of design, materials, and construction methods to the conditions of a high-altitude environment. Individual pieces of machinery, or their direct evidence, can reflect the adaptation of conventional amalgamation methods to the gold ore of the San Juan Mountains. In summary, mills may be eligible under Criterion C if the resource possesses intact architectural or advanced engineering features reflecting a type, period, or

method of construction associated with mining. Mills may further be contributing elements of historic mining landscapes or larger districts. Mill sites may provide context or constitute discrete landscapes in themselves.

Amalgamation stamp mill sites may be eligible under Criterion D, especially in the following cases. Buried archaeological deposits such as privy pits, thick boiler clinker dumps, and refuse layers in tailings dumps may include artifacts capable of yielding information that augments current understanding of workplace behavior and diet. If workers lived on site, residential deposits may further illuminate that social history. Secondly, an assemblage of structures, foundations, or machinery related to the ore treatment process may reveal how metallurgists adapted conventional amalgamation methods to complex local ore. Thirdly, extant infrastructure may demonstrate how engineers designed water, power, ore input, and tailings disposal systems. Smaller mill sites may lack buried deposits of substance.

Eligible mills should possess physical integrity, most likely relative to the 1870s Periods of Significance. Mills were prime targets for salvage of structural materials and machinery when abandoned. The general mill complex, its building locations, flow-path for ore, and infrastructure should be identifiable. The particular crushing and concentration processes can be extrapolated from common features, listed below. Integrity of design, setting, feeling, materials, and association is particularly relevant to the eligibility of these resources. For a resource to retain integrity of *design*, material evidence, including archaeological features, should convey the arrangement of buildings, infrastructure, and general flow-path of crushing and amalgamation. In many cases, companies retrofitted mills to improve processing. In such cases, a resource reflects the evolution of facilities over time. To retain integrity of *setting*, the surrounding area must not have changed a great degree from its Period of Significance. In terms of *feeling*, the resource should convey the sense of historic ore treatment operations. Integrity of *association* exists where a site's features convey a strong sense of connectedness between the property and a contemporary observer's ability to discern the historic milling operation. Common features encountered at mill complexes are listed below.

Arrastras:

The eligibility of arrastras is predicated on meeting at least one of the NRHP Criteria and adequate integrity to convey their significance. Arrastras eligible under Criterion A must be associated with at least one Area of Significance noted above, events and trends important to the county. However, arrastra sites tend to possess few clearly dateable artifacts and were not thoroughly documented by contemporaries, rendering dates of operation difficult to confirm. As such, unless a timeframe can be established, few arrastras may be eligible under Criterion A. Arrastras may be eligible under Criterion B provided they reflect the direct and active on-site contribution in the life of an important person or persons. However, it may be difficult to document association with particular individuals for these properties. To be eligible under Criterion C, a resource must clearly represent an arrastra's character-defining features. Few if any complete arrastras remain extant, but the circular stone floor should be in situ. Other features including the sidewalls, capstan, mechanized power source, or support facilities strengthen site

integrity. Arrastras may further be contributing elements of historic mining landscapes or larger districts.

Arrastras are likely to be eligible under Criterion D for their potential to yield information, as few arrastras have previously been documented in the Rocky Mountain states. Little is currently understood about how miners constructed and operated the facilities. Surface features and artifacts may enhance current knowledge, and, even when only the floor is visible, arrastras can possess buried archaeological deposits and features that may contribute important details.

Eligible arrastras should possess physical integrity, most likely relative to the 1870s Periods of Significance. Structural elements may have deteriorated or been removed, however, requiring analysis of remaining integrity. For instance, stone floors were often dismantled and surrounding ground excavated and processed for gold amalgam, leaving most resources with insufficient integrity for eligibility. Integrity of design, setting, location, and association are particularly relevant to the eligibility of these resources. For a resource to retain integrity of *design*, material evidence, including archaeological features, should represent the arrastra floor, portions of the power train, and waste disposal methods. To retain integrity of *setting*, the surrounding area must not have changed a great degree from its Period of Significance. In terms of *feeling*, the resource should convey the sense of historic ore treatment operations. Integrity of *association* exists where a site's features convey a strong sense of connectedness between the property and a contemporary observer's ability to discern the historic milling operation. Common features encountered at ore concentration facilities are listed below.

Features Common to Ore Concentration Facility Resources

Mill sites can possess an array of archaeological, engineering, and architectural features that were components of the crushing, concentration, power, and support facility systems. To help researchers understand ore treatment processes, the Feature Types below are arranged according to the general flow path employed at mills.

General Feature Types

Arrastra: An arrastra consisted of a circular stone floor ringed with low sidewalls and a capstan at center. A draft animal tethered to a harness beam bolted to the capstan walked around the floor, dragging stones chained to the beam.

Arrastra Remnant: Arrastra remnants may retain portions of the floor, sidewalls, and capstan.

Assay Shop: Mills usually featured assay shops to track the efficiency of metals recovery and concentration. A metallurgist periodically tested samples of unprocessed crude ore and compared the results with tests on tailings and concentrates. If he found that the metals recovered by the mill approximated the amount in the crude ore, the metallurgist knew the mill functioned efficiently. The assay shop may have been within the overall mill building at small facilities, or provided with its own building at large plants. The shops had distinct appliances such as a free-standing or masonry assay furnace, blower, coal bin, and stout workbenches. Assay shop buildings were usually constructed with the same materials and workmanship as the associated

mill. Most were frame, had ample windows, a chimney for the furnace, and a heavy sub-frame or foundation for crushing machinery. The shops were vernacular in design in that they had no recognized architectural style and were custom-designed for function and economy. A tall brick chimney, machine foundations, and artifact assemblage of assay debris are often distinguishing characteristics.

Assay Shop Foundation/Platform: Assay shops often stood on earthen platforms or foundations of concrete and rock masonry. Distinct characteristics can define a platform as that for an assay shop. Foundations or other remnants of an assay furnace, its blower, and small crushers may remain. Artifact assemblages typically include furnace clinker, fire-bricks, broken assay crucibles, mineral samples, and laboratory artifacts.

Cistern: A concrete, masonry, or timber chamber that contained water for mill use. Because mills usually relied on gravity to pressurize plumbing, cisterns tend to be located upslope from a mill.

Conveyor: Mills relied on gravity to draw ore through a sequence of crushing and concentration machinery installed on terraces. Many designs used conveyors to return the ore to the upper terraces for reprocessing or from one treatment stage to another. Early conveyors consisted of a bucket line or spiral feed, and later conveyors consisted of belts on rollers. A timber or steel frame was the chassis for the assembly.

Conveyor Remnant: A partially disassembled conveyor.

Ditch: An excavation that carried water to a mill.

Flume: A wooden structure usually constructed with plank walls and a plank floor. Workers built flumes to convey water to or tailings away from a mill, or to transfer slurry from one process to another within the mill.

Flume Remnant: The collapsed or buried remnants of a flume.

Machine Foundation: A foundation that anchored an unknown mill machine.

Mill Building: Mill buildings were distinct buildings in the mining landscape. Most enclosed the ore treatment machinery, power source, and other facilities under one roof. The buildings tended to be large, sloped in profile to conform to stair-step terraces or foundations, and irregular in plan. Each mill was unique in design and incorporated elements of engineering. Most were based on a custom-designed frame that not only supported the walls and roof, but also appliances, bins, and the system of driveshafts and belts that ran the machinery. Given this function, most frames varied in design and construction within the mill, but were made of heavy timbers. The foundations for small mills consisted of log or timber footers direct-laid on the ground, while stone or concrete can be encountered at large plants. Well-designed mill buildings stood independently from interior structures such as bins and stamp batteries, allowing for replacement of components. Most, however, were integrated into the interior structures for economy of materials. These vernacular designs prior to the 1910s tended to include board-and-batten siding or walls of mere planks were common, while corrugated sheet iron and tarpaper dominated later.

Mill Building Foundation: Mills stood on stout foundations that not only supported the building, but also machinery and structures within. The foundations had footers around the circumference for the walls and additional footers on the terraces for the frame and machinery. At small mills,

foundations were timber and log embedded in earth. At large mills, the foundations consisted of concrete or masonry and were often integrated with walls retaining the terraces.
Mill Building Ruin: A collapsed mill building.
Mill Platform/Terrace: Because mills relied on gravity to draw the ore through crushing and concentration, they were built over a series of terraces cut out of a slope. Often, the terraces are the principal features representing a mill. Each terrace supported a stage of treatment. When recorded, platforms should ideally be numbered from the top down and described according to function.
Mill Tailings Dump: A deposit of finely ground rock flour and sand usually downslope or downstream from a mill.
Pipeline: An assembly of pipes that carried water.
Pipeline Remnant: Evidence of a disassembled pipeline.
Privy: Most mill complexes included a privy for the crew's use.
Privy Pit: The pit that underlay a privy. Privy pits are often less than 5' in diameter and may feature artifacts visible in the walls and floor.
Pump Foundation: Often of concrete, pump foundations are rectangular, less than 2' x 4' in area, and may feature pipes.
Receiving Bin: Nearly all mills featured an ore bin at the head to receive crude ore for processing. The bins typically had sloped floors and discharge chutes in the front, which directed the ore into a stamp battery or primary crusher. The walls consisted of a timber frame sided on the interior with heavy planks.
Receiving Bin Platform or Foundation: Receiving bins stood on foundations and platforms similar to those for ore bins at mine sites. Timber or log footers embedded in the ground supported the frame, and cribbing or masonry may have supported the head and toe.
Receiving Bin Ruin: The collapsed remnants of a receiving bin, usually jumbled frame elements, plank siding, and foundation footers.
Refuse Dump: A collection of hardware, structural materials, and other cast-off items.
Reservoir: Some milling operations erected dams in drainages to impound water for use.
Utility Pole: A pole that carried electrical or telephone lines.
Water Tank: A large vessel, usually cylindrical, made of planks or sheet iron. To pressurize plumbing, water tanks were usually located near the head of a mill.
Water Tank Platform: Often a circular or semicircular platform for a tank. The platform's floor may feature a pipe.

Crushing System Feature Types
Jaw Crusher: A jaw crusher reduced crude ore from the receiving bin into gravel, completing the first stage of physical reduction. The heavy machine, also known as a Blake crusher, was located on the mill's upper terrace. Crushers usually featured jaws and dual flywheels powered by a belt. Small units were around 2' x 4' in area and large units were up to 4' x 8' in area.

Crusher Foundation: Due to severe vibrations, crushers were often anchored to stout timber or masonry foundations with timber footings. Small piles of crushed gravel often underlie crusher foundations.

Stamp Battery: Early mills relied on stamp batteries for primary crushing. After the mid-1880s, batteries often provided secondary crushing, reducing the gravel produced by a jaw crusher. A stamp battery consisted of a heavy timber gallows frame, heavy iron stamps that dropped into a battery box, and a cam shaft that raised and let the stamps fall. The cam rotated in the top of the frame, and it was fitted with a large bullwheel turned by a belt. The stamp shoes were fixed to steel rods that slid in guides. Batteries usually featured stamps in groups of five. The timber frame for a single group tended to be 7' wide, up to 15' high, and stood over a cast iron battery box bolted to a timber pedestal. Initially, workers shoveled ore into the battery box for crushing, and by the 1890s, automatic feeders introduced the ore.

Stamp Battery Frame: In many cases salvage efforts dismantled the iron hardware from a stamp battery, leaving the timber frame. Bolts for the cam shaft and semi-circular guides for the stamp rods are usually are evident.

Stamp Battery Pedestal: Often, stamp mills were dismantled for use elsewhere, leaving a pedestal as the principal representation today. Stamp battery pedestals were rectangular, often 2' x 5' in area and 2' high, and consisted of timbers set on end. The pedestal anchored a cast-iron battery box in which the stamps crushed the ore.

Screening Station: Successful concentration and amalgamation required the crushed ore to be absolutely uniform in particle size after crushing. Screens in between each crushing stage allowed fine material to proceed while returning coarse particles for reprocessing. Trommels were preferred because they screened ore in a continuous flow. A trommel consisted of wire mesh cylinders nested together and bolted to a steel frame. As they rotated, fine material passed through while coarse particles rolled out and were returned.

Crushing Rolls: A crushing rolls was an apparatus that provided secondary or tertiary crushing for ore already reduced to gravel. The apparatus featured a pair of large iron rollers set slightly apart in a cast-iron or heavy timber frame. As they rotated, the rollers drew gravel into the gap and fractured it. Small units were around 4' x 4' in area while common units were 6' x 6' in area. Crushing rolls were usually located on an upper mill terrace below the primary crusher.

Crushing Rolls Foundation: Crushing rolls were often anchored to a rectangular timber foundation consisting of heavy horizontal beams bolted to posts that leaned slightly inward.

Huntington Mill: A Huntington mill was an apparatus that finely ground previously crushed ore, and some were used for amalgamation. The machine was based on a cast-iron pan approximately 6' in diameter and 3' to 4' deep ringed with a channel. A set of heavy iron rollers rotated across the pan floor and ground the ore to a slurry. Fine particles passed through screens breaching the walls and left via the channel.

Huntington Mill Foundation: Huntington mill foundations were factory-made, and the timbers often feature beveled edges. The foundation usually consisted of rectangular timber footers 6' x 9' in total area. The machine stood on heavy posts forming a 6' x 6' cube at one end, and the other end featured a raised block with a brace for the drive shaft.

Ball Mill: A ball mill was a steel vessel similar to today's cement mixer. The vessel tapered at one or both ends, rotated in heavy bearings, and was powered by a canvas belt and shaft. As the vessel rotated, steel balls inside tumbled and pulverized the ore into a fine slurry. Small units were 4' in diameter and 6' long. Balls mills were used for tertiary crushing in concentration mills, and to recover gold with mercury in amalgamation plants.
Ball Mill Foundation: Ball mills were anchored to heavy concrete foundations distinct in footprint. The foundation featured three parallel pylons, usually 1' thick. Two pylons supported the vessel's ends. The one for the narrow end was usually 2' long and 4' high, and the pylon for the broad end was 3' long and slightly lower. The third pylon, often square, stood away and anchored the driveshaft.
Rod Mill: A rod mill operated according to same principles as a ball mill, with like applications. The vessel, however, was cylindrical, and steel rods inside ground the ore.
Rod Mill Foundation: Rod mill foundations were similar to those for ball mills. Parallel pylons, usually 1' thick, 3' long, and as high, supported the vessel, and another pylon smaller in size anchored the driveshaft.

Concentration System Feature Types
Amalgamation Table: Amalgamation tables were only used in mills that processed simple gold and silver ores. The tables stood on heavy timber frames and sloped away from the toe of a stamp battery. The tabletops were usually copper, coated with mercury, and around 6' x 12' in area. The slurry of pulverized ore produced by the stamp battery trickled over the copper plate, and the mercury caught the gold. In early mills, a flume diverted the spent slurry out of the mill as tailings. Later, the flume delivered the slurry to other amalgamation appliances such as Huntington mills.
Amalgamation Table Frame: Amalgamation tables were usually removed from mills when facilities were abandoned, leaving a heavy timber frame around 6' x 12' in area and at least 4' high.
Jig: A jig was a concentration appliance that enhanced the separation of metalliferous particles from waste. Common jigs consisted of a wood body with a V-shaped bottom that featured drain ports and wood walls dividing the interior into cells. A frame over the cells supported a cam shaft powered by a canvas belt. The shaft gently moved plungers up and down, agitating the slurry in the cells. The action kept light waste in suspension while allowing heavy metalliferous material to drop out and settle in the floor. A water current flushed the waste away. Most jigs were around 4' x 9' in area and 4' high.
Vanner: A vanner was a concentration apparatus between 4' x 8' and 6' x 13' in area. The machine featured a broad rubber belt that passed around rollers at both ends of a mobile iron frame. An eccentric cam imparted a vibrating motion that caused heavy metalliferous particles to settle on the belt. The lighter waste remained on the surface, and a jet of water washed it into a flume. The waste may have flowed out of the mill as tailings or continued to another set of concentration appliances. Scrapers removed the metalliferous material into another flume for recovery.

Vanner Foundation: Vanners were usually bolted to timber foundations that featured cross-members at both ends, stringers linking the cross-members, and braces for the frame. A flume for the waste slurry usually passed by the vanner's toe.
Vibrating Table: The vibrating table, introduced during the late 1890s, was one of the most successful and widely used concentration apparatuses. Vibrating tables featured a slanted tabletop, often 5' x 15' in area, clad with rubber and narrow wooden riffles. The tabletops were often mounted at a slant on a mobile iron frame that oscillated. The motion caused heavy metalliferous material to settle against the riffles while a current of water washed the light waste into an adjacent flume.
Vibrating Table Foundation: Vibrating table foundations featured anchor bolts projecting out of three timber cross-members. Two cross-members were at the ends, and a third was parallel and near one of the ends. The foundations are typically around 12' to 15' in length.
Flotation Cells: Introduced during the early 1910s, flotation was a highly successful stage of concentration for complex ore. Flotation cells were based on a large rectangular wooden tank divided into compartments. Paddles agitated a slurry solution in each cell and swept a froth of metalliferous material over the cell's sides. The froth either flowed into a flume or into a second set of cells for additional concentration. A plank walkway often extended along the tank, and the assemblage stood on timbers on one of the mill's lower terraces.
Cyanide Tank: Cyanidation was an alterative to amalgamation for recovering gold from complex ore. Finely ground slurry was introduced into cyanidation tanks, where a dilute cyanide solution leached out the gold. Slowly rotating agitation arms on the tank floor ensured a constant blend. Similar to a water tank, the vessels were usually located on a mill's lowest terrace and provided a last stage of ore treatment.
Settling Tank: Some concentration mills featured settling tanks on the lowest platform where heavy metalliferous fines gravitated out of spent slurry. Settling tanks were similar to wooden water tanks and often featured a revolving arm at center to exacerbate the settling process.

Power System Feature Types
Boiler: Prior to the 1910s, steam engines powered most mills. Return-tube boilers usually generated the steam. See Hardrock Mine Feature Types for a description of boilers.
Boiler Foundation: See Hardrock Mine Feature Types.
Boiler Setting Ruin: See Hardrock Mine Feature Types.
Boiler Clinker Dump: See Hardrock Mine Feature Types.
Motor: See Hardrock Mine Feature Types.
Motor Foundation: See Hardrock Mine Feature Types.
Overhead Driveshaft: Few mill appliances had their own independent power sources, and central engines or motors drove most. Sets of overhead driveshafts and canvas belts transferred motion from the engine or motor to the appliances. Overhead driveshafts, also known as line shafts, featured belt pulleys over each mill appliance and rotated in bearings bolted to the mill building's frame.

Steam Engine: Prior to the 1910s, steam engines were a common source of power for mills. Usually located on the mill's lowest terrace, the engine transferred motion to a system of overhead driveshafts via a canvas belt. Most engines were horizontal units between 2' and 3' in width and 8' to 12' long. A steam engine required a boiler.
Steam Engine Foundation: Steam engine foundations are often rectangular, studded with anchor bolts, and between 2' and 3' in width and 8' to 12' long. Workers built engine foundations with heavy timbers, brick or rock masonry, or concrete, and the foundations often featured a pylon for the outboard flywheel bearing.
Transformer Station: Those mills with electric power required transformer stations to convert and distribute the current. See Hardrock Mine Feature Types for a description.
Transformer Station Platform: See Hardrock Mine Feature Types.
Transformer Station Ruin: See Hardrock Mine Feature Types.

PROPERTY TYPE: SMELTER

Smelters were essential facilities for the mining industry. They were the final recipients for crude ore delivered from mines and the concentrates generated by mills. Smelters converted the ore and concentrates into metals. The Greene Smelter, built in 1874, was the first functional smelter in San Juan County and facilitated the county's mining industry for five years. Without the plant, the industry would have remained static, if not failed altogether. The Greene Smelter closed in 1879, dismantled, and incorporated into the Durango Smelter, which began treating ore in 1882. The Martha Rose Smelter, Silverton's second local plant, began at the same time but failed within the year. In 1894, Thomas F. Walsh opened Silverton's third local smelter, the only functional plant in nearly a decade. Walsh's plant filled an important niche until it closed around 1898. The county was without a local smelter until 1900, when the San Juan Smelting & Refining Company filled the void with the Kendrick-Gelder Smelter. This facility served the same market as the Walsh Smelter and operated until 1909. Declining ore production discouraged further smelting ventures, and the Durango and Standard smelters in Durango received the county's ore and concentrates.

San Juan County's smelters used a combination of mechanical, chemical, roasting, and smelting processes to convert ores and concentrates into metals. Most facilities required flat space, a source of abundant water, and well-graded roads, thus tending to be limited in scale and variety of components. The smelters usually featured several large buildings, high-volume coal and coke bins, and several free-standing steel furnaces. The companies usually designed the smelter complexes according to a standard plan, and as a result, various components shared common orientation. Slag, the waste produced by smelting ore, almost always lies around a smelter site and manifests as fine-grained or glassy cobbles dark gray to black in hue.

Smelter Significance

Between 1874 and 1879, the mining industry depended on the Greene Smelter to reduce ore to its constituent metals. With successful concentration mills, mining could have continued in the absence of the smelter, but companies would have shipped their concentrates to distant facilities at great cost. Given this, without the Greene Smelter, mining would have been severely stunted. By contrast, when the Walsh and Kendrick-Gelder smelters began operations, they were not the principal ore treatment plants. Instead, the Walsh and Kendrick-Gelder smelters offered supplemental ore treatment services and accepted specific types of ore for which the other Silverton and Durango facilities were not equipped. Thus, the Walsh and Kendrick-Gelder plants allowed certain mines to remain profitable from 1894 through 1909. The output of these mines represents a significant contribution to the county's overall production. The above trends fall within Industry as an Area of Significance.

Smelters may further be significant in the area of metallurgical Engineering. The county's complex ores defied conventional metallurgical practices and methods proven to recover metals in other regions. To render complex ores profitable, John Porter and other experts with the Greene Smelter combined their experience with calculation and devised effective processes. This became a foundation for the methods employed at the successive Durango Smelter, the most successful smelting plant in southwestern Colorado. The Walsh and Kendrick-Gelder plants offered similar advances for the complex ores of the Red Mountain district and northern portion of San Juan County.

Regarding Economics, the three smelting companies contributed to complex regional, statewide, and national economic and financial systems. Investment, banking, and acquisition and shipment of supplies occurred on interstate and intrastate levels. The smelting companies also diverted money into the local economy by paying wages to their workers, hiring consultants for services, and buying goods from local businesses. The companies also purchased machinery and other industrial goods from manufacturers mostly in Denver and outside of Colorado. Smelting companies supported primarily Colorado's and secondarily other economies. On a local level, smelting companies purchased their ore from mining outfits throughout the county. Such business disbursed money throughout the region.

Regarding Politics/Government, mining, and in turn smelting, was integrally tied to political systems on local, statewide, national, and international levels. After all, smelters relied on production of silver ore, a primary focus of policy decisions in the context developed here. Federal programs stimulated demand and inflated silver's values to levels that rendered mining profitable. The Bland-Allison Act of 1878 and the Sherman Silver Purchase Act of 1890 instituted price supports and acquisition quotas for silver. Repeal of the Sherman Silver Purchase Act and subsequent collapse of silver's value brought mining and smelting to an abrupt halt for several years. Industry workers, capitalists, and companies provided political support for elected officials who advocated for programs that kept the value of metals high. Further, Colorado mining elite, including Thomas Walsh and Thomas Porter, contributed financial support to legislators who influenced federal policy. Business activity at smelters at times reflected political developments.

Smelter Registration Requirements

The eligibility of smelters is predicated on meeting at least one of the NRHP Criteria and adequate integrity to convey their significance. Smelters eligible under Criterion A must be associated with at least one Area of Significance noted above, events and trends important to the county. The county's three smelter sites may be eligible under Criterion B provided they reflect the direct and active on-site contribution in the life of an important person or persons. If the significance is related to an important individual's design of the plant or complex, then Criterion C applies. To be eligible under Criterion C, a resource must clearly represent a smelter. Because equipment and buildings may have removed when smelters were abandoned, archaeological features may represent the complex. A site should possess material evidence clearly conveying the system design and engineering, such as the footprint, terraces, and aspects of infrastructure and support facilities. The general flow path of the ore from input to furnace should be identifiable, if not the process specifics. Intact structures and equipment strengthen site eligibility. A site retains high integrity when its features clearly represent each stage of ore treatment, as well as individual machines and appliances. Buildings, structures, and machinery may represent the adaptation of metallurgical engineering and technology to local ore and the conditions of a high-altitude environment. Slag dumps and flows may be another important character-defining feature. In summary, smelter sites may be eligible under Criterion C if the resource possesses intact architectural or advanced engineering features reflecting a type, period, or method of construction associated with mining. Smelters may further be contributing elements of historic mining landscapes or larger districts. Extensive smelter sites may provide context or constitute discrete landscapes in themselves.

Smelter sites may be eligible under Criterion D, due to the potential to yield information, especially in the following cases. Buried archaeological deposits such as privy pits, thick clinker dumps, and refuse layers in tailings dumps may include artifacts capable of augmenting current understanding of workplace behavior and diet. If workers lived on site, residential deposits may further illuminate that social history. Secondly, an assemblage of structures, foundations, or machinery related to smelting may reveal how metallurgists adapted the smelting process to complex local ore. Thirdly, extant infrastructure may demonstrate how engineers designed water, power, transportation, and slag disposal systems. Smaller mill sites may lack buried deposits of substance.

Eligible mills should possess physical integrity relative to its Period of Significance. Smelters were often targets for salvage when abandoned, but surface features and archaeological evidence can represent the complex's design, infrastructure, and waste disposal in order to approximate the smelting process. Integrity of design, setting, feeling, location, and association are particularly relevant to the eligibility of these resources. For a resource to retain integrity of *design*, material evidence, including archaeological features, should convey the smelting process, plant design, arrangement of buildings, and infrastructure. To retain integrity of *setting*, the surrounding area must not have changed a great degree from its Period of Significance, with the exception of some removal of structures and equipment. In terms of *feeling*, the resource should

convey the sense of historic ore treatment operations. Integrity of *association* exists where structures, buildings, machinery, and archaeological features convey a strong sense of connectedness between the property and a contemporary observer's ability to discern the historic smelting operation. Common features encountered at smelter complexes are listed below as well as under the ore-concentration property type.

Features Common to Smelter Resources
The features below comprise an abbreviated list of those characterizing smelter sites. Most smelters relied on the same water and power systems as ore treatment mills and included preliminary stages of crushing, screening, and concentration. The researcher should review Ore Treatment Mill Feature Types for additional description.

Blower: Smelters relied on blowers to force an air blast into a furnace. A typical blower featured a ring of vanes encased in a wood or sheet iron shroud with a port for the outflow. A motor or steam engine powered the blower, often standing nearby. Blowers ranged from 3' to 8' in diameter.
Blower Foundation: A foundation that anchored a blower. Foundations were usually rectangular, less than 6' x 8' in area, and consisted of masonry, concrete, or timbers.
Coal Bin: Because smelters consumed high volumes of fuel, they almost always featured substantial bins for coal or coke. The bins were usually sloped-floor structures that facilitated a gravity-drawn flow of fuel from the structure.
Coal Bin Ruin: The collapsed remnants of a coal bin.
Coal Bin Foundation: Due to their great weight, coal bins usually stood on masonry or timber foundations. Scatters of coal or coke strongly suggest that a given foundation supported a coal bin.
Furnace: The small smelters in the county relied on two general types of furnaces. The earliest and least efficient was a brick or masonry structure with multiple chambers lined by fire bricks. Combustion in lower chambers created superheated gases that melted ore in upper chambers. The masonry should feature evidence of intense heat and slag. The type of furnace used in the Greene and later smelters was a free-standing, cylindrical steel vessel lined with fire bricks. These furnaces tended to be from 6' to 20' in diameter and as high, and workers input crushed ore in the top and drew out molten material through ports in the bottom.
Furnace Remnant: The collapsed remnant of a furnace.
Furnace Foundation: The early masonry furnaces stood on rectangular foundations of brick or rock integral to the chamber walls. The free-standing furnaces stood on brick or rock pads larger in footprint than the steel vessel. A foundation for a blower is usually nearby. Furnace foundations almost always feature slag and evidence of heat.
Furnace Platform/Terrace: Furnaces usually stood on dedicated platforms or terraces within the smelter building. Because the furnace provided one of the last stages of ore treatment, the platform was among the lowest at a smelter. Evidence of a furnace, such as slag flows or a

foundation, should remain. Free-standing steel furnaces often left little more than the foundation surrounded by slag flows, while masonry types may have left structural ruins.
Slag Dump: Slag is a vitreous waste left after ore melted and metal content was drawn off. Smelting companies disposed of their slag in dumps downslope from the smelting complex.
Slag Flow: Uncontrolled releases of slag from a furnace created flows on the furnace platform. The flows appear similar to lava or smooth concrete.
Smelter Building: Smelter buildings were similar to those for ore treatment mills. Where possible, they were built over a series of platforms or terraces so gravity could draw the ore through the stages of preparation and smelting. Each terrace was usually dedicated to a specific treatment stage. For a description of the general constitution of these buildings, see Ore Treatment Mills above.
Smelter Building Foundation: The foundations for smelters were similar to ore treatment mills.
Smelter Ruin: The collapsed remnants of a smelter building.

PROPERTY TYPE: MINING SETTLEMENT AND RESIDENCE

Because most county mines and prospects were distant from the principal town of Silverton, prospectors, miners, and other workers lived near their work. Prospectors established temporary camps, mining companies erected company housing, and other workers provided their own residences. All mining districts featured enough activity and people to support both organized and unincorporated settlements. Most forms of residence and settlement exist as individual resources. They are sometimes components of other sites, in which case they should be included with their parent resources.

Mining Settlement and Residence Subtypes

Prospector's Camp: When examining an area or developing a claim, prospectors usually established impermanent camps abandoned after brief occupation. Prospectors' camps were simple, may have lacked formal buildings, and were located in the most favorable environment an area had to offer. In terms of residence, individual and pairs of prospectors often lived in wall tents because of their low cost and portability. Occasionally, prospectors intensely examining an area erected primitive log cabins as longer term bases of operations. Camps also may have included a well-built hearth for outdoor cooking, and a field forge for blacksmithing. Because prospect camps were intended to be impermanent, they often left little material evidence. The residence tends to manifest as a small earthen platform, log cabins, if any, are in ruins, and a sparse scatter of food cans and hardware reflect occupation. For such assemblages of features and artifacts to qualify as a prospector's camp, they must be either directly associated with nearby prospect workings or located in an area that was subject to prospecting. If a camp is directly associated with a specific prospect complex, shaft, or adit, then it would be part of that larger Property Subtype.

Workers' Housing: Workers' housing is a resource subtype category encompassing various types of buildings where mining industry workers lived. Buildings ranged from primitive cabins to single-family houses to boardinghouses. The unifying element is that residents who lived in these buildings were confirmed mining industry workers. Houses and boardinghouses near mines and mills are likely to meet the definition because of their proximity to these industrial operations. Similarly, houses in unincorporated settlements usually qualify because most men were employed at nearby mines. Residences in towns such as Silverton, however, require archival documentation to substantiate the occupation of inhabitants. Often, mining companies built cabins and boardinghouses for their employees. Although these residences are workers' housing, they should be recorded as components of larger mine or mill sites when possible.

Workers' housing can be recorded as an independent resource under several conditions: first, when workers' housing cannot be directly attributed to a specific industrial complex or single employer. For example, residences may lie near a cluster of mines, and yet be far enough away from any one so that the residences cannot be attributed to a specific operation. Second, when residences are within an unincorporated settlement dependent on mines or mills and inhabited by a population dominated by industry workers, it may be registered independently. Finally, when residential features are a component of a larger industrial site, but the industrial aspects have been destroyed or have little integrity, the residential features may be recorded independently. They indeed may be the only surviving intact portion of the site. In this case, the residential features would constitute a site unto itself, but the lost industrial complex should be noted.

As a resource, workers' housing includes all features associated with inhabitation and other domestic activities. The sites were usually complexes centered on at least one residential building, and often several. Buildings may have been cabins or formal houses occupied by a miner and family, or shared by a handful of unmarried workers. Boardinghouses provided accommodations for unmarried workers who dined and spent leisure time in a communal setting. Isolated mines and mills commonly had boardinghouses for workers and separate cabins or houses for the superintendent and family. Typically, archaeological features such as building platforms, foundations, and ruins represent residential buildings today. Some workers' housing still exist as standing buildings. Small houses and boardinghouses may be of log or frame construction, while large boardinghouses are almost always frame. Nearly all are vernacular in function, construction, and form. Vernacular buildings adapted conventional designs and construction methods to the environment and building materials available locally. The builder's economic resources, skills, preferences, and needs influenced the built form.

Workers' housing complexes almost always possess site features in addition to the residences, many of which are primarily archaeological in nature. Privy pits and refuse dumps reflect primitive waste disposal practices. The dumps usually extend downslope from the residence doorway and consist of domestic refuse, and materials generated by food preparation. Residents usually cleared an area by the building for chopping firewood, cleaning laundry, and

other outdoor activities. Complexes for numerous workers often included root cellars for the storage of perishable food.

Isolated Residence: Isolated residences are places of developed inhabitation that cannot be clearly tied to an industrial operation due to insufficient evidence. Such resources lack characteristics or artifacts that can associate the resource with prospecting, mining, logging, transportation, or agriculture. Determining whether a resource in a mining district is an isolated residence can be subjective since it may have served as base of operations for prospectors, hunters, or homesteaders. Isolated residences are simple resources and usually consist of a few residential features, generic artifact assemblages, and no industrial or commercial attributes. If buildings stand, they are likely to be small cabins or frame houses vernacular in appearance and form, as defined above.

Unincorporated Settlement: Popularly known as mining camps, unincorporated settlements were informal communities established in response to several factors, but often a mineral boom. When prospectors and miners joined a local rush, they tended to erect residences in a common area that offered flat ground, open space, and water. In San Juan County, Poughkeepsie and Mineral Point are examples. Informal settlements also grew as communities to house the workforce of a primary industry, such as a group of mines. Gladstone was one such settlement.

Unincorporated settlements were rarely planned in advance and instead evolved organically according to local housing needs. The communities usually possessed no formal organization or infrastructure, and buildings tended to be disbursed among the most favorable micro-environments. Mining companies and individual workers built residences near their employment, which assumed form as a settlement when concentrated in one area. When the population became large enough, entrepreneurs and community activists established basic services and businesses such as a post office, mercantile, saloon, and restaurant-hotel. The businesses then formed the settlement center, even if residences were few and scattered.

As a center for a working population, an unincorporated settlement usually was the hub of a local transportation network. Several wagon roads linked settlement with the nearest nodes of commerce as pack trails fanned out to places of employment. Because draft animals were a principal transportation method, residences for multiple people often featured corrals. Sanitation was limited to privies, and water came from streams, springs, and wells. By the mid-1890s, some settlements enjoyed electricity for lighting, wired from nearby mines or mills.

The architecture in unincorporated settlements tended to be vernacular in appearance and form. The buildings were rarely designed by architects, and were instead planned in the field for function and economy. Residents imitated familiar methods and forms as best they could, adapting them to the local environment and incorporating available materials. Milled lumber was preferred for its regularity, but residents substituted local building materials such as logs and stone masonry. When a settlement was in infancy, almost all its buildings were wall tents, small cabins, and buildings combining logs, lumber, and canvas. Mature settlements often featured at least several substantial frame buildings, as well as log cabins with plank or board-and-batten

siding. By the 1900s, residents made increased use of corrugated sheet metal. Some business buildings had false-fronts and nearly all possessed gable roofs.

Today, few if any unincorporated settlements survive in a well-preserved state. Although some settlements still possess intact buildings, most have been reduced to archaeological sites. Features such as earthen platforms, foundations, and ruins represent buildings. Such ruins are usually center to associated features such as yards, refuse dumps, privy pits, root cellars, and wells. At sites completely overgrown, differentials in vegetation may outline features. If a researcher suspects a site to be an unincorporated settlement, he or she should survey a large area for outlying residences, primitive infrastructure such as community springs, and industrial complexes. Companies frequently built ore treatment mills and sawmills in drainages near settlements.

Townsite: When a mineral boom matured from the prospecting phase toward development and production, the nascent industry drew a working population. The shift ushered in a stage of growth, and a common result was the evolution of unincorporated settlements into organized towns. In many cases, the towns remained small and were abandoned within a short time, but if the industry was successful, some became large and sophisticated. Small townsites may be recorded and evaluated as individual sites or districts as discussed above. The town of Silverton, as a major regional center, requires additional context beyond that generalized to the mining industry.

Small or large, both forms of community shared basic physical characteristics and organization patterns. An identifiable business district was the most elementary, offering goods and services proportional in volume and diversity to the population. Towns in early stages of growth usually featured a few mercantiles, saloons, restaurants, and hotels, as well as a butcher, bakery, assayer, laundry, livery, and blacksmith. As the population increased in number and sophistication, entrepreneurs began additional businesses such as newspapers, law practices, surveying, confectioneries, clothing retailers, stationary and book stores, medical and dental, and hygiene. Although not heavily documented, women and families were an essential demographic of mining town and reflected a stable working population. They demanded social institutions such as schools, churches, social organizations, and public meeting halls. Gaming houses and prostitution were rare in the county's small towns, with Silverton as one exception.

Business districts, however small, served as town centers surrounded by formal residences usually occupied by members of an upper socioeconomic status. In many towns, proprietors lived in their commercial buildings on an upper story. The town core conformed to a surveyed grid of lots and blocks, while outlying residences may have been scattered. These were usually inhabited by workers and members of a lower socioeconomic status. Workers also rented space in boardinghouses or took a room in a house. As the town grew and population diversified, both the business and residential districts divided further along socioeconomic or ethnic lines.

Town architecture was a function of community development, success of the mining industry, timeframe, distance from shipping and manufacturing centers, and available materials. In a town's early period, the architecture tended to be vernacular in appearance and form.

Builders preferred milled lumber and manufactured elements, but made extensive use of local materials when these were costly or unavailable. Logs were the most common local material for walls and roof beams, with stone for foundations.

The earliest buildings in a town were wall tents and log cabins. Within several years of establishment, residents assembled buildings from combinations of lumber, log, canvas, and sheet metal. Frame construction was preferred, but expensive until the town had a sawmill or wagon road to outside commercial centers. In form, most buildings were simple with gabled roofs and one or two stories. Commercial buildings may have featured false-fronts and plank walks or stoops. Buildings usually stood on informal foundations, had roofs sided with shingles or log strips, and featured walls clad with boards and batten, plank, or clapboard. Wealthier individuals at times added some ornamentation, such as trim to display status or imitate architecture in established cities.

Architectural improvements were hallmarks of community maturation and economic stability. New buildings tended to be more substantial and standardized construction materials dominated. An increase in value of building lots, the perceived obsolescence of log construction, and social preference for frame construction contributed to gradual architectural evolution. Elements of architectural style began to appear as early as the 1880s, including ornamentation suggestive of Greek Revival, Italianate, and Queen Anne styles and pattern books. Even though some business owners did not attempt a specific architectural style, they still decorated their buildings with lathed columns, molding, ornamental brick or woodwork, and polychromatic effects. Vernacular form and appearance, however, continued to be universal. Although brick and stone replaced lumber for some of the most important buildings in Silverton, the county's small towns saw little masonry construction. The residents did, however, use sheet metal stamped with imitation brick and stone patterns, which suggested masonry from a distance.

Most mining towns possessed infrastructures proportional in sophistication to the success of the mining industry, population, and expectation of permanency. On a base level, most infrastructure related to transportation, communication, and limited public utilities. Transportation infrastructure usually featured trunk roads that carried freight and passenger traffic to town, and feeder roads extended to the surrounding mines and mills. Streets and footpaths directed traffic within the town, and even though many towns were arranged according to a grid, roads and paths did not always conform. The ultimate transportation system was the railroad, which served Silverton, Howardsville, Eureka, Animas Forks, and Silver Ledge.

Communication systems were initially limited to the postal service and newspapers. By the early 1880s, Silverton, Howardsville, and Eureka were linked by telegraph, followed by a telephone system within several years. By around 1900, many towns of lesser importance also subscribed to telephone service. Water systems existed in both towns and workers' housing erected by mining companies. Water systems appeared in Silverton during the 1880s, and some other principal towns followed during the subsequent thirty years, although most small towns never saw service. The introduction of flush toilets, bathtubs, and sinks during the 1890s fostered a demand for sewer systems in the large towns and advanced workers' housing complexes. Common systems consisted of little more than pipes and culverts that drained into local

waterways. One of the most important forms of public utility was electricity, available when the town of Silverton and the Silver Lake Mines Company built local power plants during the early 1890s. The ability to subscribe to domestic and commercial service was based on socioeconomic status, which excluded many residents until the 1940s.

Mining Settlement and Residence Significance

Settlement and residence property subtypes provided shelter and granted inhabitants an environment where they could attend to the basic necessities of life. Both individual residences and settlements served as bases for cultural practices, leisure, socializing, communication, transactions between individuals, education, and numerous other activities. In sum, settlements and residences were the support system for participants in the mining industry and in turn facilitated permanent settlement. Individual subtypes are associated with narrower Areas of Significance outlined below.

Prospectors' Camps: Because prospectors' camps were a function of prospecting, they share the same Periods and Areas of Significance as Hardrock Prospect Property Types. The timeframe spans 1870, when prospectors arrived in significant numbers, until 1885 when mining subsumed prospecting. Regarding Exploration/Settlement, temporary encampments were bases of operations for prospectors at the forefront of the mining frontier. Camps allowed prospectors to search for ore, characterize a region's geology, and conduct general exploration. These important steps preceded the establishment of the mining industry. Prospectors and organized outfits were the first Euro-American settlers to inhabit the county, especially when the rush developed.

Regarding Social History, camps inhabited by groups of prospectors served as frontier communication centers where individuals exchanged information and news. The camps also served as primitive social centers for a segment of the industry that often went without human contact for long periods of time. To search and labor in the wilderness, prospectors had to be adventuresome, independent, curious, physically robust, and skilled at survival. Most possessed at least some formal education. Seeking wealth often attracted individuals who did not conform to the traditional values of an agrarian lifestyle.

Regarding Politics/Government, prospectors organized the earliest mining districts in the San Juan Mountains, setting a precedent for districts elsewhere in the 1870s. In general, mining districts were tantamount to a frontier government that brought order to mining. This trend is relevant to camps as places of district administration. By supporting the presence of prospectors, camps can in turn be associated with the division of southwestern Colorado into counties. In particular, the territorial legislature originally designated La Plata County in 1874 in response to the surge of prospecting and mining in the Animas River drainage. Because of continued growth, the legislature then carved San Juan County out of La Plata.

Workers' Housing: Among the Areas of Significance relevant to workers' housing, Architecture applies to cabins, houses, and boardinghouses. Usually vernacular in form and construction,

residential buildings reflect the adaptation of building methods and design to the physical environment and available materials of the San Juan Mountains. Boardinghouses can represent how mining companies adapted conventional engineering and architectural practices to meet the needs of housing large crews in the environment of the San Juans. Well-capitalized organizations erected handsomely appointed accommodations for their workers to attract skilled workers and entice them to remain. Less commonly companies sought to provide comfortable housing out of humanitarian concern and social progressiveness. Between around 1890 and 1920, companies installed plumbing and electric lighting, and a few even provided showers, flush toilets, steam heat, dining halls, and commercial kitchens. Such appointments set an example followed by companies elsewhere.

Regarding Community Planning and Development, workers' housing complexes were often apart from larger communities, thus constituting a distinct settlement pattern. Workers' housing supported population distant from concentrated settlements, contributing to permanent settlement.

Regarding Economics, workers' housing, especially boardinghouses and bunkhouses, were microcosms of intrapersonal financial transactions. Cumulatively, workers' housing participated in regional economic systems, including agriculture and commerce. Merchants in the major towns handled food and goods and the acquisition of such contributed to local economies.

Regarding Social History, communal residences were important centers of communication and socialization. They were also the place of cultural diffusion among employees of different ethnicities. Residences sheltered much of the mining industry's workforce, saw it fed, and allowed people to attend to the necessities of life outside of the workplace.

Isolated Residences: By definition, isolated residences cannot be directly attributed to an industry or other pattern of subsistence. For this reason, their historical associations and Areas of Significance remain unknown until detailed research or archaeological investigation provides clarifying information.

Townsites and Unincorporated Settlements: Both forms of settlement are associated with similar Areas of Significance. Regarding Architecture, settlements were places where both companies and residents adapted conventional design and construction to the physical environment and materials available in the San Juan Mountains. Most buildings were vernacular, influenced by the builder's financial resources, needs, skills, and experience. Townsites also were later a vehicle for the introduction of defined architectural stylistic elements.

Townsites and unincorporated settlements were significant in the area of Community Planning and Development. Townsites, and to a lesser degree unincorporated settlements, introduced platting, community organization, infrastructure, municipal ordinances, and business development. Townsites and unincorporated settlements also influenced the distribution of population, social classes, gender, businesses, and some industrial facilities. Townsites and

unincorporated settlements were transportation nodes and transfer points for the movement of goods and people. The supplies, equipment, and services required by mining companies and the population often flowed into settlements prior to their distribution to consumers, and ore and mill products flowed out. Such a function influenced where communities grew and how large they became.

Regarding Economics, settlements participated in the same complex local, statewide, and national economic systems as noted above in relation to workers' housing. Regarding Commerce, townsites and unincorporated settlement were local centers of banking, business, and trade. They also served as anchors and conduits for capital and investment. The presence of established settlements, especially towns, lent legitimacy to a local mining industry, fostering confidence among potential investors. When these investors provided capital, the settlements became the points through which that capital flowed to associated mines and mills.

Regarding Social History, townsites and unincorporated settlements were centers of social relationships as well as passive and active cultural development. Passive development occurred when cultural traditions practiced by different ethnicities diffused among the population. Active development occurred when inhabitants purposefully sought out cultural performances, lectures, salons, organizations, and community events. In addition, employment the mining industry impacted social patterns. Further, townsites and unincorporated settlements attracted a variety of individuals who did not work directly in mines or mills but were important to the development of the social fabric. This included women, families, day laborers, and businessmen. Their arrival fostered a demand for cultural and social institutions, both constructive and recreational. Institutions that communities accepted were schools, churches, civic associations, unions, and meeting halls. Institutions less condoned included venues catering to substance abuse and saloons.

Regarding Industry, towns and unincorporated settlements supported the mining industry by housing the workforce, providing goods and services, and hosting mines and mills. Towns and unincorporated settlements were also nodes of infrastructure, including transportation, communication, and utility systems.

Regarding Politics/Government, townsites and unincorporated settlements were centers of law enforcement and judicial systems created in response to social and mining disputes and crime. Administrative and regulatory bodies developed in towns to oversee local government activities, claim registration and regulation, and records keeping. Settlements also served as polling stations, where populations proved instrumental in the election of government officials.

Mining Settlement and Residence Registration Requirements

Prospectors' Camps:

The eligibility of prospectors' camps is predicated on meeting at least one of the NRHP Criteria and adequate integrity to convey their significance. Camps eligible under Criterion A must be associated with at least one Area of Significance noted above, events and trends important to the county. Prospectors'' camps may be eligible under Criterion B provided they

reflect the direct and active on-site contribution in the life of an important person or persons. For instance, an important person lived in the camp. However, few camps possess sufficient archival documentation to demonstrate the presence of an important person. To be eligible under Criterion C, a resource must clearly represent short-term residence associated with mineral discovery, mineral boom, or general exploration. Because prospectors' camps were purposely impermanent, most lack buildings and manifest as archaeological features. Clearly definable resources with integrity are uncommon because brief occupation left minimal evidence. Tent or cabin platforms, sparse artifact assemblages, and corral remnants are important character-defining features. Prospectors' camps may also be eligible under Criterion C if the resource possesses intact architectural features or facilities necessary for prospecting, such as cabins and field forges. These are significant and rare manifestations of historic prospecting efforts.

Under Criterion D, in the relatively rare cases where camp sites possess building platforms, privy pits, and refuse dumps that feature buried archaeological deposits, testing and excavation may reveal information regarding the lifestyles, social structures, and demographics of prospectors, as well as the presence of families and women. Such information has not been extensively documented. However, because camps were occupied briefly, material evidence tends to be ephemeral. Prospectors' camps featured few built elements, most of which were usually removed when the site was abandoned.

Resources that can be confirmed as prospectors' camps and possess physical integrity relative to a stated Period of Significance are significant. Integrity of setting, feeling, location, and association are particularly relevant to the eligibility of these resources. To retain integrity of *setting*, the surrounding area must not have changed a great degree from its Period of Significance. In terms of *feeling*, the resource should convey the sense of historic prospecting and residence. Integrity of *association* exists where archaeological artifacts and features convey a strong sense of connectedness between the property and a contemporary observer's ability to discern historic occupation.

Workers' Housing: This subtype comprises a spectrum ranging from simple cabins to large complexes with multiple boardinghouses. Because most workers' housing was a function of the mining industry, it shares similar Periods of Significance. The eligibility of workers' housing is predicated on meeting at least one of the NRHP Criteria and adequate integrity to convey its significance. Housing eligible under Criterion A must be associated with at least one Area of Significance noted above, events and trends important to the county. Housing may be eligible under Criterion B when occupation by an important person or persons can be confirmed. The important individual must have lived or worked at the complex or been directly present during its construction. If the important individual designed the complex or building but did not live there or was otherwise associated with the site, then Criterion C applies.

Workers' housing may be eligible under Criterion C under certain conditions. Here, it is best to distinguish between resources with standing buildings from those that have been reduced to archaeological features. Currently, workers' housing in the forms of cabins, houses, and boardinghouses stand intact in the county. Small and simple houses and cabins can represent the

austere, vernacular architecture typical of wage workers in the San Juan Mountains. Boardinghouses are uncommon and can also reflect architectural adaptation to the needs of a mining operation and its workforce. Character-defining features may include adaptations to environment and geography, such as function, construction method, and materials use.

Archaeological integrity requires intact assemblages of surface artifacts and features clearly conveying the organization and infrastructure of the housing and information about the residents and their lifestyles. Evidence of how the residents inhabited the complex, conducted domestic activities, and added support facilities are additional information a site may yield. Workers' housing may be eligible under Criterion D for its potential to yield meaningful information. An analysis of a complex and its features may augment existing understanding of the design of complexes, architectural practices and methods, and the residential environment associated with the mining industry. Workers' housing often possesses building platforms, privy pits, and refuse dumps that represent buried archaeological deposits. Testing and excavation may reveal information regarding the lifestyles, social structures, and demographics of workers, as well as the presence of families and women. Such information is significant because these subjects have not been extensively documented.

Resources that can be confirmed as workers' housing and possess physical integrity relative to a stated Period of Significance are significant. Integrity of setting, feeling, location, design, and association are particularly relevant to the eligibility of these resources. To retain integrity of *setting*, the surrounding area must not have changed a great degree from its Period of Significance. In terms of *feeling*, the resource should convey the sense of historic residence. Integrity of *association* exists where archaeological artifacts and features convey a strong sense of connectedness between the property and a contemporary observer's ability to discern historic occupation. For housing to retain integrity of *design*, material evidence, including archaeological features, must convey organization and planning of the complex. For individual buildings to possess integrity of design, their floorplan, form, and construction must be readily discernable. Resources may include standing buildings that were re-occupied periodically. Integrity of *materials* and *workmanship* requires most materials to be original, and any repairs completed with materials and workmanship similar to the original.

Isolated Residences: Since isolated residences often cannot be tied to a specific industry without substantial research, but the presence of buried archaeological deposits may yield information related to what industry residents were associated with. In this case, the site may be eligible under Criterion D.

Townsites and Unincorporated Settlements: This subtype comprises a spectrum ranging from small unincorporated settlements with a handful of buildings to formally organized towns. The eligibility of townsites and unincorporated settlements is predicated on meeting at least one of the NRHP Criteria and adequate integrity to convey its significance. In general, each settlement was important at least on a local level, and some were tied to historical trends and patterns significant on statewide and sometimes national levels. Settlements eligible under Criterion A

must be associated with at least one Area of Significance noted above, events and trends important to the county. Settlements may be eligible under Criterion B when occupation by an important person or persons can be confirmed. For instance, the individual's specific residence or place of employment must be identified, and in such cases, the place with the greater association will qualify.

Settlements may be eligible under Criterion C under certain conditions. Although some townsites currently possess standing buildings, all include a majority of archaeological features. Integrity at least on an archaeological level is required for eligibility. Townsites and settlements may be eligible in their entirety if the archaeological, architectural or engineering features and artifacts clearly convey broad patterns of the community. The settlement's organization and design is one example. Although most designs were based on grids, some communities grew spontaneously in response to local conditions. Road intersections, railroads, and local topography greatly influenced a settlement's final form. The distribution of residences, businesses, and industrial facilities constitutes another broad pattern. The transportation infrastructure, water sources, and waste disposal practices, however primitive, are additional patterns of potential significance.

Archaeological integrity requires intact assemblages of surface artifacts with the potential to yield important information. Artifacts are necessary to interpret timeframe and function in the community, as well as its individual buildings. Boardinghouses, cabins inhabited by families, and different businesses left distinct types of artifacts. By analyzing the artifacts, the researcher may be able to determine the function of some buildings, even when represented solely by archaeological remnants. A researcher may further be able to interpret socioeconomic status, gender, ethnicity, and modes of employment of residents through artifacts; characterizing aspects of lifestyle such as diet, health, and consumerism.

Standing buildings possessing integrity relative to a Period of Significance may be eligible individually or as contributing elements of a larger site. Settlements still inhabited today often possess more recent construction. If the number of such buildings overly disrupts the townsite's historic fabric, then the townsite as an entity may no longer possess the necessary level of integrity. Even if a townsite lacks integrity as a whole, standing buildings may be individually eligible under Criterion C. If the building retains architectural integrity relative to its Period of Significance, it may represent a type common to that era. Buildings altered over time may represent serial occupation and changes in preferred materials, styles, and spatial requirements. Some buildings possess innovative designs, construction methods, and materials uses in response to the conditions of a specific area. Such buildings may be eligible as adaptations of architecture to the environment, climate, and geography of the San Juan Mountains. In a few cases, buildings can be attributed to important architects and builders. If the building retains integrity relative to the original design, it may be eligible as the work of a master architect or builder, known or unidentified. Even when largely reduced to archaeological features, townsites may further be eligible under Criterion C as historic mining landscapes.

Settlements and townsites may be eligible under Criterion D for their potential to yield meaningful information. An analysis of architectural features may augment existing

understanding of the commercial and residential environment associated with the mining industry. Broad-scale studies of settlements often reveal aspects of community development, distribution of gender, modes of employment, socioeconomic status, and business practice. Settlements often possess building platforms, privy pits, and refuse dumps that feature buried archaeological deposits. Testing and excavation may reveal information regarding types of businesses, lifestyles, social structures, and demographics of residents, as well as the presence of families and women. Such information is significant because these subjects were not extensively documented.

Eligible townsites and unincorporated settlements must possess physical integrity relative to their Period of Significance. Features commonly encountered at settlements are listed under the feature types below. Most of the seven aspects of integrity defined by the NRHP apply to settlements. For a settlement to retain integrity of *design*, material evidence, including archaeological features, must convey community organization and planning. Individual buildings can retain integrity of design in two principal ways. Unaltered buildings can exhibit their original form, floorplan, and construction. Buildings altered through serial occupation retain integrity of design if they reflect evolution within the historic period. Integrity of *materials* and *workmanship* is retained when a building exhibits predominantly original materials and construction methods. Modern repairs must be made with compatible materials and workmanship. To retain integrity of *setting*, the area around the resource must not have changed a great degree from its Period of Significance, with allowance for removal of buildings and structures. To retain integrity of *feeling*, the resource should convey the sense of historic community. Integrity of *association* exists where features convey a strong sense of connectedness between the settlement and a contemporary observer's ability to discern historic occupation.

Features Common to Mining Settlement and Residence Resources

As historic resources, settlement subtypes possess a diverse array of architectural and structural features and their archaeological manifestations. Only the most common features are defined below.

Prospectors' Camp Features

Corral Remnant: Prospectors usually relied on pack-animals to carry their goods and penned the animals in informal corrals near their camps. Corral boundaries maximized natural obstructions, and had fences of branches, stumps, and wire.

Dugout: A dugout was among the most impermanent and primitive forms of residence. They were created by prospectors who lacked wall tents but were unwilling to invest time and resources in other accommodations. A dugout consisted of an excavation in a slope, 8' x 10' or larger in area, roofed with logs or branches covered with earth. The front often had a log or rock masonry façade, window, and doorway. A chimney or stovepipe extended from the roof. Dugouts were not limited to residential use. Root cellars, hay storage, and explosive magazines can resemble these resources. To recognize a resource as a dugout, it may be center to an assemblage of domestic refuse, which reflects inhabitation.

Dugout Ruin: Dugouts usually collapsed when abandoned. Ruins manifest as ovoid depressions embedded with structural materials. A sparse artifact assemblage of domestic refuse should be present.
Fire Hearth: Prospectors often built large outdoor rings or rock structures for cooking and heating fires. The ring should be near the tent or cabin platform and exhibit signs of aging such as collapse and revegetation.
Pack Trail: Pack trails often radiated outward from prospectors' camps to the areas under examination and to the nearest commercial centers. Most were created by foot and pack animal traffic, while others were intentionally graded to fulfill claim assessment requirements. Pack trails are no wider than 8'.
Tent Platform: Prospectors often graded small platforms, usually less than 20' x 20' in area, for wall tents. In some cases, prospectors placed rocks on the platform's edges or corners to support a tent's wood pallet floor and drove stakes along the edges to guy the walls. A paucity of structural artifacts, the presence of tarpaper washers, and disbursed domestic artifacts characterize tent platforms.

Workers' Housing Features
Boardinghouse: Mining companies erected boardinghouses for crews of four or more workers. The residents lived in a communal atmosphere, may have shared sleeping quarters, and usually consumed meals prepared in the building. Privies, outdoor work areas, and domestic refuse dumps or scatters are usually associated with boardinghouses. In form, the buildings were often greater than 20' x 25' in area, one or two stories in height, and rectangular, L-shaped, or irregular in plan. Roofs were usually gabled with a loft underneath, and foundations were informal on earthen platforms. Although builders preferred lumber, they used locally available materials to save capital. Boardinghouses were typically vernacular, in that the builder adapted conventional form and construction methods to local conditions, available materials, and interpreted needs.
Boardinghouse Platform: Boardinghouses usually stood on earthen platforms, which may feature rock or log footers and a collapsed a root cellar. The platform often represents the building's size and footprint.
Boardinghouse Ruin: The structural remnants of a boardinghouse.
Bunkhouse: Bunkhouses were a type of company housing where workers slept and spent leisure time, but did not regularly prepare food. Instead, they ate in a boardinghouse or company dining hall. Given this, bunkhouses often feature few food-related artifacts relative to the size of the building and the number of inhabitants. In form, construction, and style, bunkhouses were similar to boardinghouses.
Bunkhouse Platform: A platform where a bunkhouse stood. The platform should feature few food-related artifacts, and the platform usually represents the structure's size and footprint.
Bunkhouse Ruin: The structural remnants of a bunkhouse.
Cabin: A cabin was a self-contained residence for several workers or a family. In form, cabins were less than 20' x 25' in area, rectangular or L-shaped in plan, and one story high. Workers built cabins with any combination of logs, lumber, canvas, and sheet iron. Cabins were typically

vernacular, in that the builder adapted conventional form and construction methods to local conditions, available materials, and need. Because cabins were self-contained households, they usually offer a wide array of domestic artifacts. Privies and refuse scatters are often associated.

Cabin Ruin: The collapsed remains of a cabin.

Cellar Pit: Cellars, at times mistaken for dugout residences, were subterranean structures that provided cold storage for perishable food. They usually had plank walls retaining an earthen pit, a plank or log roof covered with earth, and a sunken doorway. In some cases, cellars were underneath cabins and boardinghouses. When the walls and roof collapsed, the cellars tend to manifest as pits with notches marking the entry. A lack of domestic refuse is a common attribute.

Chimney Remnant: A collapsed chimney, usually consisting of rocks or bricks. Chimneys are usually components of building platforms.

Cistern: Organized, well-capitalized residential complexes occasionally included cisterns for fresh water. Cisterns were plank, concrete, or stone masonry chambers sunk into the ground, usually with inlet and outflow pipes.

Corral: Pack animals provided transportation in the mining industry before 1940, when automobiles became common. Company housing complexes, unincorporated settlements, and towns almost always had corrals to impound multiple animals. The corrals varied widely in size, plan, and constitution, depending on the number of animals and type of operation. Livery businesses tended to build large corrals geometric in plan with wooden or wire fences, feed troughs, and stables. Mining and logging companies, on the other hand, built smaller corrals that utilized natural features as barriers to save construction costs. Such corrals were built in open areas bordered by streams, rock outcrops, thickets, and slope changes, and incorporated combinations of branches, upended stumps, and wire as fencing.

Corral Remnant: After abandonment, corrals may feature evidence of their boundaries such as wires, branches, upended stumps, individual fence posts, and cobble alignments marking a fence line. The interior should either be open or feature vegetation younger than in the surrounding area.

Developed Spring: Settlements depended on water for existence, and residents were able to subsist on surface sources when a community was still in its early stages of growth. Springs were preferred because of their purity. When water was difficult to collect, the residents developed the spring by excavating a chamber, lining it with planks or masonry, and diverting drainage around the excavation.

Domestic Refuse Dump: People usually threw their solid refuse downslope from their residences, forming deposits of domestic artifacts. Large deposits that were high in volume qualify as dumps. Artifacts are usually domestic in nature, primarily food-related, and include food cans, fragmented bottles and tableware, and personal articles.

Domestic Refuse Scatter: A refuse scatter is a light amount of domestic artifacts disbursed over a broad area. Domestic scatters usually extend downslope from a residential feature.

Privy: Until flush toilets became common during the 1940s, most people outside of principal towns relied on privies for their personal use. Privy buildings enclosed toilet benches with cut-out holes as the seats. Most buildings were vernacular with shed or gabled roofs, plank floors,

and a plank door. The residents often preassembled the walls, leaned them together, and nailed the corners. The buildings stood over a pit on posts or rocks.

Privy Pit: Privy pits were excavated in the ground underneath privies to receive waste. When a pit became full, the residents relocated the privy building, topped the depression off with domestic refuse, and shoveled over a soil cap. The cap subsided as the pit contents leached away and decayed, creating a depression usually less than 6' in diameter. Pits often feature backdirt downslope, some domestic refuse in the interior, and ashy soil. The pit may be surrounded by more refuse and footers for the privy building.

Residential Building: Settlement sites may feature buildings that material evidence defines as residential, but the buildings do not clearly possess the characteristics of boardinghouses, bunkhouses, or small cabins. Such buildings can be recorded as general residences.

Residential Building Platform: A platform, confirmed by artifacts, which supported an unspecified residential building.

Residential Building Ruin: The structural remnants of a residential building.

Road: Residential complexes usually required roads to accommodate traffic. Roads are at least 8' wide.

Root Cellar: Residences and businesses that handled high volumes of perishable food had root cellars for storage. Such enterprises were commonly boardinghouses, restaurants, hotels, and markets. Root cellars, often mistaken for dugouts, were excavated near their associated buildings. Walls usually made of rocks, logs, or lumber retained the earthen sides and a roof covered with more earth. Because root cellars were not residences, they usually offer few domestic artifacts and lack stovepipe ports.

Spring Box: A spring box was a small enclosure built over a developed spring. The structures had plank walls, often a masonry or concrete chamber, a roof, and an entry door.

Stable: Mining companies and livery operators erected stables to house draft animals used for wagon drayage. Stables were vernacular, poorly constructed, and assembled from inferior materials to save costs. In form, stables were square to rectangular, and one-story high with shed or gabled roofs. Logs were used for the foundation and walls, and lumber and sheet metal for the roof. Defining characteristics include wide doorways, low ceilings, broad gaps in the walls, and mangers and stalls in the interior.

Stable Ruin: A collapsed stable.

Well: Because many settlements lacked reliable and clean sources of water, residents turned to wells. Three types were common in mining districts. The earliest was a hand-dug shaft lined with dry-laid masonry and crowned by a platform at the collar. Once hardware was available, residents sank pipes into the ground and fitted them with hand-pumps. In some cases, communities or mining companies installed steam- or gasoline-powered pumping stations over large-diameter wells.

Townsite and Unincorporated Settlement Features

Townsites and unincorporated settlements usually included similar features described above with Workers' Housing.

Assay Shop: An assay shop was a facility where a trained metallurgist tested ore samples for their mineral content. In function, content, and form, the shops were like those described with the Ore Treatment Mill property subtype above. The shops in unincorporated settlements may have been an independent business or run by a mining company, while those in towns were usually businesses.

Assay Shop Foundation/Platform: Assay shops often stood on earthen platforms or foundations of concrete and rock masonry. Distinct characteristics can define a platform as that for an assay shop. Foundations or other remnants of an assay furnace, its blower, and small crushers may remain. Artifact assemblages typically include furnace clinker, fire-bricks, broken assay crucibles, mineral samples, and laboratory artifacts.

Blacksmith Shop: Blacksmiths were vital to mining communities because they manufactured hardware, maintained tools, and shoed draft animals. Nearly every community had a blacksmith, who kept shop on the fringes of the business district. Community blacksmith shops were equipped like those at mines, and the buildings were vernacular and simple in form. They were square, rectangular, or L-shaped, one-story, and gabled. In construction, they consisted of combinations of logs, lumber, and sheet iron, and were rough. The floor was the underlying earthen platform and the foundation usually of logs or rocks. The interior was open and featured workbenches, a coal bin, forge, anvil block, and blower to force air into the forge.

Blacksmith Shop Platform: Blacksmith shops usually stood on earthen platforms larger than the building for storage of materials and large items. Rock alignments and deposits of forge clinker usually define the building's footprint. The artifact assemblage is distinct and includes much forge clinker, forge-cut iron scraps, hardware, and sheet iron.

Blacksmith Shop Ruin: The collapsed remnants of a blacksmith shop.

Commercial Building: Commercial building is a general term applied to a building that housed a business. Commercial buildings were usually located in or near a town's business district. The buildings assumed a variety of plans, were as high as two stories, and usually featured gabled roofs. Commercial buildings in most settlements were vernacular and consisted of any combination of log and lumber construction.

Commercial Building Foundation/Platform: Primitive commercial buildings stood on logs or rocks laid on earthen platforms. Large buildings may have stood on formal foundations of masonry or concrete. Artifacts and buried archaeological deposits are often few because most service and retail businesses generated little refuse.

Commercial Building Ruin: The collapsed remnants of a commercial building.

Ditch: Many unincorporated settlements and towns featured ditches that delivered fresh water for consumption and other uses. The ditch, an early public utility, tapped the nearest reliable source and carried the water through the settlement.

Hotel: A hotel was a business that housed guests on a short-term basis. A boardinghouse, in contrast, provided long-term accommodations. In the early years of unincorporated settlements and towns, hotels were small and featured only several rooms. In mature settlements, the hotels were more substantial and complimented by a dining and drinking establishment. In form, hotels

had varying floorplans, were often two stories in height, and usually featured gabled roofs. In construction, small buildings were usually made of logs and stood on foundations of logs or rocks, while large hotels were constructed of lumber with formal foundations. Most were vernacular in appearance and had may have featured false-fronts, boardwalks, and ornamental trim.

Hotel Foundation/Platform: Small hotels stood on rock alignments and logs laid on earthen platforms, while larger hotels may have had formal masonry or concrete foundations. The platforms tend to be large and may feature a cellar pit if the hotel had a kitchen. The artifact assemblages are often distinct and can include a high proportion of small personal items, clothing hardware, decorative domestic wares, furniture parts, and lamp parts. Large and numerous privy pits are often associated.

Livery: A livery was a business that temporarily boarded draft animals. Defining characteristics include corrals, collapsed fences, evidence of stables, earth packed by animal traffic, and manure deposits. Because of noisome pests and odors, liveries were usually located on the fringes of a settlement. The artifact assemblage should include a high proportion of tack straps and hardware.

Mercantile: A mercantile was a retail establishment that sold a variety of goods. In form and construction, mercantiles were similar to the commercial buildings described above.

Mercantile Foundation/Platform: Mercantiles may be identified by a substantial platform or foundation, an associated privy pit, and little evidence of residence, such as food-related items.

Restaurant: A restaurant was a food service business that may have also sold baked goods. Similar in form and construction to commercial buildings, restaurants featured a dining room, a kitchen, a storage area, and a root cellar. Work areas also usually existed behind the restaurant building. The artifact assemblage is distinct and includes high proportions of cans, broken tableware, butchered bones, and stove clinker. Large and numerous privy pits were behind the buildings.

Restaurant Foundation/Platform: Restaurant platforms are similar to those for commercial buildings, except they almost always offer large quantities of food cans, fragmented tableware and bottles, butchered bones, and kitchen implements.

Saloon: A saloon was a business that served primarily alcoholic beverages and, possibly, light dining fare. Most saloons ranged in construction from small log buildings in nascent settlements to formal frame buildings in developed towns. They usually featured a bar room, storage area, and root cellar.

Saloon Foundation/Platform: Saloons stood on platforms similar to those for commercial buildings. The artifact assemblage is distinct and includes high proportions of fragmented bottles relative to other items.

Property Type: Rural Historic Mining Landscape

Rural Historic Landscapes are a large-scale property type representing the history of an area's human occupation, life ways, and land use. The National Park Service recognizes other types of landscapes for National Register nomination, such as designed historic landscapes and

cemeteries. The National Park Service describes Rural Historic Landscapes in detail in its *National Register Bulletin: Guidelines for Evaluating and Documenting Rural Historic Landscapes*. In overview, the Bulletin states:

> A rural historic landscape is defined as a geographical area that historically has been used by people, or shaped or modified by human activity, occupancy, or intervention, and that possesses a significant concentration, linkage, or continuity of areas of land use, vegetation, buildings and structures, roads and waterways, and natural features.[10]

Areas that experienced intensive mining form a subset, Rural Historic Mining Landscapes. Such landscapes provide a physical context for individual resources, and when viewed in total, the resources and their setting constitute a greater whole. Extensive tracts of land, its natural features, and individual historic resources represent the history, people, and traditions of mining in San Juan County.

The National Park Service organized the defining characteristics of Rural Historic Landscapes into eleven categories: land uses and activities; patterns of spatial organization; response to the natural environment; cultural traditions; circulation networks; boundary demarcations; vegetation related to land use; buildings, structures, and objects; clusters; archaeological sites; and small-scale elements. The first four are the result of processes, while the latter seven are physical attributes.[11] A rural historic mining landscape can also be described as a "landscape of work."[12] Mining outfits molded the landscape for the efficiency, organization, and economics of finding ore, extracting it, and processing the material. Mining landscapes of work include features characteristic of hardrock mining. Prospects are concentrated in areas where ore was likely to be found, while mines lie on land where ore formations were confirmed, regardless of topography. Ore treatment mills were sited either at the mines or in drainages where water and open ground were available. Companies erected workers' housing at mines and mills that were distant from established communities. Unincorporated settlements and formal towns grew in the most suitable environments near the centers of mining and milling. Circulation systems in the form of pack trails linked prospects with communities, and roads connected mines, mills, and transportation centers. Ditch systems diverted water from streams to reservoirs for industrial and community consumption. The forests around the mines and communities were cut over to provide wood for heating, steam power, and lumber. Sawmills were located close to the mature stands to minimize the distance workers hauled the cut logs. All are variations on the working landscape as related to the San Juan County mining industry.

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[10] Linda Flint McClelland, et al.,. *National Register Bulletin: Guidelines for Evaluating and Documenting Rural Historic Landscapes* (National Park Service, 1999) 1.

[11] McClelland, et al., 1999:3.

[12] Denise P. Messick, J.W. Joseph, and Natalie P. Adams, *Tilling the Earth: Georgia's Historic Agricultural Heritage, A Context* (Stone Mountain, GA, New South Associates, 2001) 62.

Rural Historic Mining Landscape Significance

Because multiple historic resources and natural features make up rural historic mining landscapes, significance can be assessed in terms of the broad historical theme of the mining industry, associated settlement, and infrastructure development. Potential Areas of Significance include Architecture, Community Planning and Development, Engineering, Industry, and Landscape Architecture. Because of the complexity and diversity of constituent historic resources, coupled with ongoing and evolving use, most landscapes may be significant under multiple areas and criteria. Extended Periods of Significance must be considered when determining the significance of rural historic mining landscapes.

Regarding Architecture and Engineering, mining industry participants adapted conventional designs and construction methods to the environment of the San Juan Mountains. Conditions included topography, natural landscape features, local climate, and available buildings materials. In the context of a landscape, a spectrum of buildings can represent the evolution of architecture specific to the mining industry. Similarly, structures may be significant representations of mining engineering, and multiple structures within a single landscape may reflect the evolution of function, design, methods, workmanship, and materials.

Regarding Community Planning and Development, landscapes may reveal settlement patterns pertaining to hardrock mining. Unlike traditional settlement patterns, mining industry participants established residential complexes near centers of mining or related industry regardless of environmental conditions. Proximity to mines and industry was a first priority, and the best micro-environment for residence or community was secondary. Landscapes may reflect the development patterns of industrial aspects of mining and natural resource influence on settlement. It should be noted that settlement is not limited to concentrations of residences, such as townsites. Workers' housing and prospectors' camps scattered throughout the county comprise an alternate another settlement pattern.

Regarding Economics and Commerce, assemblages of sites including mines, mills, roads, and railroads reflect the overall process of converting natural resources into wealth. The mines produced ore that was carried over the roads to mills. The ore was processed at the mills, metals recovered, and concentrates shipped by road or rail to a smelter for the final processing. Each stage furthered the ore-to-wealth cycle. Each stage also represents a divestment of money into the region through workers' wages and consumption of goods. Communities in the landscape were local economic centers where the divested funds supported commerce.

The area of Industry is fundamental. Mining landscapes are tied to and representations of the mining industry, which was the most important factor in the exploration and development of the county. The industry was the principal force behind the county's economy, infrastructure, permanent settlement, and development. The industry and its impacts on the land made San Juan County one of Colorado's most productive sources of mineral wealth, a center known in greater mining circles. Prospectors and mining outfits adapted known methods and technology to the physical environment, geology, and mineralogy of the San Juan Mountains. Through their efforts, prospectors and companies contributed to the development of mining technology and engineering in numerous ways. Many innovations were adopted widely and forwarded mining

and infrastructure elsewhere. Some innovations were smaller in scale, such as individual pieces of machinery or structures. Others were macro in scale, such as tramways and enormous mines and mills.

The area of Landscape Architecture pertains to landscapes purposefully manipulated. Infrastructure such as water systems and railroads are forms of purposeful large-scale land uses. Townsites, with grids of buildings and scattered outlying industries, are another. Large mine and mill complexes, where portions of the land were designated and altered for specific functions, are a third. On a large scale, designed systems associated with mining changed the appearance of landscapes.

Rural Historic Mining Landscape Registration Requirements

To qualify for nomination, a landscape must meet at least one of the NRHP Criteria and possess related physical integrity. Under Criterion A, a landscape and its contributing resources must date to one of the mining industry's Periods of Significance and one of the associated Areas of Significance, trends and events important to the county. Landscapes such as individual mines or milling complexes may be eligible under Criterion B through residence, employment, or other involvement by a significant person or persons. The associated resource must retain physical integrity relative to that person's occupation during their productive period of time. A prominent mineral surveyor may have platted numerous claims in a region, for example. Larger scale landscapes are less easily documented under Criterion B generally, as they evolved organically through the actions of numerous people.

Mining landscapes may be eligible under Criterion C if any buildings, structures, archaeological features, or natural features represent mining, its subsidiary industries, or related settlement patterns. Landscapes occupied for extended periods of time can reflect evolution in land use, while those occupied for a narrow period might reflect land use patterns of that era. Intact buildings and structures can be significant and often rare contributing elements of mining landscapes. Most contributing resources comprising the landscape should retain integrity at least on an archaeological level. Modern intrusions should either be minimal or compatible with the historic land use. The researcher must discuss how the landscape's characteristics and contributing elements represent an aspect of the mining industry.

Landscapes may be eligible under Criterion D when they hold a high potential to yield information based on a holistic representation of buildings, structures, or archaeological features. The arenas of inquiry may be broad and rely on information offered by the landscape as a whole. If residential complexes within the landscape possess building platforms, privy pits, and refuse dumps with buried archaeological deposits, testing and excavation may reveal important information regarding lifestyle and demographics of occupants. When information from multiple complexes is compared, regional patterns may become apparent. Important areas of inquiry include but are not limited to diet, health, distribution of gender, families, ethnicities, professional occupation, and socioeconomic status. Comparative studies of industrial sites may reveal patterns of the application of systems engineering, ore treatment processes, and equipment. Other patterns regarding construction methods, materials, structural design, and

architecture may become apparent. Such information can be compared to geology, mineralogy, and the successful or failed operations for a full understanding of a region's industry. Intact underground mine workings is another area of inquiry under Criterion D. Groups of mines may feature connected workings that can contribute to the understanding of broad-scale mine engineering, planning, and operations.

Eligible rural historic mining landscapes must possess physical integrity relative to one of the county's Periods of Significance. Landscapes in the county changed to varying degrees through continuity in use, as well as degradation of resources following abandonment. Overt modern intrusions can compromise integrity if out of keeping with land use patterns characteristic of historic mining. Such intrusions should be few and unobtrusive. The presence of some characteristics is more important to integrity than others. Historic settlement patterns, vegetation patterns, circulation systems, and small-scale features typical of mining should be present. Because the natural environment was a prominent backdrop for mining during the county's Periods of Significance, a preserved natural setting is important to integrity.

Many of the seven aspects of integrity defined by the NRHP may apply to rural historic landscapes, although not all need be present. *Location* is the place where the significant activities that shaped land took place and remain apparent. To retain integrity of *design*, landscape features, both manmade and natural, must convey organization and planning relative to mining land use. *Setting* is the physical environment surrounding a historic property. Both large-scale and small-scale features form a setting that conveys mining land use and settlement patterns. To retain integrity of setting, a landscape and bordering area must not have changed a great degree in overall character. To retain integrity of *feeling*, the landscape should convey mining and associated settlement. Integrity of *association* exists where a combination of natural and manmade features conveys a strong sense of connectedness between the landscape and a contemporary observer's ability to discern the historic mining industry or settlement.

SECTION G: GEOGRAPHICAL DATA

The geographical area covered by this document consists of San Juan County, near the center of the San Juan Mountains in southwestern Colorado.

SECTION H: IDENTIFICATION AND EVALUATION METHODS

Two general research tracks proved to be effective in providing accurate contextual information and informing Property Types. The collections of six important research facilities in the Denver area provided primary archival and secondary source material. The institutions in order of relevance are Denver Public Library Western History Collection, Colorado School of Mines, Colorado State Archives, University of Colorado at Boulder library system, and History Colorado (the Colorado Historical Society). Of these, Colorado School of Mines, Colorado State Archives, and Denver Public Library possessed the richest collections relevant to mining. Key events and trends were synthesized from contemporary publications, including mining periodicals, newspapers, mine inspectors' and engineers' reports, manuscript collections, and other archival materials. Secondary sources, primarily popular literature, were used to clarify some information, synthesize historical overviews, and provide contextual information for broad trends.

Two approaches were useful for identifying discrete Periods of Significance: examination of the materials identified above and statistical analysis of population, ore production figures, and numbers of active prospects, mines, and mills between 1860 and 1980. This information was tabulated in five year increments when possible, and mines divided among small, medium, and large scale operations. Colorado Mining Directories (1870-1915), newspapers, Colorado Mine Inspectors' Reports (1915-1980) and other archival materials were used to reconstruct the number of mines and mills active between 1870 and 1980. Susanne Schulz's census compilation, *A Century of the Colorado Census,* provided population figures. Charles Henderson's *Mining in Colorado* provided production figures between 1874 and 1923, while the Bureau of Mines' *Minerals Yearbook* provided figures for 1931 to 1980. The above-described statistical analysis revealed some inherent challenges. Production figures for some periods may be inaccurate, while active mines and mills may have gone unreported. The period 1885 to 1897 in particular was poorly documented in archival resources. Overall, however, statistical analysis proved effective for identifying Periods of Significance and their associated trends. For example, sudden rises in both population and numbers of prospects can be interpreted as a period of discovery, mineral exploration, and boom. Gradual population growth combined with high production figures and an increase in small and medium-sized mines reflected the early phase of productive mining. A slight contraction in population, decrease in small mines, increase in large operations, and increase in production figures suggested the maturation of mining.

Regarding further comparison and contrast, several Multiple Property Documentation Forms document the mining industry in Colorado. The author co-authored *The Mining Industry in Colorado* with Jay Fell, Ph.D., in addition to solely authoring the *Amendment to Tourist Era and Metal Mining Resources in Boulder County*. These documents served as models for *Historic Mining Resources of San Juan County*. Descriptions of mining technology in Section E 2 of this context as well as the property types described in Section F were reproduced and adapted from *The Mining Industry in Colorado* with author permission.[1] The author's treatise on mining technology, *Riches to Rust*, and his work on the Las Animas Mining District, *Basins of Silver* also served for heavy reference. Text from the latter publication is also reproduced here. However, *Historic Mining Resources of San Juan County* differs from the above publications in its emphasis on the adaptation of mining and ore treatment to the difficult environmental, geological, and mineralogical conditions of San Juan County.

[1] Steve Baker, *Cement Creek West Study Unit-AML Historic Site Survey* (Montrose, CO, Centuries Research, 1998); Steve Baker, *The 1999 Abandoned Mine Land Reclamation Program Recording of Historic Mining Sites in the Treasure Mountain Study Unit of the Upper Animas Drainage, San Juan County, Colorado* (Montrose, CO: Centuries Research, 2000); .Ross S. Curtis, *Recording of Historic Mining Properties in the Galena Mountain Study Unit, San Juan County, Colorado* (Durango: Durango Archaeological Consultants, 2001); Julie Singer, Jonathan Horn, and Eric Twitty, *Martha Rose/Walsh Smelter (5SA1177) Archaeological Assessment, San Juan County* (Silverton:, Silverton Restoration Consulting, 2006); .Eric Twitty, *Mining Cement Creek: A Selective Inventory of Historic Mine Sites on the East Side of the Cement Creek Drainage, San Juan County, Colorado* (Boulder: Mountain States Historical, 2000); Eric Twitty, *The Silverton Mining District k: A Selective Inventory of Principal Historic Sites, San Juan County, Colorado* (Boulder: Mountain States Historical, 2002); Eric Twitty, *Kittimac Mine, Site 5SA181A, Level II Documentation* (Boulder: Mountain States Historical, 2005); Eric Twitty, *Legal Tender Tunnel, Site 5SA795, Level II Documentation* (Boulder: Mountain States Historical, 2005); Eric Twitty, *Level II Documentation of the Contention Tramway, Site 5SA1184.1* (2006,), forms on file at the Colorado Office of Archaeology and Historic Preservation; Eric Twitty and Jonathan Horn, *Level II Documentation of the Gold Prince Tramway, Site 5SA585* (2006), forms on file at the Colorado Office of Archaeology and Historic Preservation.

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Section E 1: San Juan County's Mining Districts

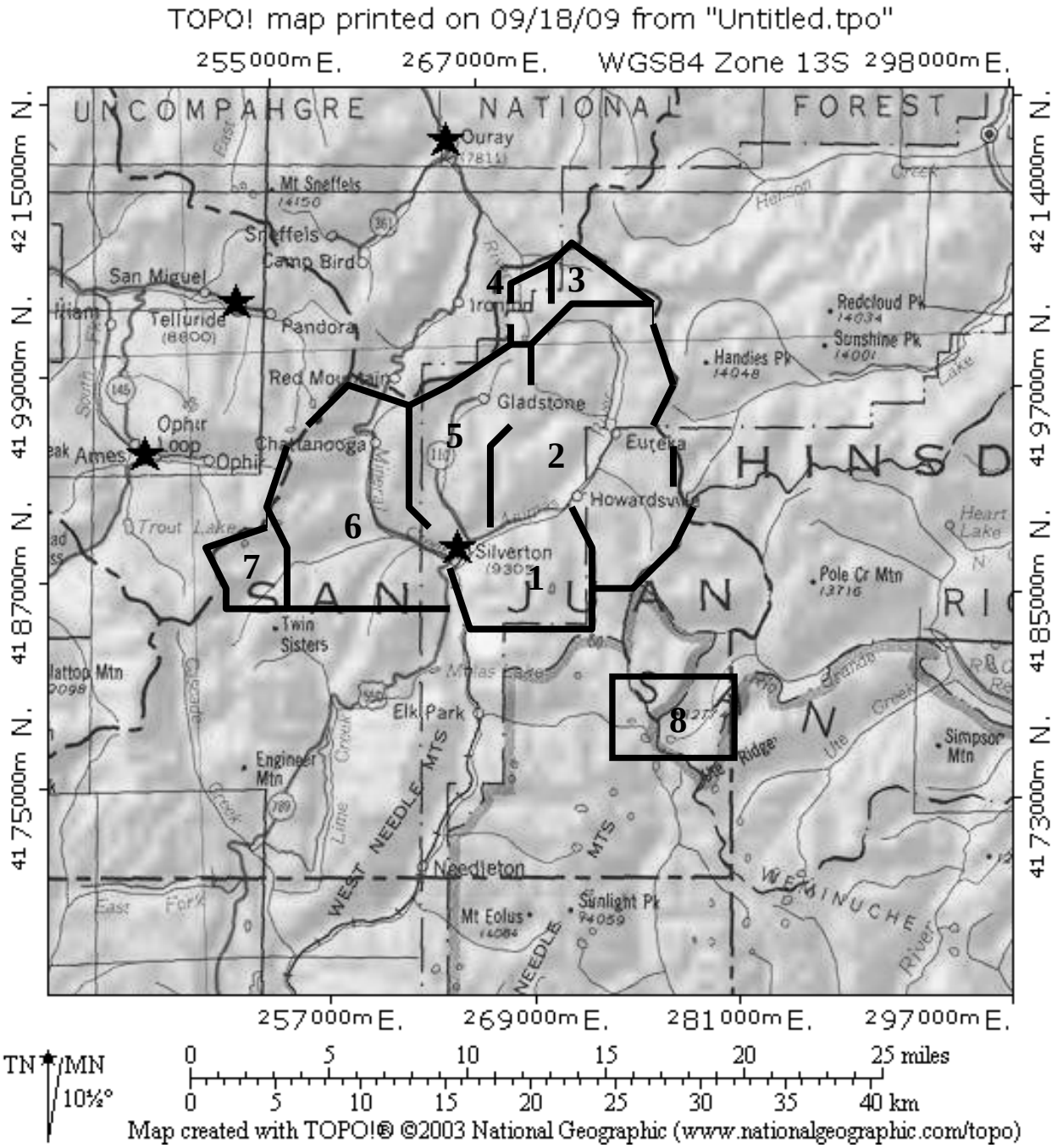


Figure E 1: The map is an index of San Juan County's mining districts. 1 = Las Animas; 2 = Eureka; 3 = Mineral Point; 4 = Poughkeepsie; 5 = Cement Creek; 6 = Mineral Creek; 7 = Ice Lake; 8 = Bear Creek.

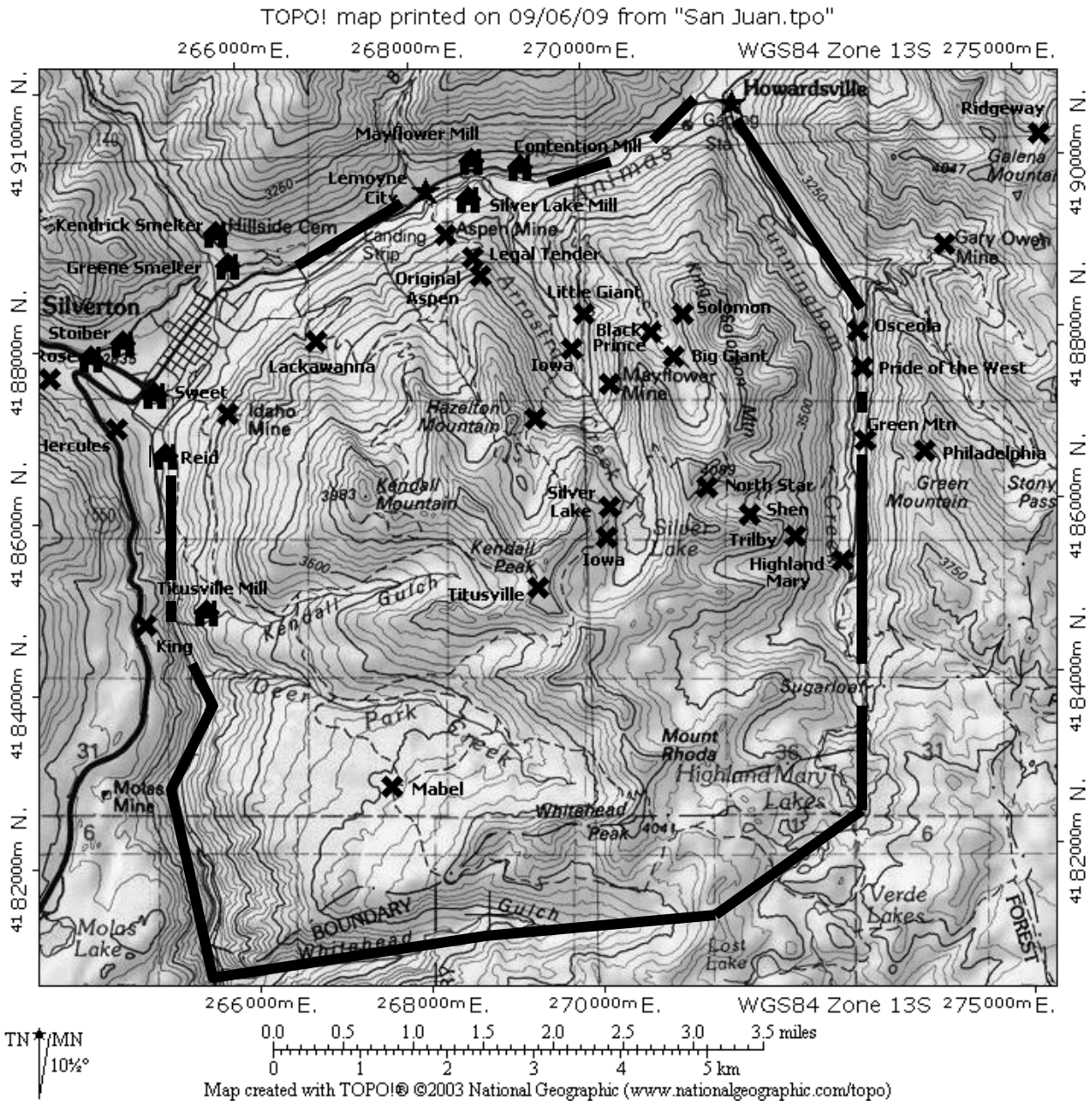


Figure E 2: The map depicts the principal mines, mills, and boundaries of the Las Animas Mining District.

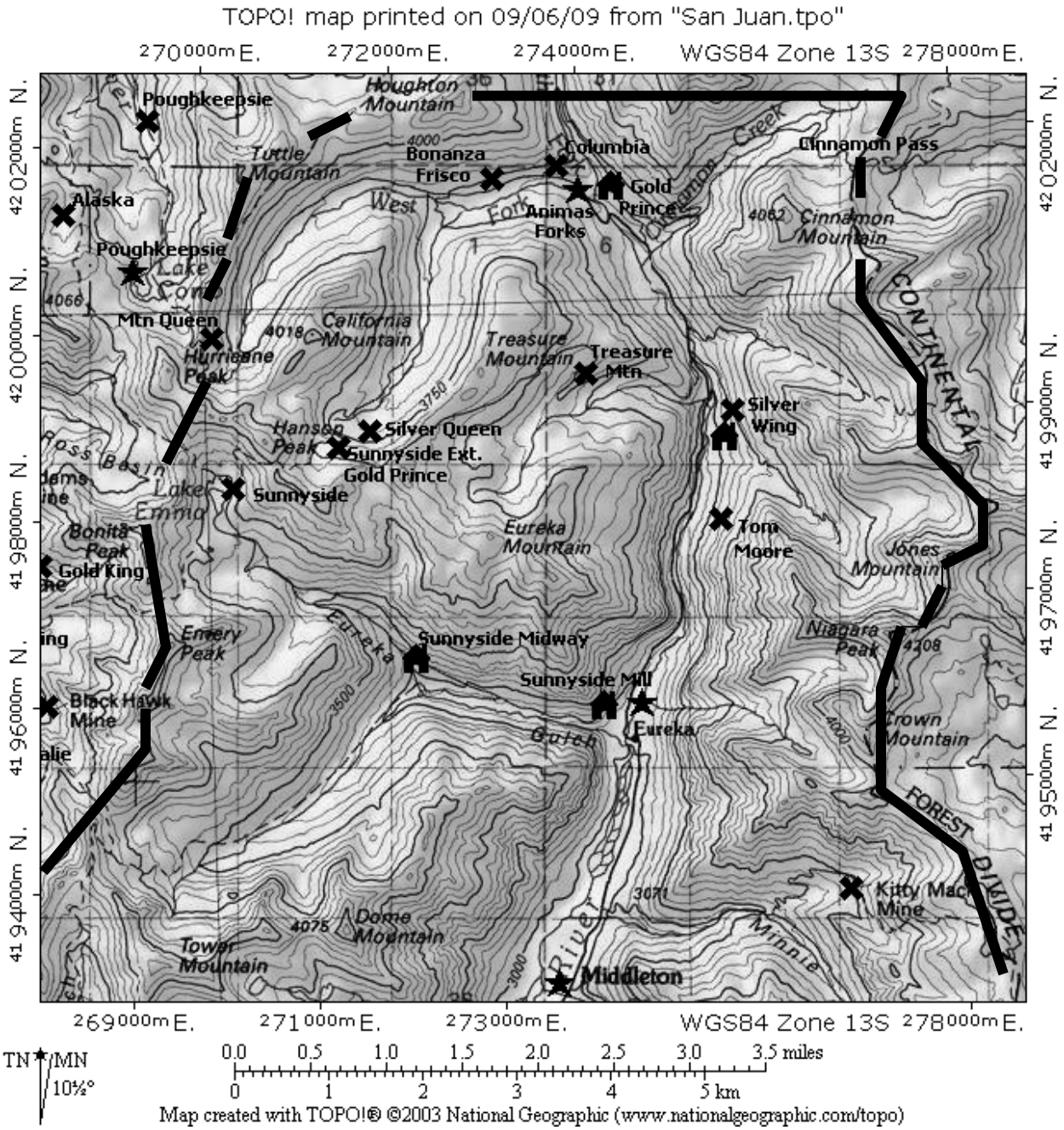


Figure E 3: The map depicts the principal mines, mills, and boundaries of the Eureka Mining District's northern portion. The settlements are Middleton at bottom, Eureka above, and Animas Forks at top.

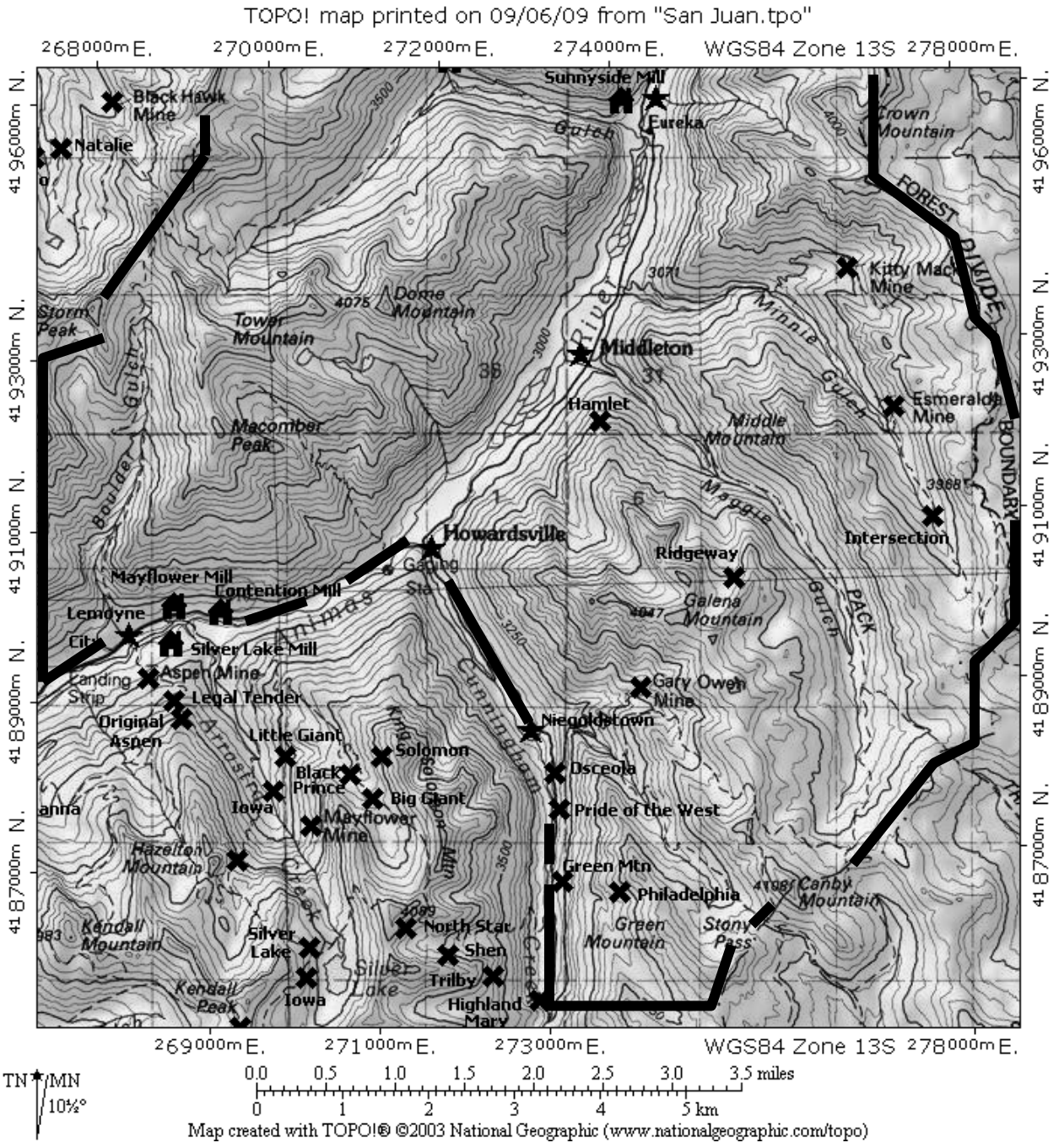


Figure E 4: The map depicts the principal mines, mills, and boundaries of the Eureka Mining District's southern portion. The Las Animas Mining District extends southwest.

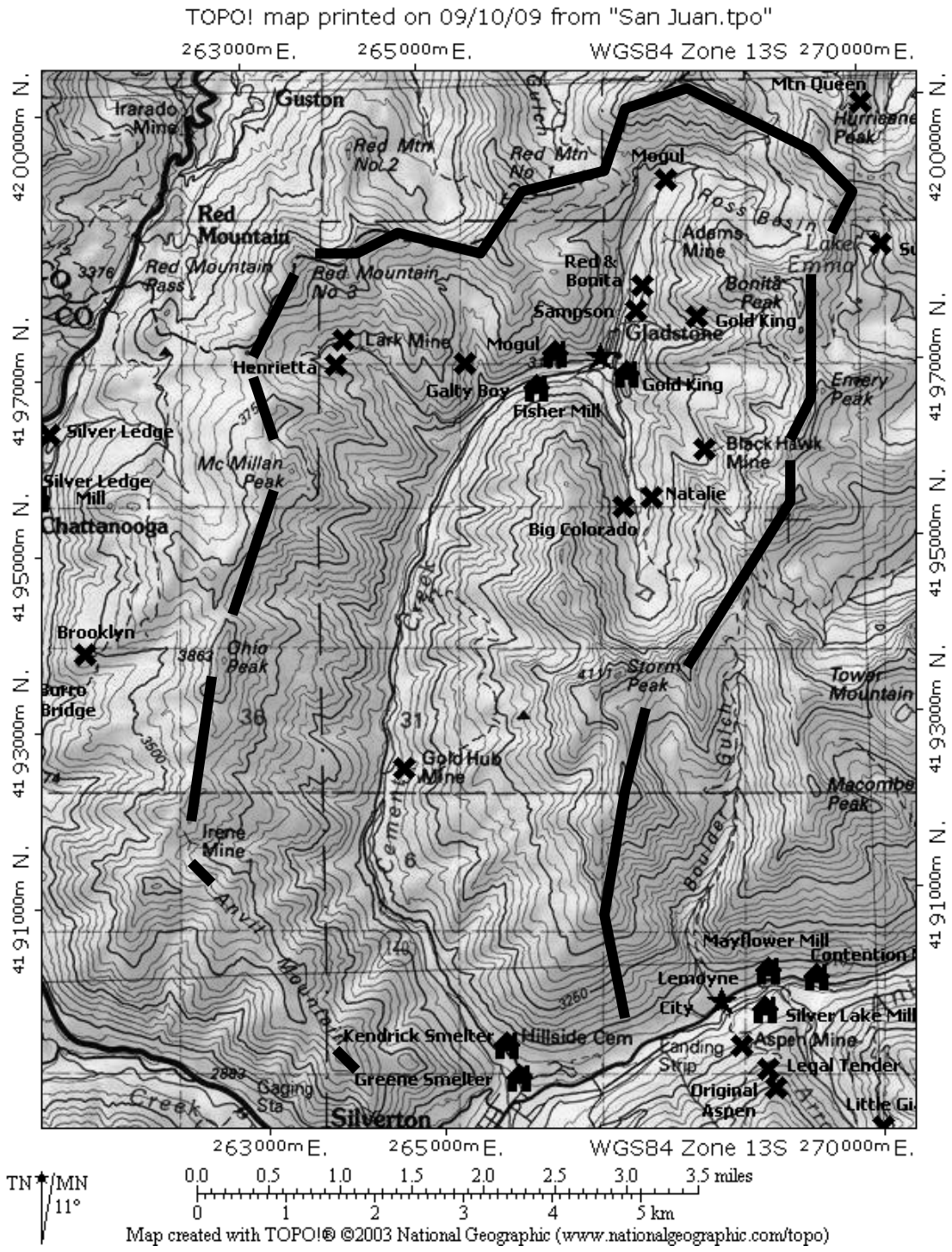


Figure E 5: The map illustrates the principal mines, mills, and boundaries of the Cement Creek sub-district.

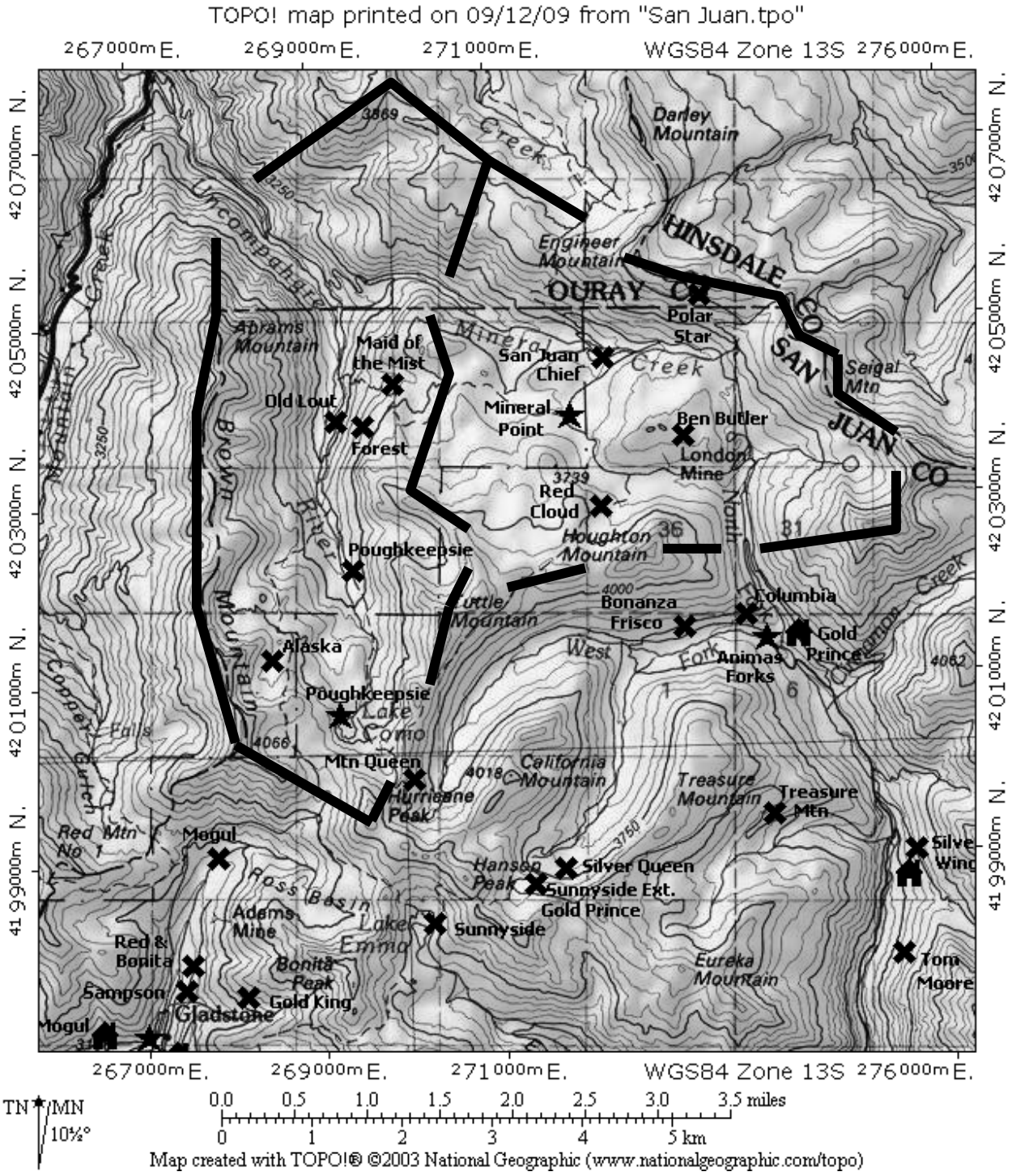


Figure E 6: The map depicts the principal mines of the Poughkeepsie Mining District, left, and Mineral Point Mining District, right. The Eureka district extends south, and the Red Mountain valley is west.

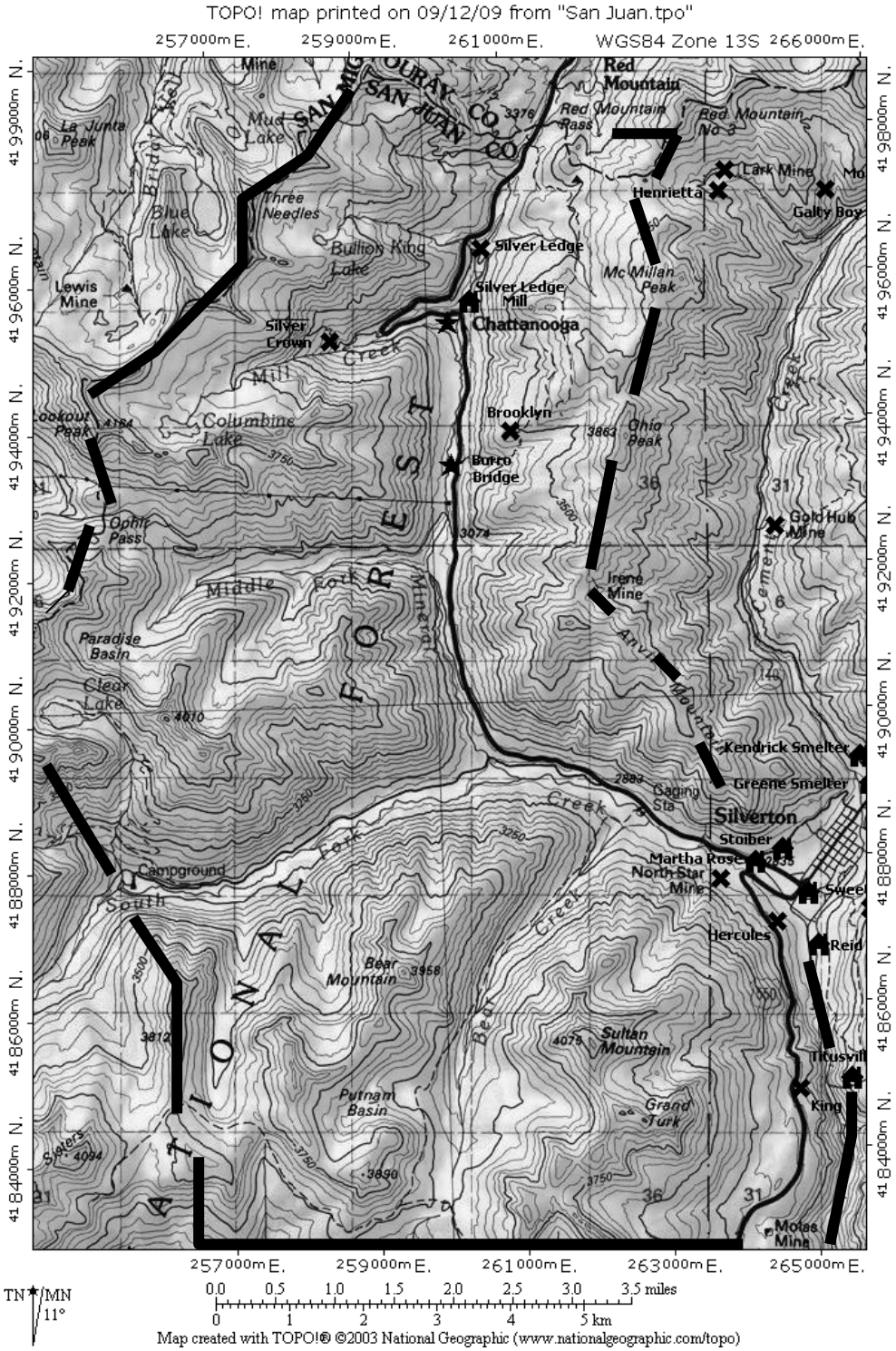


Figure E 7: The map depicts the principal mines, mills, and boundaries of the Mineral Creek Mining District.

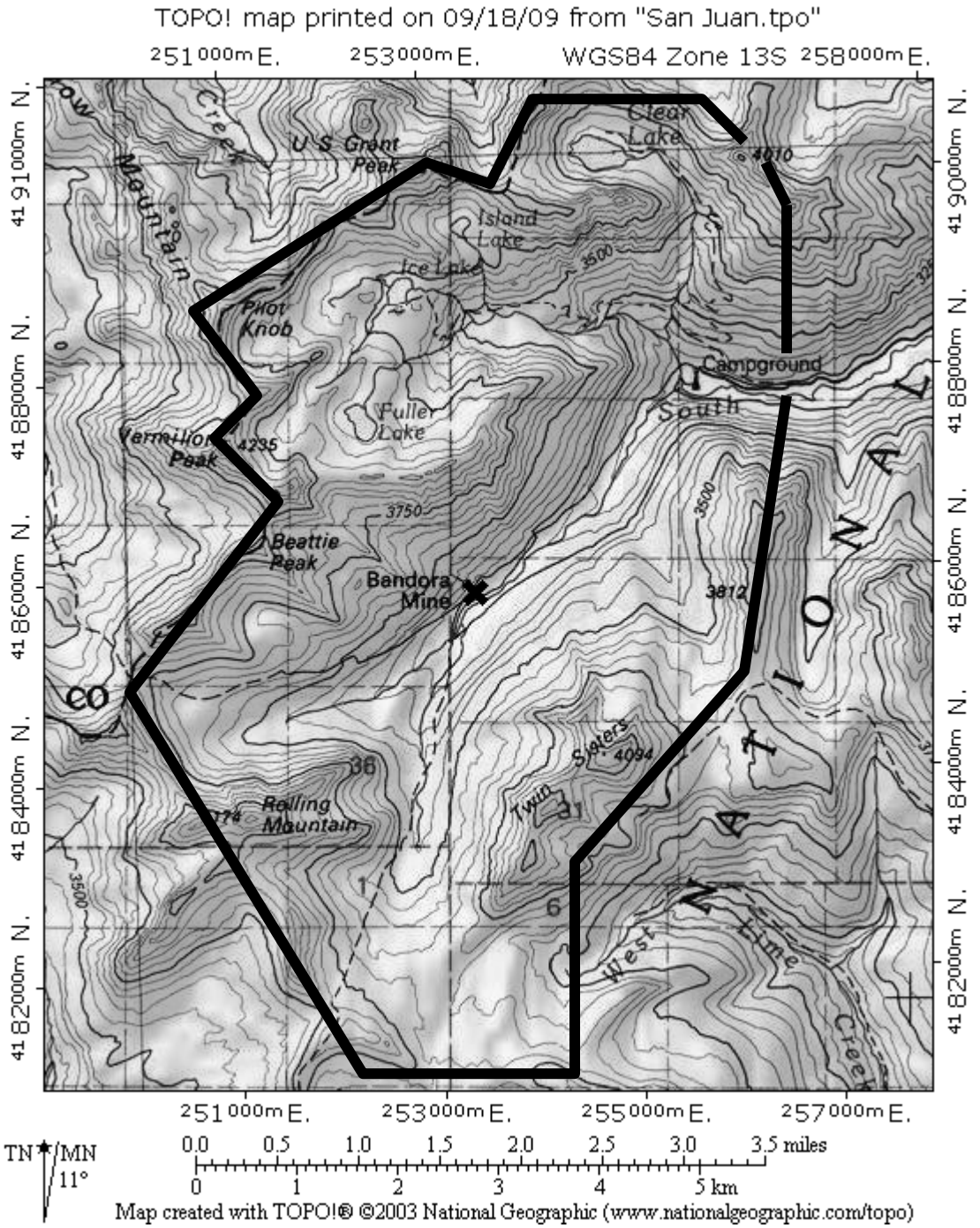


Figure E 8: The boundaries generalize the Ice Lake Mining District. The district's eastern portion overlaps the western edge of the Mineral Creek district.

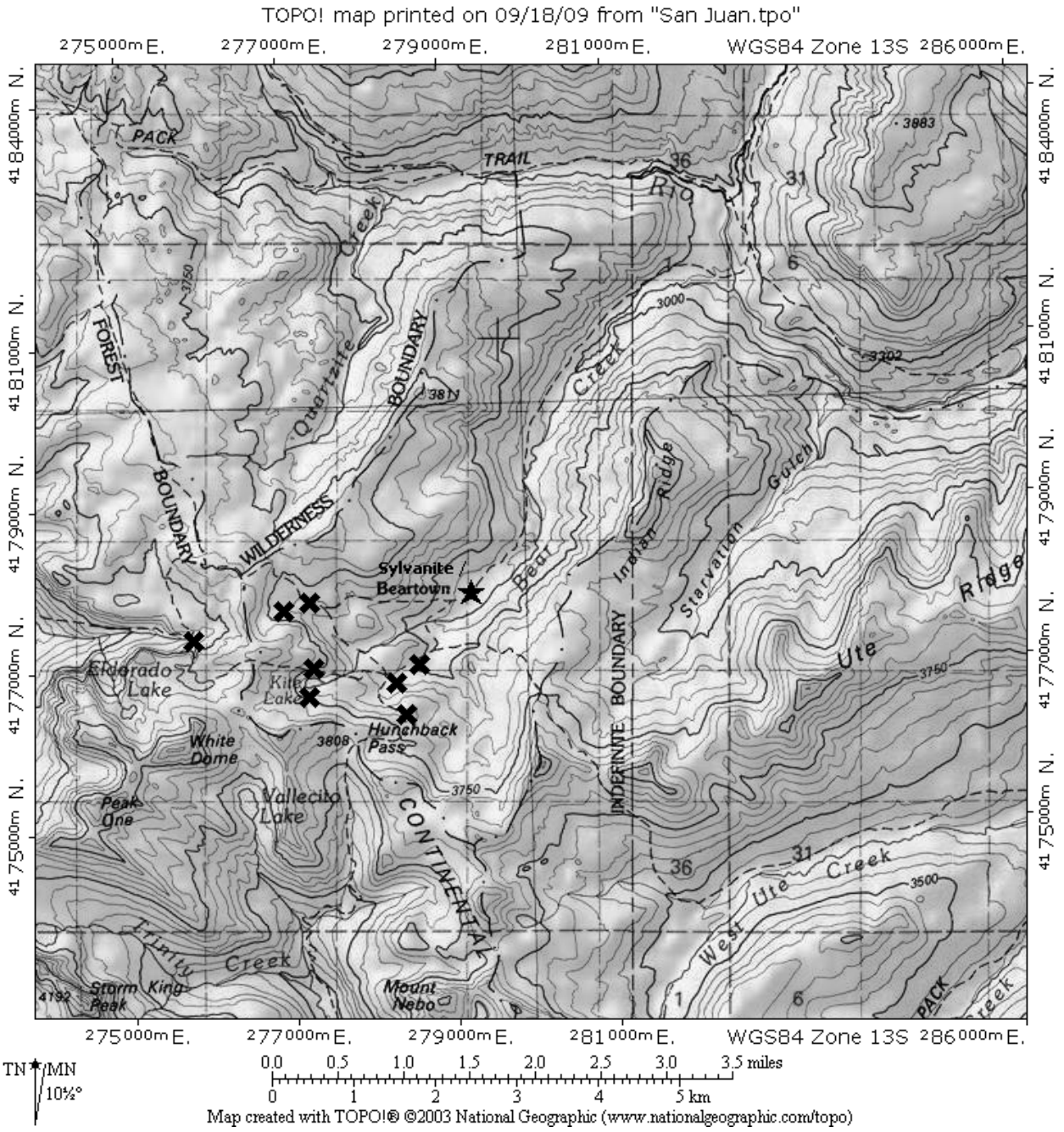


Figure E 9: The Bear Creek Mining District encompassed the collection of mines southwest of Beartown. The district's exact boundaries are uncertain and are therefore not shown. The Rio Grande River valley traverses upper right and, historically, provided easy access to the town of Creede in Mineral County.

Section E 1: The Gold Rush, 1860-1861

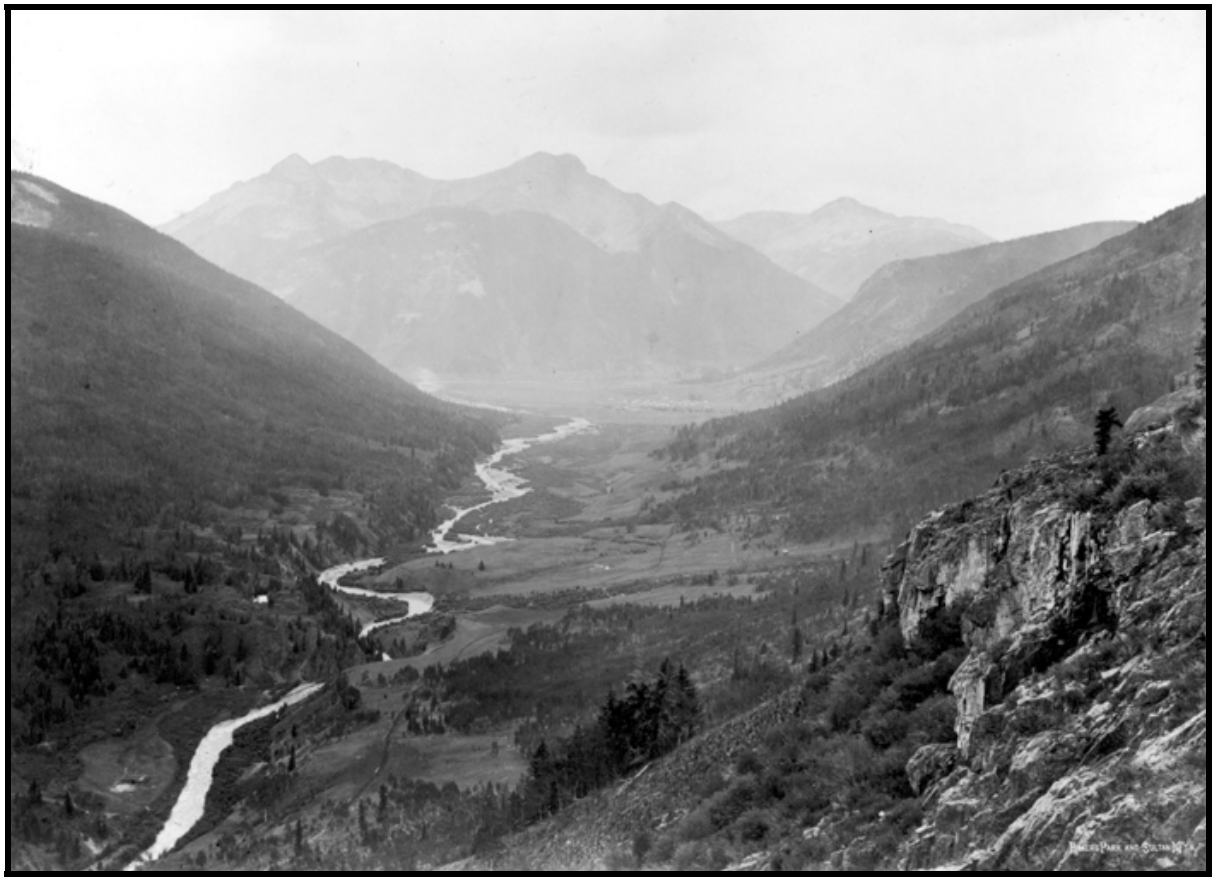


Figure E 10: Baker's Park was a prospectors' paradise, at least between May and October when the ground was thawed. The area offered enough drainages, rock outcrops, and peaks to keep prospectors busy for decades. William Henry Jackson took the southwesterly view in 1875. Source: U.S. Geological Survey, Jackson, W.H. 1689.

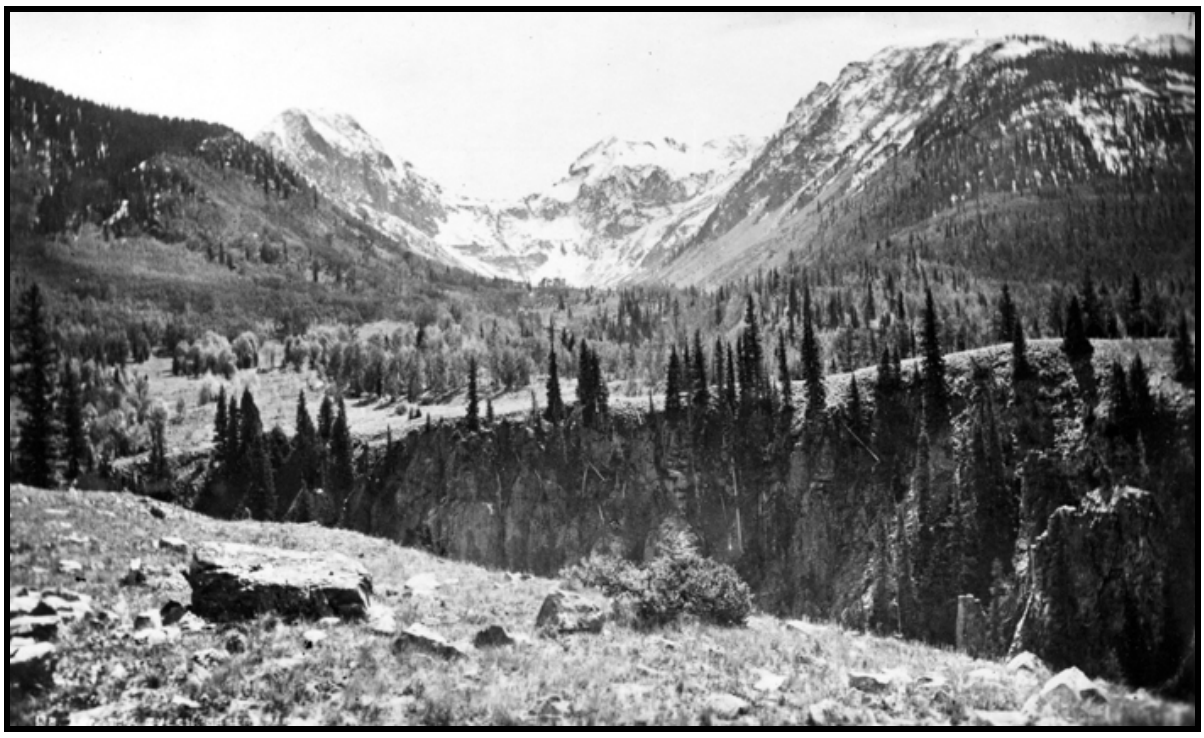


Figure E 11: Arrastra Gulch, originally known as Mason Gulch, seemed like an unlikely place to find gold, but the Baker Party found economical placer deposits on the floor in 1860. The French party traced leftover gold flakes to the Little Giant lode in 1870, which became the first hardrock mine in the San Juans. The Little Giant was located on the left side of the gulch behind the forested slope. Silver Lake Basin lies behind the imposing headwall, and William Henry Jackson captured the south view in September, when lower regions still enjoyed the warmth of summer. Source: U.S. Geological Survey, Jackson, W.H. 482.

Section E 1: Settlement and Establishment of Industry, 1875-1881

Figure E 12: William Henry Jackson took this northeast view of Howardsville in 1874. Howardsville was the county's most important town for several years, and it epitomized the county's formally organized settlements. The business district is at center and a few residences are scattered around. Source: Denver Public Library, Western History Collection, WHJ 1582.

Figure E 13: The south view depicts Eureka during the late 1870s. The town was the commercial center of the Eureka Mining District's southern portion. The town has been formally laid out in a grid of lots and blocks. Source: Denver Public Library, Western History Collection, C-131.

Figure E 14: The Greene Smelter, the county's first functional ore treatment facility, was fundamental to the success of the mining industry. In this late 1870s view, the facility is in full blast. Source: Denver Public Library, Western History Collection, X 61438.

Figure E 15: South overview of Silverton in 1877. By this time, Silverton assumed the role as the county's principal center of commerce, communication, and ore treatment. The Greene Smelter stands at bottom, the Animas River courses beyond town, Kendall Mountain towers on the left, and Sultan Mountain looms at right. Source: Denver Public Library, Western History Collection, X 11384.

Section E 1: Early 1880s Boom: 1882 – 1885

Figure E 16: The New York & San Juan Smelter, also known as the Durango Smelter, offered competitive rates and provided high returns, which rendered marginal grades of ore economical to produce. The facility also undercut Silverton's local smelting industry. Source: Denver Public Library, Western History Collection, Z 4858.

Figure E 17: Although this north view of the North Star Mine's tunnel house was taken around 1900, the building changed little from when engineer Eben Olcott erected it in 1881. The building housed the mine's tunnel portal, blacksmith shop, ore sorting station, and living quarters under one cramped and drafty roof. Source: Denver Public Library, Western History Collection, X 62714.

Figure E 18: For decades, most mining companies relied on pack trains such as this one in Silverton to carry ore down from the mines and haul supplies up. Shipping materials by pack train was costly and consumed much of a mining operation's profits, which provided incentive for the development of a network of wagon roads. Source: Denver Public Library, Western History Collection, X 1769.

Figure E 19: During the early 1880s, a boom in the Red Mountain Mining District, Ouray County, gave rise to Chattanooga. The town was not only gateway to the new district, but also center to a small collection of mines in San Juan County's northwest portion. Source: Denver Public Library, Western History Collection, c-156.

Figure E 20: During the early 1880s, Animas Forks was the eastern gateway into San Juan County, and a commercial and residential center for mines in the northern portion of the Eureka Mining District. The southern view depicts the main street. Source: Denver Public Library, Western History Collection, WHJ-758.

Figure E 21: For much of the county's history, Eureka was the commercial center for the Eureka district's southern portion. In the north view, the two-story building is Henry Helmboldt's mercantile. Helmboldt also ran one of the county's largest meat suppliers. Source: Denver Public Library, Western History Collection, X-6948.

Section E 1: The Value of Silver is Restored: 1890 – 1893

Figure E 22: Otto Mears opened the Standard Smelter in Durango in 1892 primarily to treat pyretic ore from the Red Mountain district in Ouray County. The smelter also accepted similar ore from San Juan County, providing competition for the Durango Smelter. Source: Denver Public Library, Western History Collection, X-61433.

Figure E 23: This northwest view depicts Edward Stoiber's Silver Lake Mine in 1890 or 1891. Stoiber recently finished the mill, center, a boardinghouse adjacent and right, and two shaft houses at upper left. The long chute at left delivered ore from a mid-level tunnel. The skiff floats on Silver Lake, which was a glacial tarn in an austere basin above treeline. The man on the bow is probably Edward Stoiber, and he is accompanied by engineers. Source: Colorado Historical Society, CHS X 7880.

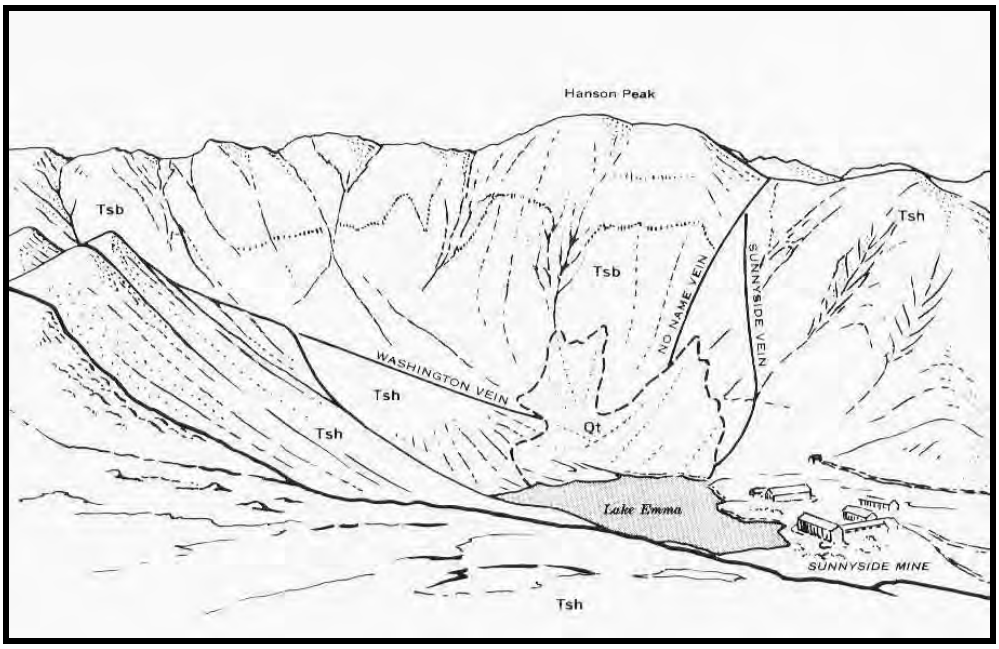


Figure E 24: The line drawing is a north view of Lake Emma, the Sunnyside Mine, and the principal veins that interested owner John H. Terry. Over time, Terry acquired rights to the veins and developed the Sunnyside into one of the county's most important producers. Source, Burbank, 1947:57.

Figure E 25: The North Star Mine, at the base of Sultan Mountain, was among the county's most important producers during the early 1890s. The operation was one of three major mines on the west edge of Silverton. Source: Denver Public Library, Western History Collection, X-62266.

Section E 1: The Silver Crash: 1894 – 1897

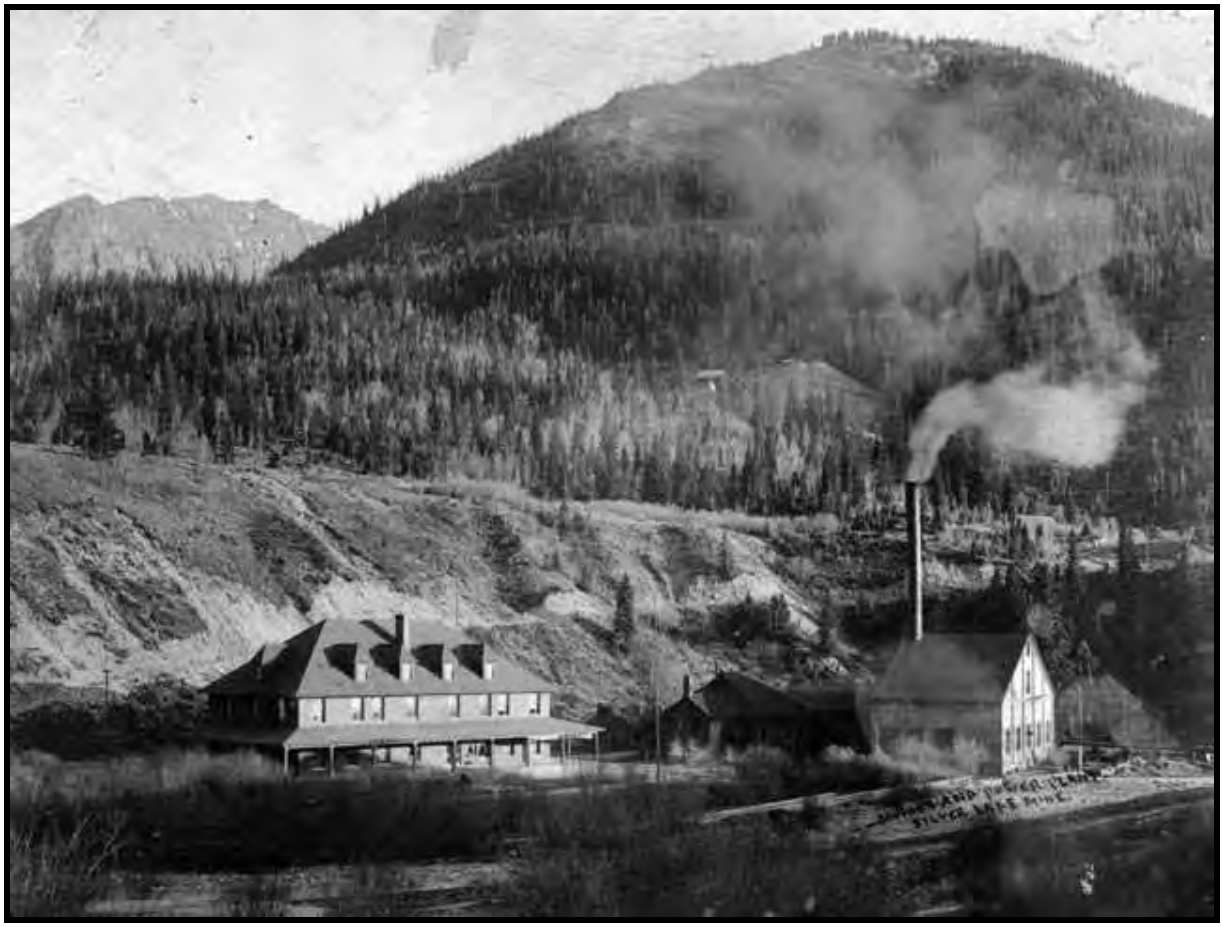


Figure E 26: In 1895, Edward Stoiber built Waldheim as the nerve center for his Silver Lake Mines Company. The buildings at right are what some engineers claimed was the most advanced private AC current powerhouse of its time, and Stoiber's mansion at left was among the largest in the San Juans. Although AC current technology was still in an experimental state, Stoiber chose AC because, unlike DC current, it could be transmitted up to the Silver Lake and Iowa mines in Silver Lake Basin. Source: Denver Public Library, Western History Collection, X-62272.

Figure E 27: The south view depicts the Iowa Mine in 1898 during a rare calm day in Silver Lake Basin. At this time, the Iowa ranked among the county's most important mines. The buildings at left were a compressor house and tram terminal, and the long structure at the upper right enclosed shops and the portal of the Iowa Tunnel. Source: Denver Public Library, Western History Collection, X 62274.

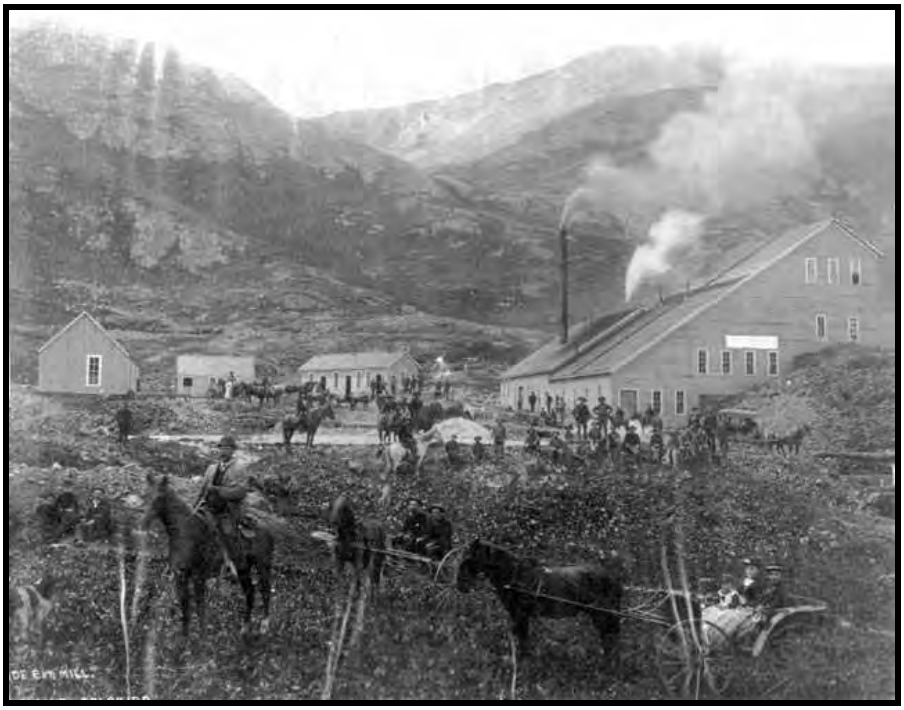


Figure E 28: In this southwest view of the Sunnyside Extension Mine, the main tunnel is at left and the mill built in 1890 stands at right. The operation was above treeline at the head of Placer Gulch. Source: Denver Public Library, Western History Collection, X 62199.

Section E 1: The Great Mining Revival: 1898 – 1910

Figure E 29: By the late 1890s, Edward and Gustavus Stoiber transformed Silver Lake Basin into an industrial landscape. The Silver Lake Mine is right of center, the Iowa Mine is on the mountainside behind, and the roofs of boardinghouses for a workforce in the hundreds are prominent. The edifice near center was a five-story boardinghouse with steam heat, hot showers, and toilets, which was rare for the era. Source: Denver Public Library, Western History Collection, X 62273.

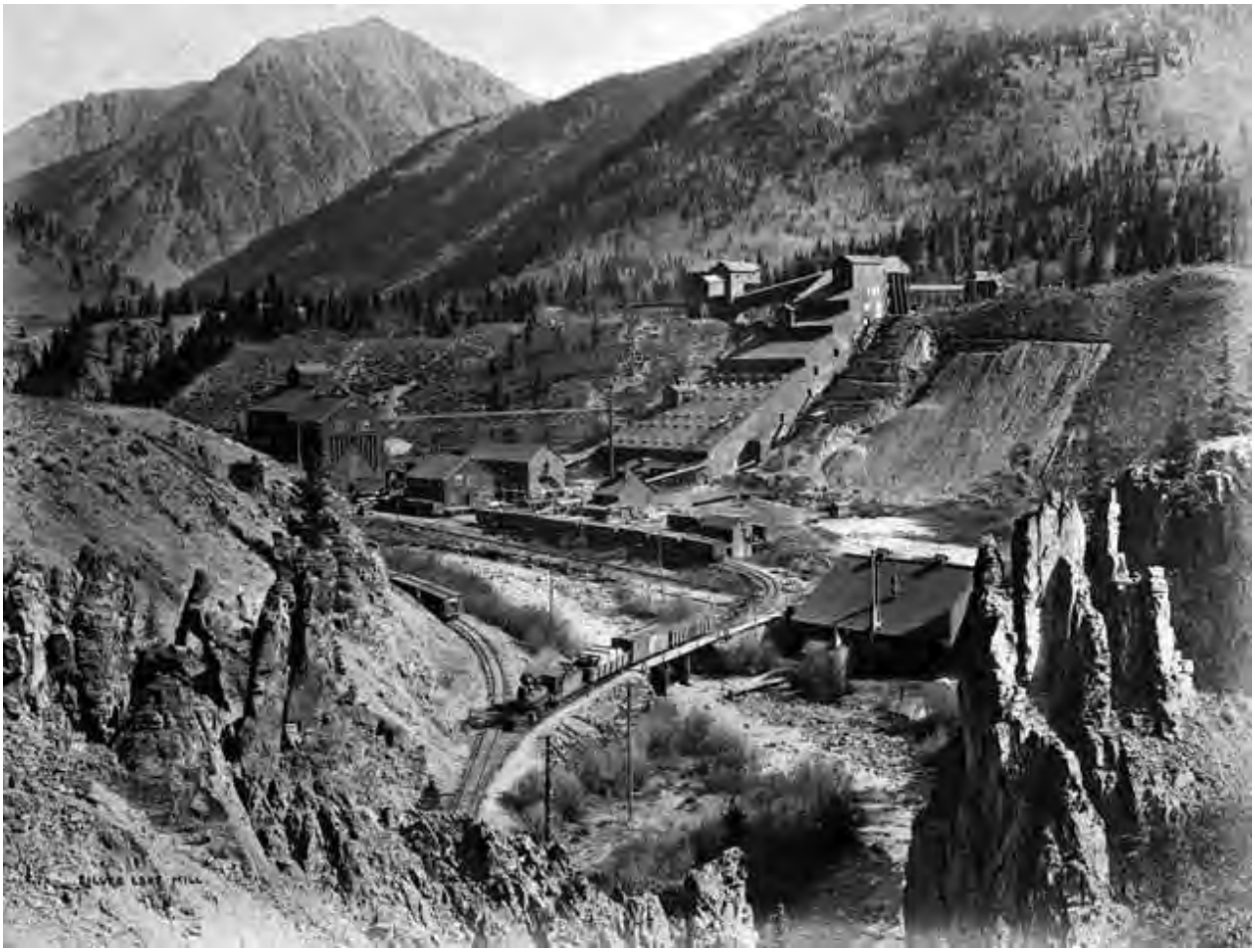


Figure E 30: Edward Stoiber designed the sprawling Silver Lake Mill, built on the Animas River in 1900. Because Stoiber was one of Otto Mears' best customers and invested in Mears' Silverton Northern Railroad, Mears provided the mill with direct rail service. At far left stands the ore bins and tram terminal of a loading station erected during the 1890s, prior to the mill. The small building with tall smokestack at photo-center was an electrical powerhouse, and the complex building to the left of the mill's head was a new tram terminal that received and crushed ore. Note how the mill building fans out to accommodate the increased number of concentration machines for each processing stage. The facility had a capacity of 1,000 tons of ore per day and ranked among the state's largest. In later years, the mill played an important role in the county because it accepted custom ores from independent mines. Source: Denver Public Library, Western History Collection, X 62275.

Figure E 31: The Iowa Mill was not as complex as the Silver Lake facility, but it was vital to the mines in Silver Lake Basin. The south view depicts the Iowa Mill, Arrastra Gulch's imposing headwall, and the confusion of tram towers in the gulch around 1900. The towers in the left background descended from the Iowa and Silver Lake mines, located above and beyond the headwall, and the tower at right carried the Unity Tunnel tramway. The cupola on top of the mill was a terminal for yet another tramway that carried finished concentrates down to a station on the Animas River. Source: Denver Public Library, Western History Collection, Z 2560.

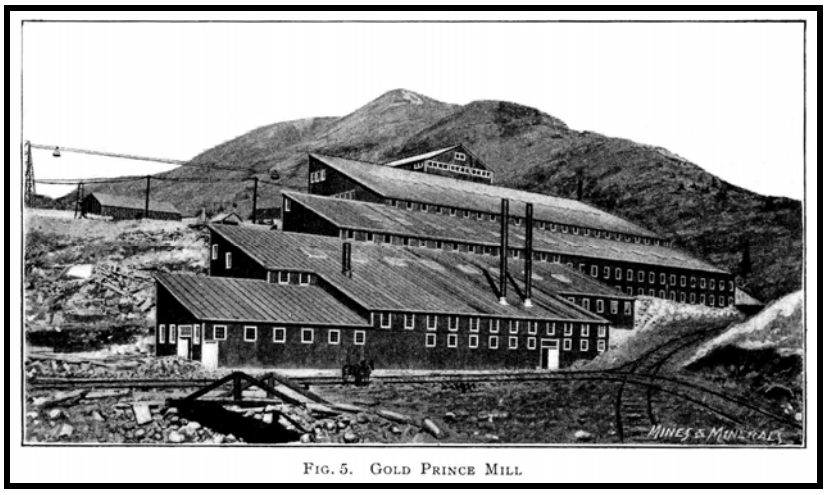


FIG. 5. GOLD PRINCE MILL

Figure E 32: In 1904, the Gold Prince Mines Company erected one of Colorado's largest and most advanced mills at Animas Forks. The mill featured structural innovations and could treat 500 tons of ore per day. Although the process was based on science, the mill was unable to recover enough metals to remain economical. As a result of this and bankruptcy of its owners, the mill was a costly failure. Source: *Mining Reporter* 54:386-389.

Figure E 33: During the early 1900s, the Little Dora complex was a component of the Hercules Consolidated Mining Company, which also operated the Hercules Mine and Mill, not shown. The complex includes the Little Dora Mill, shops, and tunnel above the mill. The operation was on the west outskirts of Silverton and one of the most successful in the Mineral Creek district. Source: Denver Public Library, Western History Collection, X 62191.

Figure E 34: Primarily through Denver mining investor Mary B. Murrell, the Gold Tunnel & Railway Company brought the Highland Mary Mine into its first meaningful production and built this mill in 1902. The large waste rock dump came out of the Innis Tunnel, located at right. The head of Cunningham Gulch rises in the background, and the roof of Edward Innis old Whitehouse can be seen at the end of the water pipe. Source: Denver Public Library, Western History Collection, X 62209.

Section E 1: World War I Revival: 1915 – 1920

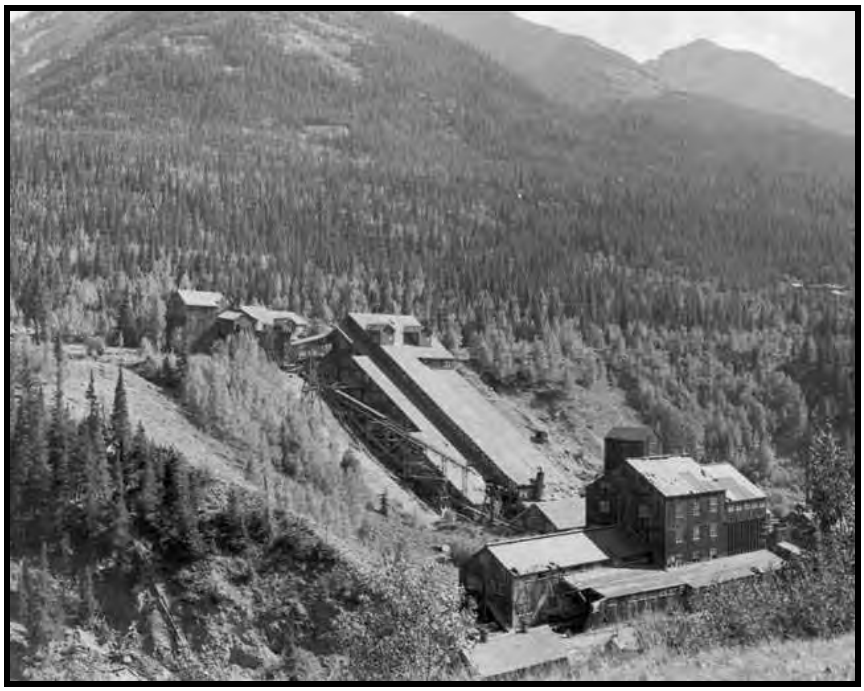


Figure E 35: When the Silver Lake Mill burned in 1906, the American Smelting & Refining Company built a replacement. The fire spared the 1898 ore storage structure at lower right, visible in Figure E 30. The new mill was smaller than Edward Stoiber's 1900 version. The Silver Lake Mine no longer provided ore by the mid-1910s, forcing the mill to run custom payrock from local companies. The mill played an important role in this capacity. Source: Denver Public Library, Western History Collection, X 62198.

Figure E 36: Peter Orella's tram terminal at the Big Giant Mine still stands. Miners input payrock into the structure from the trestle at left. A second tramway carried North Star Mill tailings down from Little Giant Basin and entered the double doorway in the cupola. The tram mechanism was located in the large room at the structure's bottom. Source: Author.

Section E 1: Great Depression Era Revival: 1933 – 1939

Figure E 37: By the early 1930s, the Highland Mary Mill appeared worn and battered. The structure, erected over the ruins of the original mining operation, was typical of such facilities during the Great Depression. And yet, the Highland Mary and similar mines were important for their economic contributions and employment. Source: Denver Public Library, Western History Collection, X 62206.

Figure E 38: The Mayflower Mine, at the base of the cliff at center, was the leading mine in San Juan County from the late 1920s until closure in 1954. The surface facilities included a five-story boardinghouse, the upper terminal for a tramway, and shops. The tramway carried ore down to the Mayflower Mill on the Animas River. The operation was the county's economic cornerstone and largest employer. Source: Denver Public Library, Western History Collection, X 62245.

Section E 2: Mining and Milling Methods, Technology, and Equipment

The Mine Shop

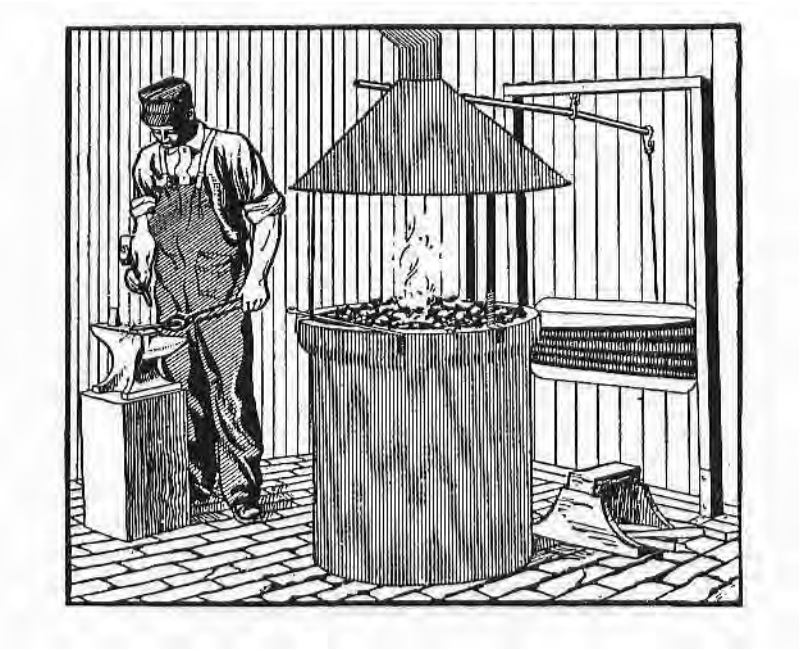


Figure E 39: The illustrated shop is representative of those at prospects and small mines. Such shops usually consisted of little more than a forge, an anvil, and hand-tools, which restricted work to drill-steel sharpening and the manufacture of light hardware. Source: Drew, 1910:1.

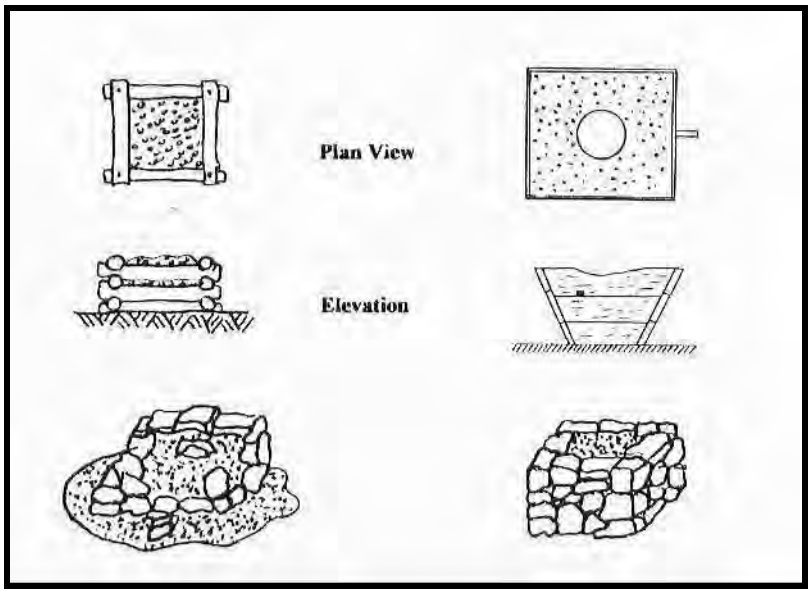


Figure E 40: Above are examples of the common forges used in blacksmith shops. At upper left is a gravel-filled log forge, at right is a wood box forge, and at lower right is a dry-laid rock forge. Over time, rock forges decay and collapse, and manifest as the remnant at lower left. Source: Eric Twitty.

Mine Ventilation

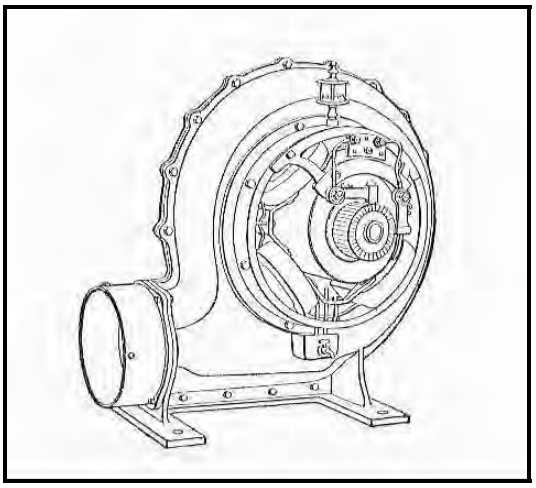


Figure E 41: At right is a common ventilation blower used to force fresh air underground. Ducting was fastened to the nozzle, and a belt turned the machine. Source: International Text Book Company, 1899, A41:146.

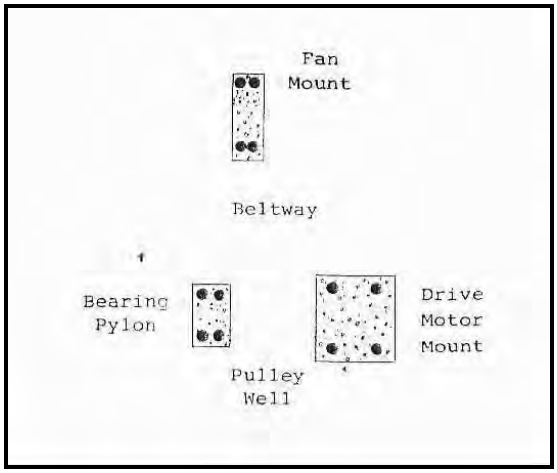


Figure E 42: The plan view at left depicts a typical concrete foundation for a ventilation blower and its drive motor. Source: Eric Twitty.

Shaft Form and Hoisting Vehicles

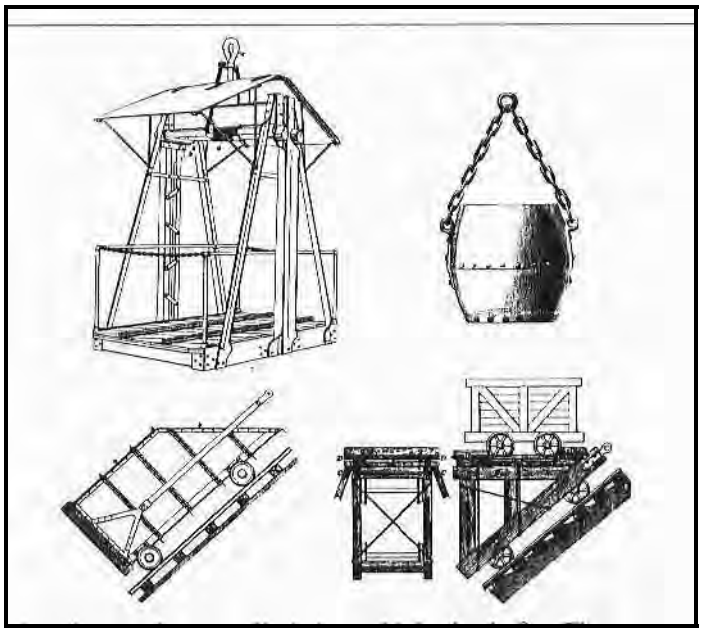


Figure E 43: Mining companies employed several types of hoisting vehicles in shafts. The cage at upper left, popular from the 1870s through the 1930s, ran on guide rails and carried miners or an ore car. The sinking bucket at upper right required no rails and was common among small operations. The skip at lower left was popular in both vertical and inclined shafts by the 1900s. It ran on rails and required guides in the headframe to empty. At lower right is a vehicle for inclined shafts that became obsolete by the 1900s. Source: Twitty: 2002:151.

Figure E 44: When intact, shafts often are divided into several compartments for hoisting and egress. The collars are usually timbered to retain loose material, and are flush with the surrounding ground. Intact examples are rare and important engineering resources. Source: Eric Twitty.

Hoists

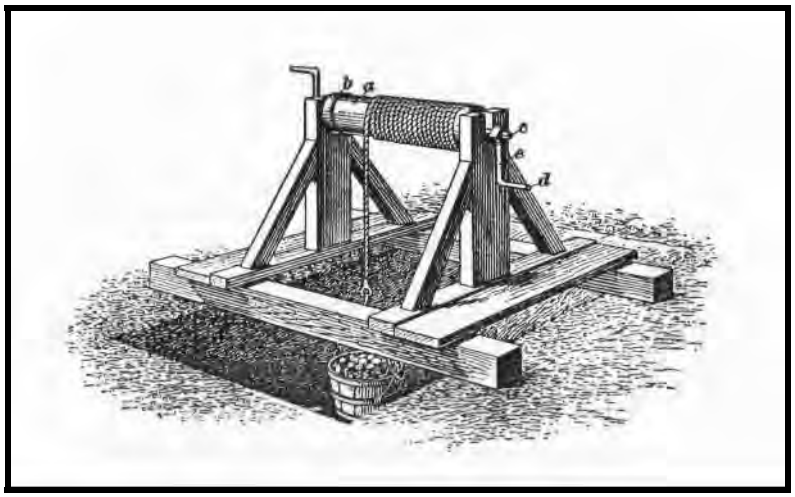


Figure E 45: The windlass was an institution among prospectors, and nearly all shafts less than 100 feet deep were equipped with this simple, inexpensive, and portable type of hoist. Source: Twitty, 2002:145.

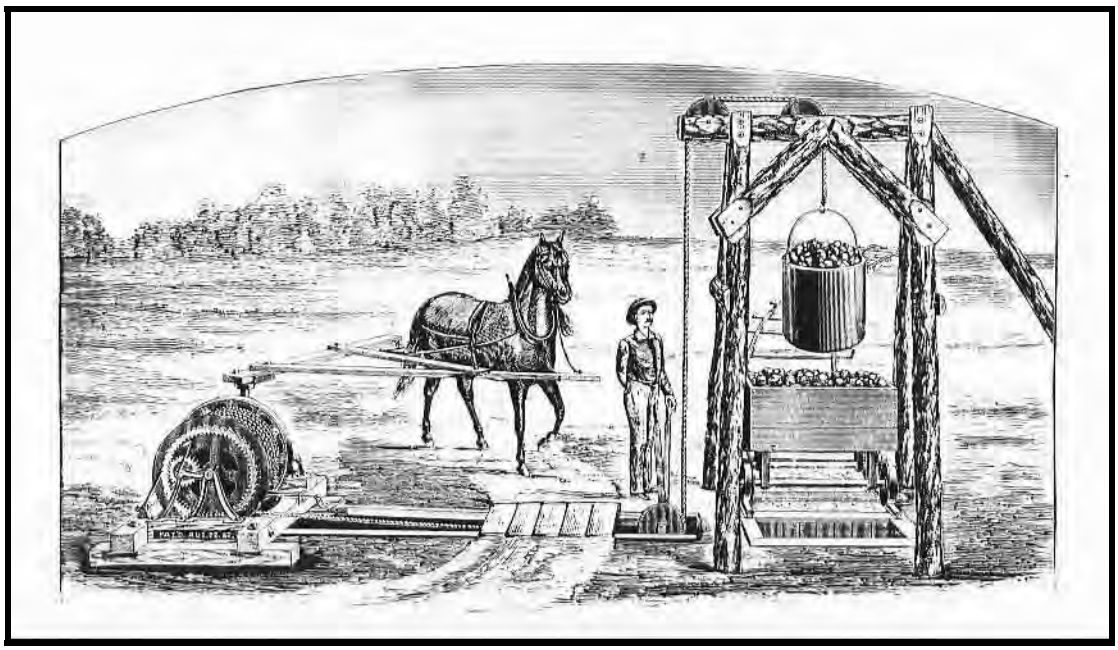


Figure E 46: Horse whims were the most primitive type of mechanical hoist, and were a favorite among prospectors because of their simplicity and portability. The unit shown is a geared whim, which was popular from the 1880s through the 1910s. The hoist operator controlled a brake and clutch via levers mounted to the shaft collar. The control linkages and hoist cable passed through the trench. Source: Ingersoll Rock Drill Company, 1887:60.

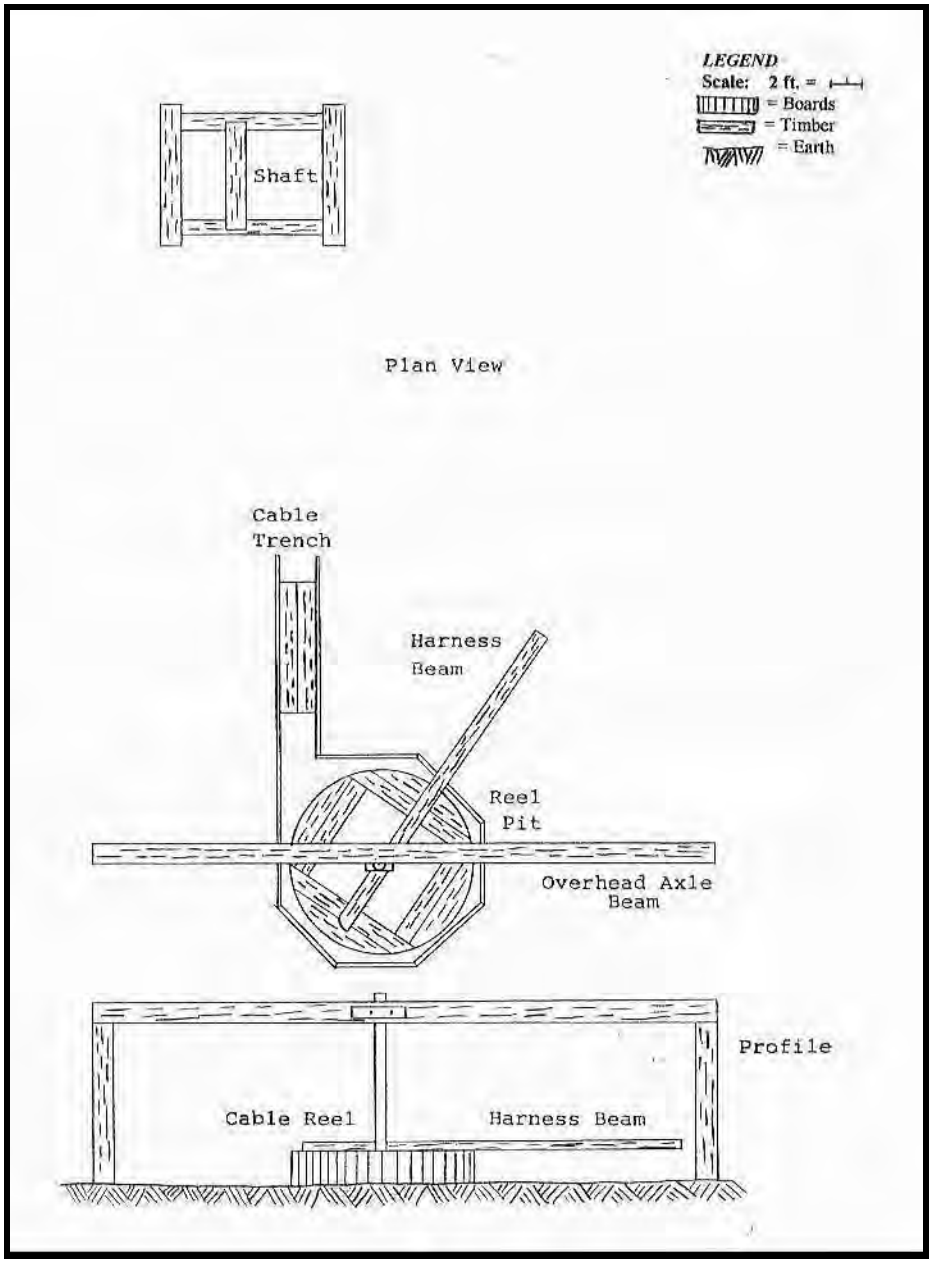


Figure E 47: The plan view, top, and elevation, bottom, depict a horizontal reel horse whim, which was a universal prospecting hoist prior to the 1880s. The reel was mounted to an axle on a timber footer buried in the floor of a plank-lined pit. Usually, only the pit and cable trench remain at prospect shaft sites today. Source: Eric Twitty.

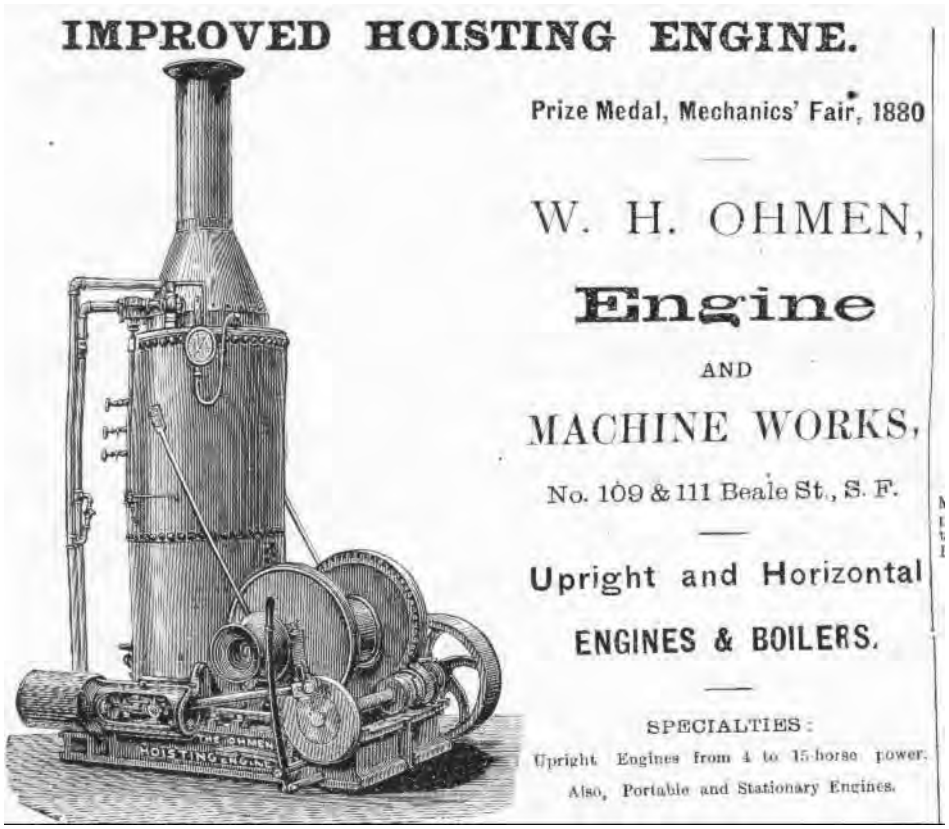


Figure E 48: Donkey hoists were popular for deep prospecting after the 1880s because they were self-contained and required little site preparation other than a flat area. Source: *Mining & Scientific Press* 1881.

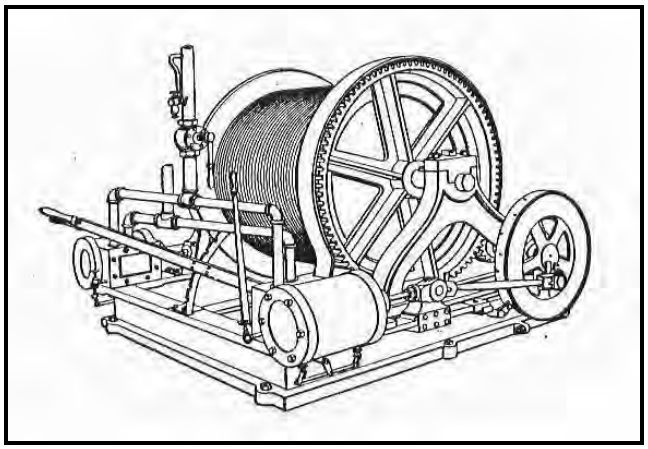


Figure E 49: Single-drum geared steam hoists were the most common power type between the 1870s and 1910s. Gasoline and electric models became popular afterward. Source: International Text Book Company, 1906, A50:8.

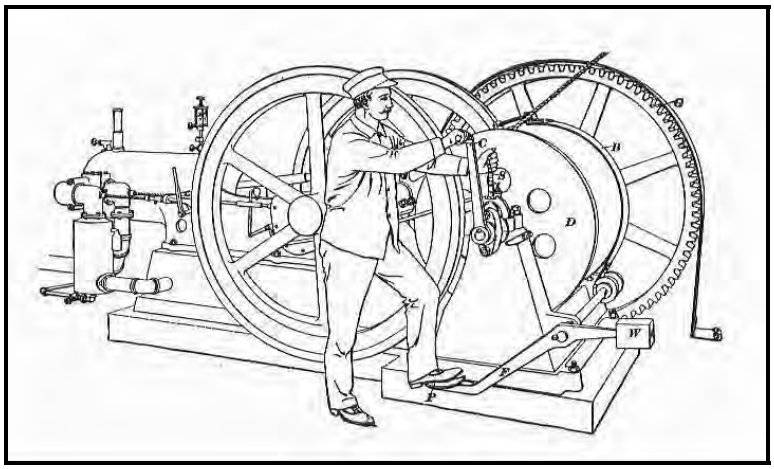


Figure E 50: This type of gasoline hoist was employed for deep prospecting and minor ore production between around 1900 and 1930. A single-cylinder engine is at left, dual flywheels are at center, and the cable drum is at right. Source: International Textbook Company, 1906, A50:31.

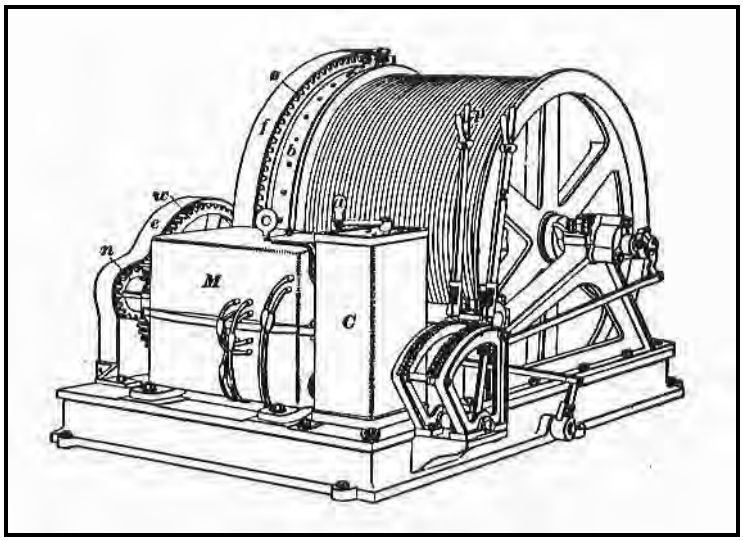


Figure E 51: The single-drum electric hoist grew in popularity during the 1910s where power was available. The motor is in the case in front, drive gearing is at left, and the upright box is a speed controller. Source: Twitty, 2002:224.

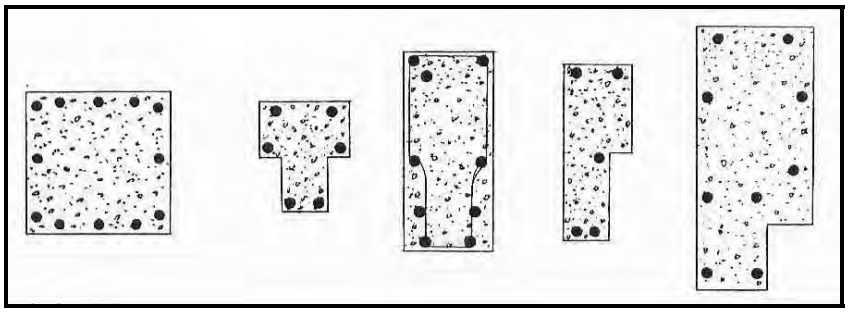


Figure E 52: Hoist foundation plan views. Single-drum steam and electric hoists were bolted to foundations like the one at left, and the other foundations were for various types of gasoline hoists. Source: Twitty, 2002:187, 241.

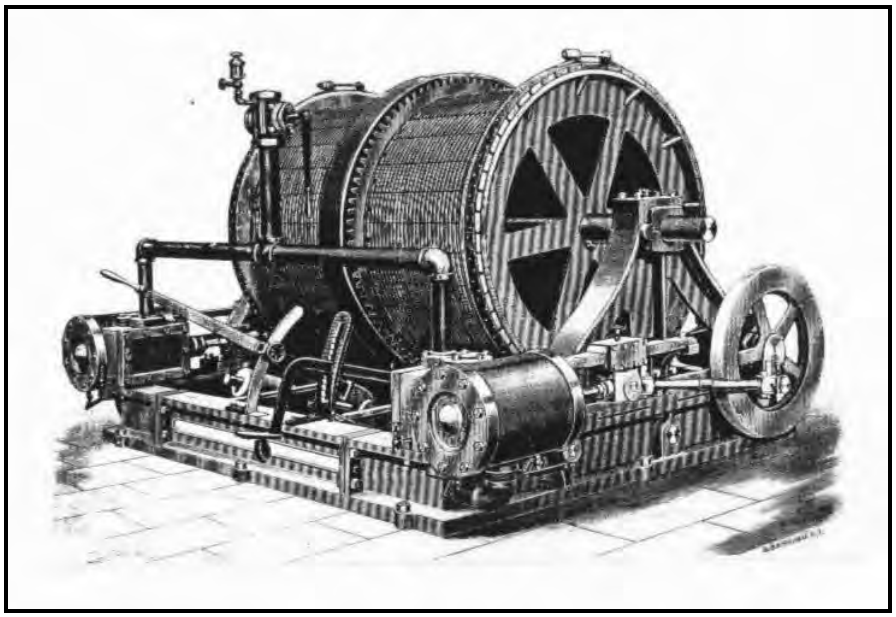


Figure E 53: Rear quarterview of a geared double-drum steam hoist. Double-drum hoists, hallmarks of significant ore production, achieved balanced hoisting with two vehicles. Source: Ingersoll Rock Drill Company, 1887:65.

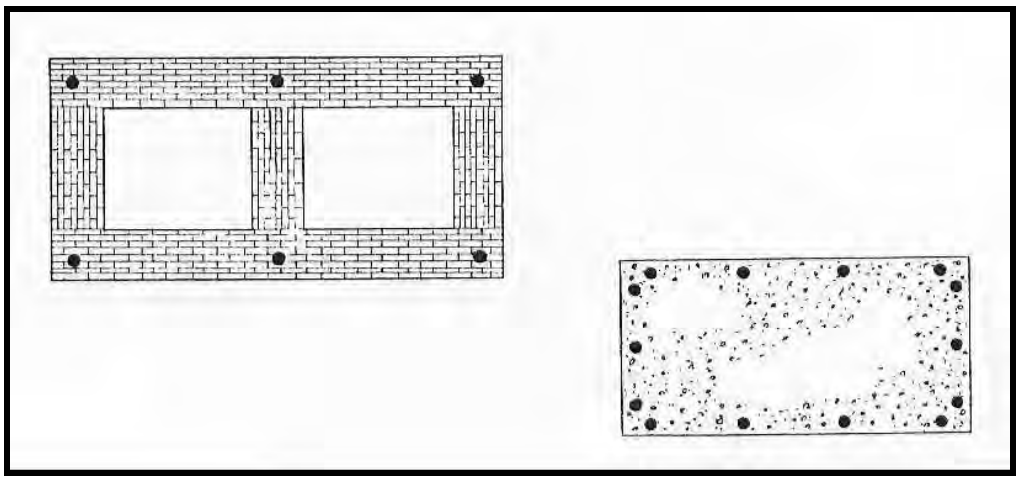


Figure E 54: The plan views depict foundations for geared double-drum steam hoists. The foundation at left features wells for the hoist's cable drums. Source: Eric Twitty.

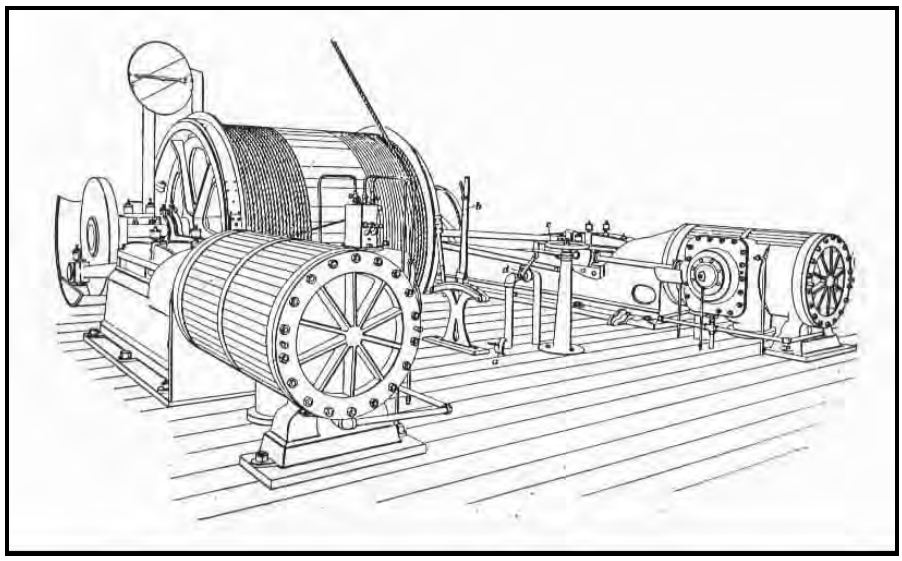


Figure E 55: Rear quarterview of a direct-drive single-drum steam hoist. Powerful steam cylinders flank the hoist's controls, and the drive-rods are directly coupled to the cable drum. Source: International Text Book Company, 1906, A50:16.

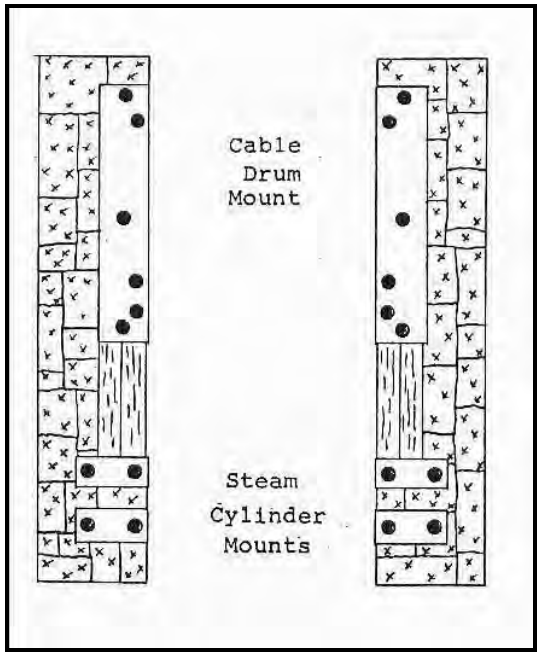


Figure E 56: The plan view depicts a typical foundation for a direct-drive single-drum steam hoist. Such foundations are usually less than 14 by 17 feet in area. Source: Eric Twitty.

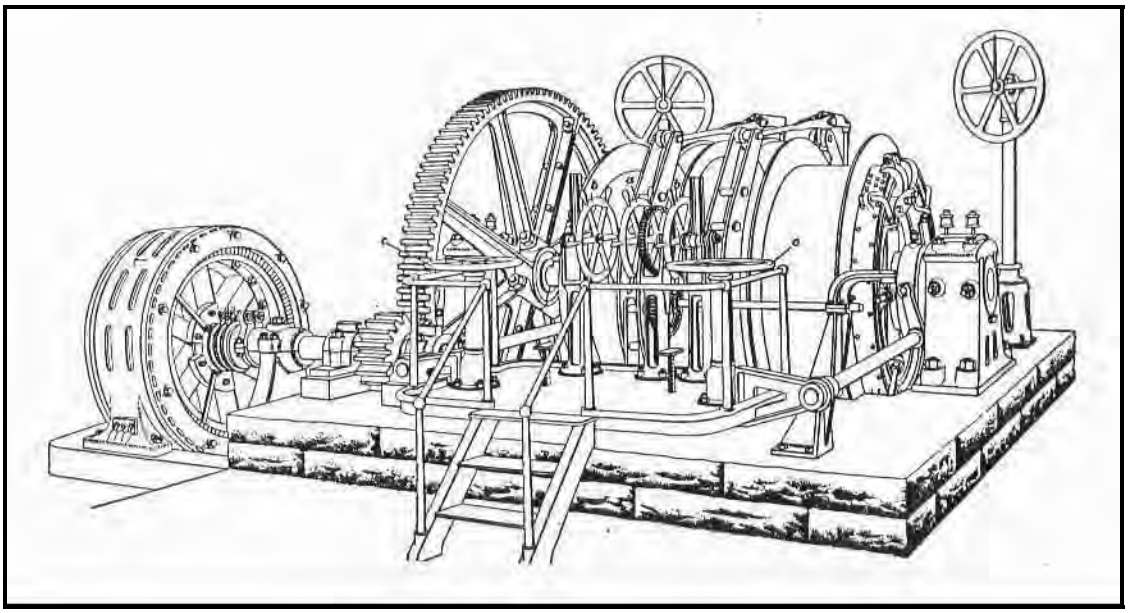


Figure E 57: Rear quarterview of a double-drum electric hoist. The motor at left drove the dual cable drums via the large bull gear. Such hoists facilitated heavy production, saw use after the 1910s, and were popular among well-capitalized companies by the 1930s. Note the foundation. Source: International Textbook Company, 1906, A50:40.

Steam Boilers

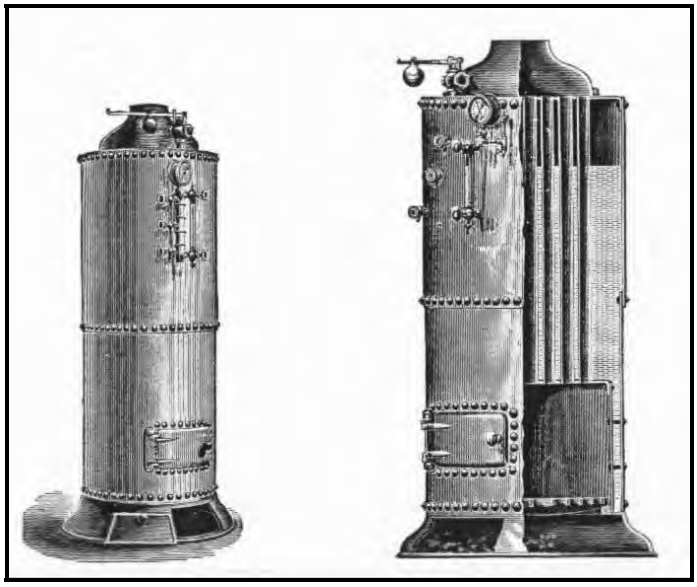


Figure E 58: Upright boilers were the least expensive and most portable type of boiler, but also inefficient. Flue gases rose from the firebox at bottom, through the flue tubes, and out a smokestack at top. Note the water level sight tube, pressure gauge, and pressure valve. Source: Rand Drill Company, 1886:47.

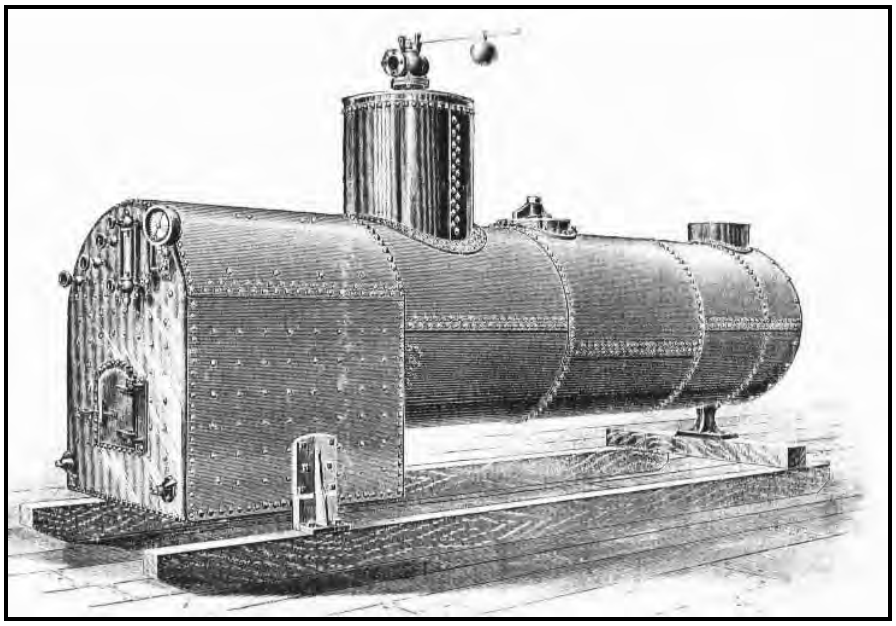


Figure E 59: The locomotive boiler was one of the most popular steam generators. Flue gases traveled from the firebox at left through flue tubes in the tank and out a smokestack at right. Source: Rand Drill Company, 1886:45.

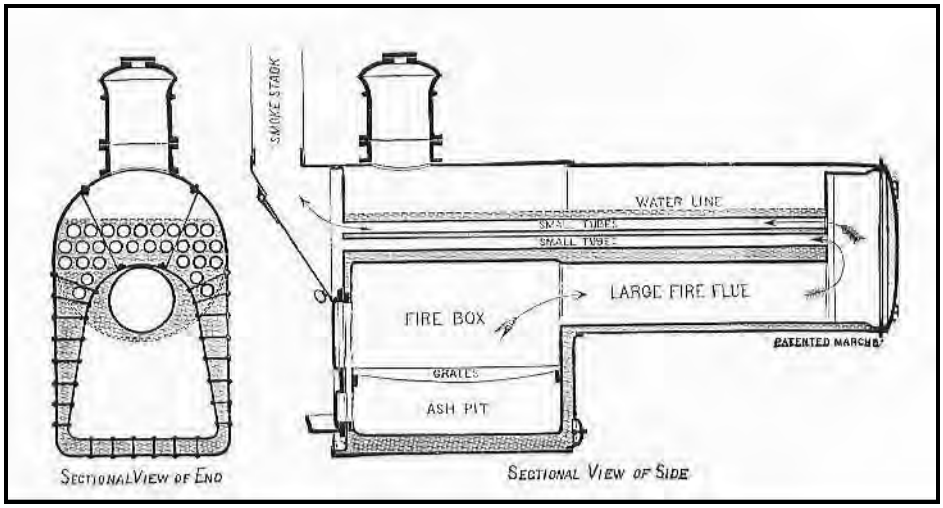


Figure E 60: The Pennsylvania boiler was portable, stood on skids, and provided greater fuel economy than the locomotive type. Note the path traveled by the flue gases, which prolonged contact with the boiler surfaces. Source: Rand Drill Company, 1886:46.

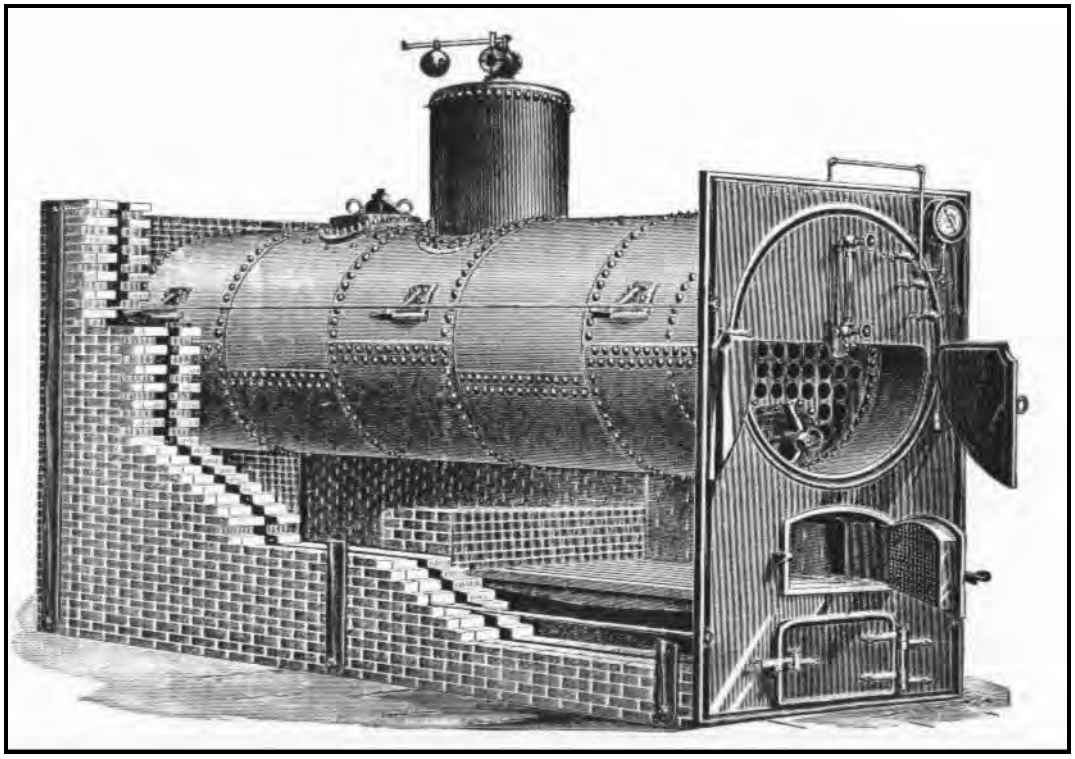


Figure E 61: The return-tube boiler was the most popular industrial steam generator prior to the widespread embrace of electricity. The unit consisted of an iron shell, a masonry setting, and a cast iron façade. Flue gases traveled from the firebox behind the façade and under the shell. The gases rose into a smoke chamber at rear, reversed direction and returned through the flue tubes perforating the shell, and escaped out a smokestack over the façade. The top doors permitted workers to swab out the flue tubes. Source: Rand Drill Company, 1886:44.

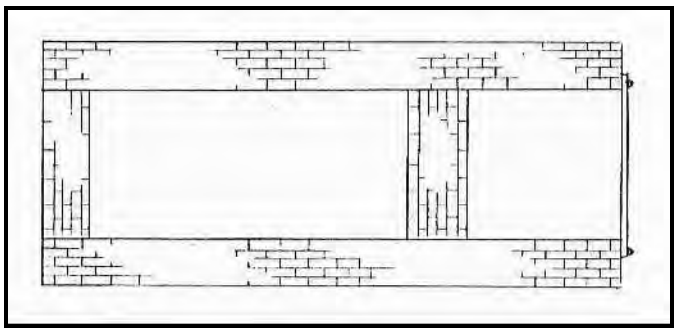


Figure E 62: Few return-tube boilers currently remain intact and have been reduced to setting remnants and foundations, such as the one in the plan view. Source: Twitty, 2002:145.

Headframes

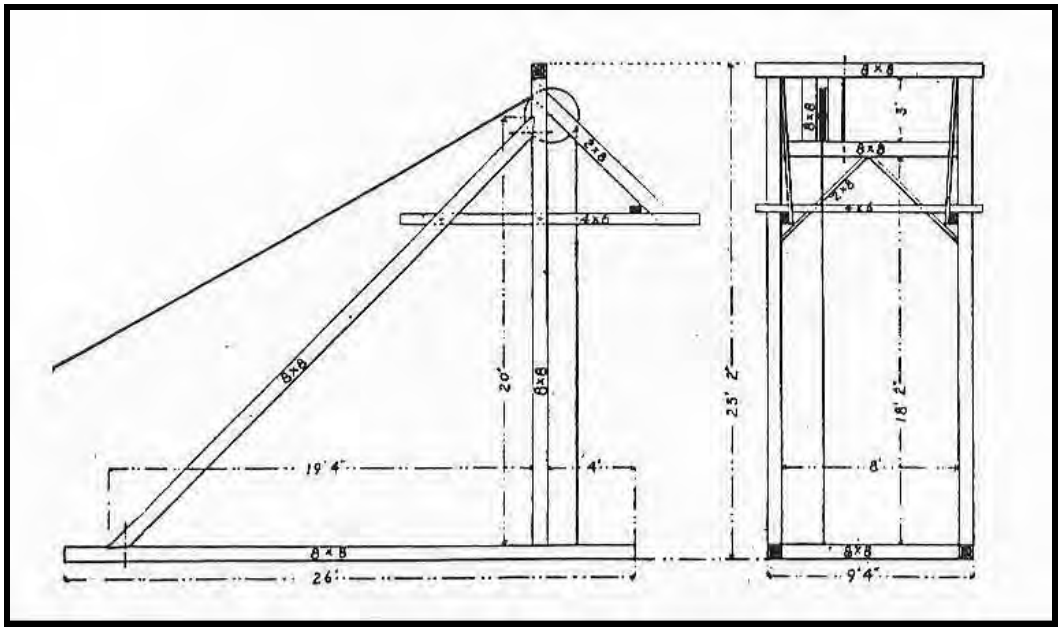


Figure E 63: The two-post gallows headframe was the most common type for prospect shafts. Sinking-class versions were less than 25 feet high and stood on timber footers. Source: *Engineering & Mining Journal* 3/7/03 p366.

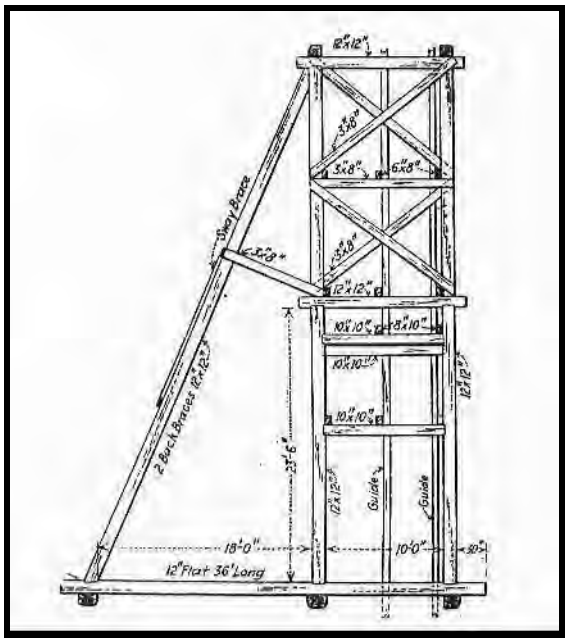


Figure E 64: The headframe at left is a four-post derrick type. Production-class headframes such as the one illustrated tend to be higher than 25 feet. Source: *Engineering & Mining Journal* 12/28/17 p1216.

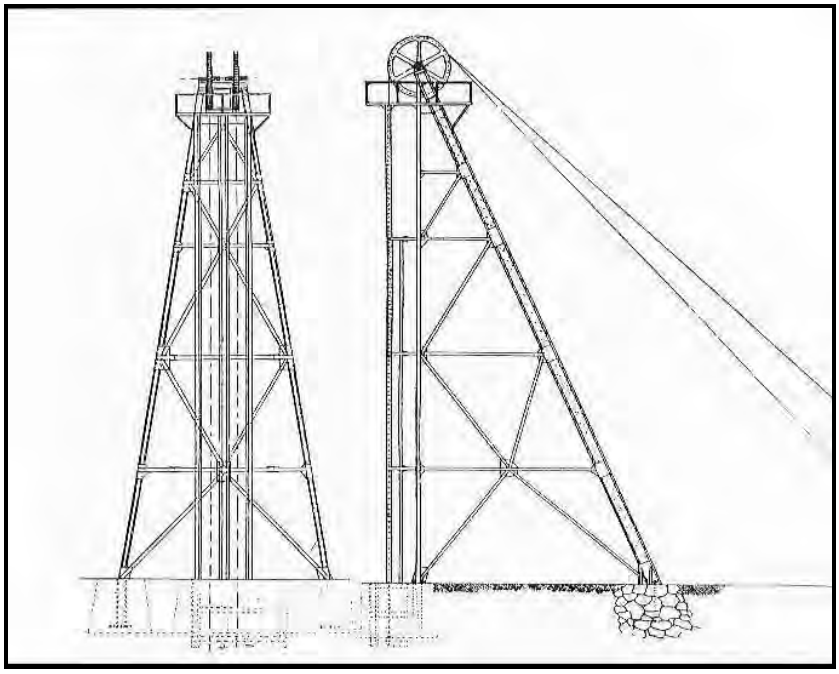


Figure E 65: The illustrated headframe is a production-class two-post gallows structure known as a Montana type. These headframes were usually tall, well-built, and stood over deep shafts. Source: Twitty, 2002:233.

Air Compressors

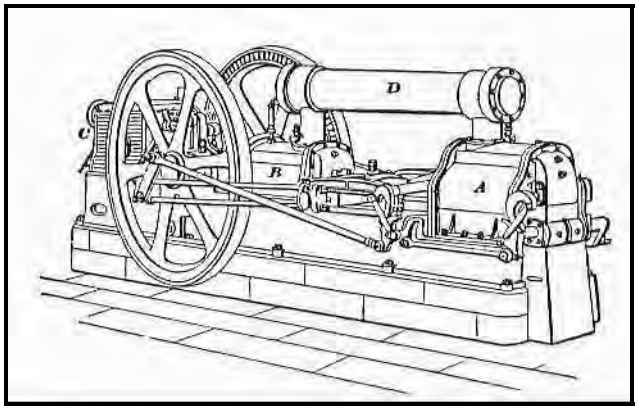


Figure E 66: The line drawing depicts a straight-line steam compressor that provided two stages of compression. One compression cylinder is at right, another is at center, and the steam drive cylinder is at left. The flywheels imparted momentum to the machine. Source: International Textbook Company, 1899, A20:32.

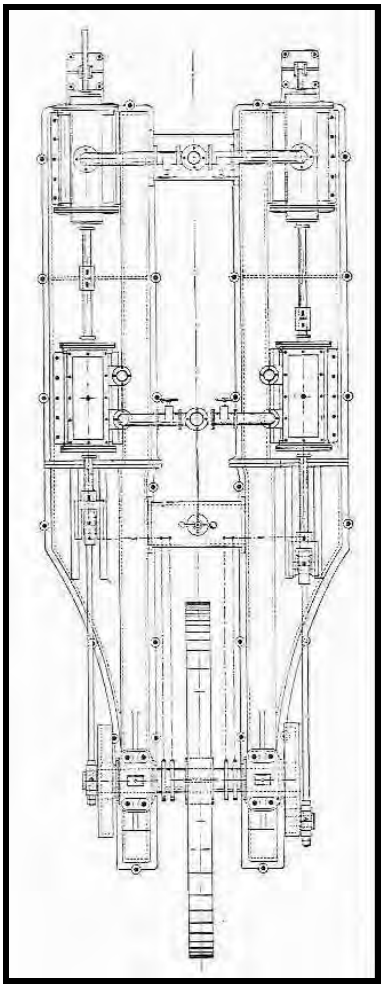


Figure E 67: The plan view shows a typical pre-1910 duplex steam compressor. The compression cylinders are at top, the steam drive cylinders are at center, and the flywheel is at bottom. Source: Ingersoll Rock Drill Company, 1887:34.

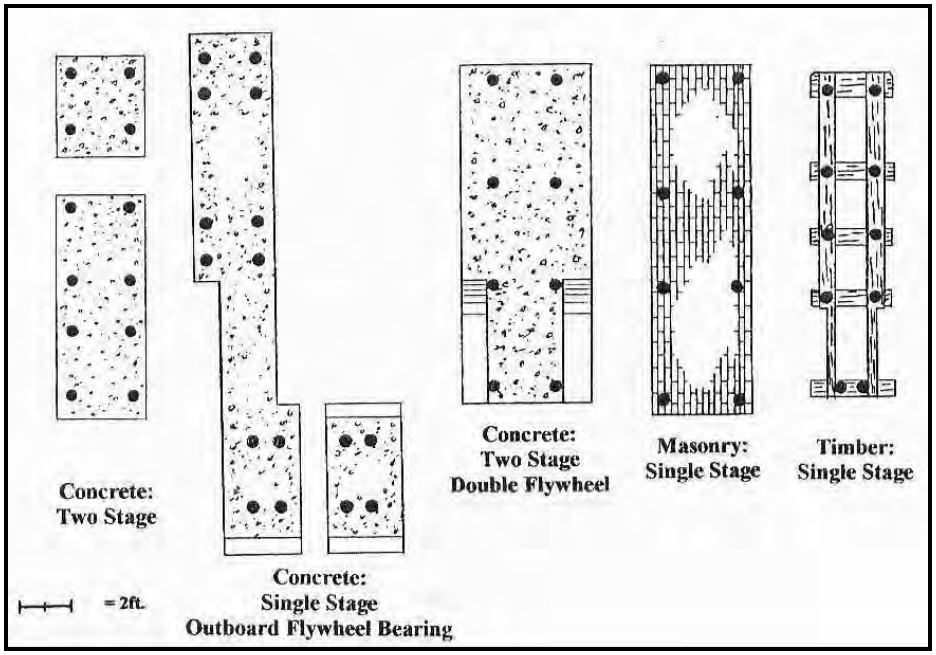


Figure E 68: The plan view depicts foundations for straight-line compressors. Source: Eric Twitty.

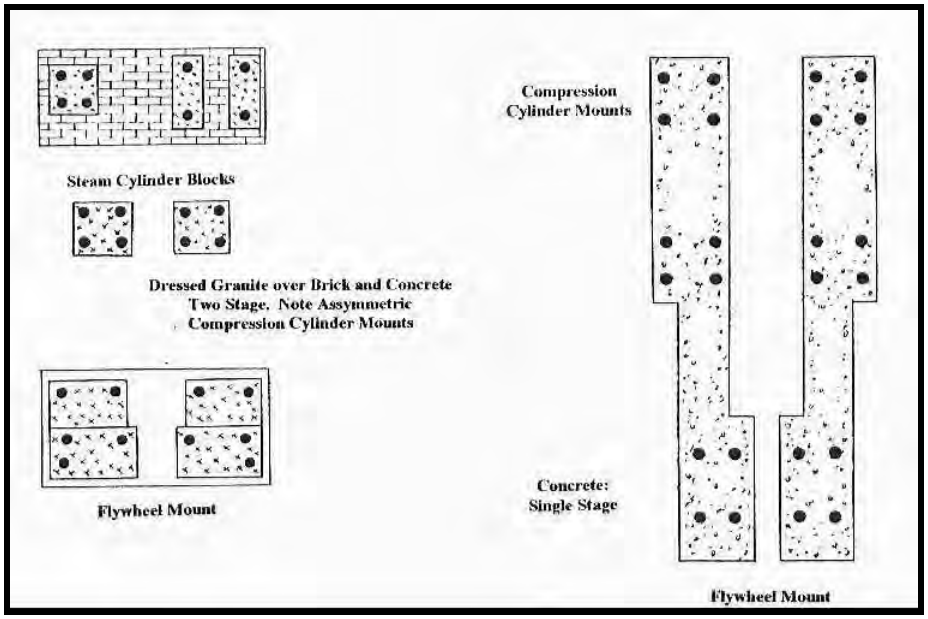


Figure E 69: The plan views portray two common foundations for duplex steam compressors. The foundation at right was for a machine like the one in Figure E 67, and the foundation at left anchored a compressor with compound action. Source: Eric Twitty.

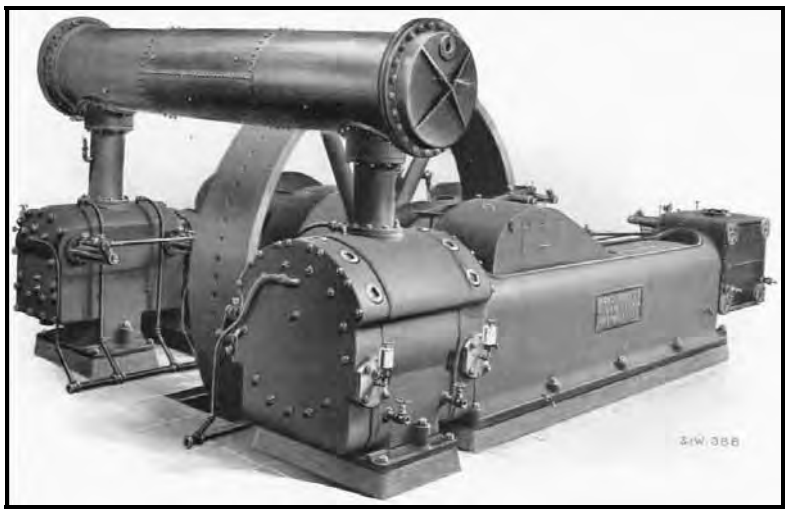


Figure E 70: During the 1890s, the above form of duplex compressor became popular. Originally, these machines were powered by steam, and by the 1900s, some were also belted to motors where electricity was available. Source: Rand Drill Company, 1904:12.

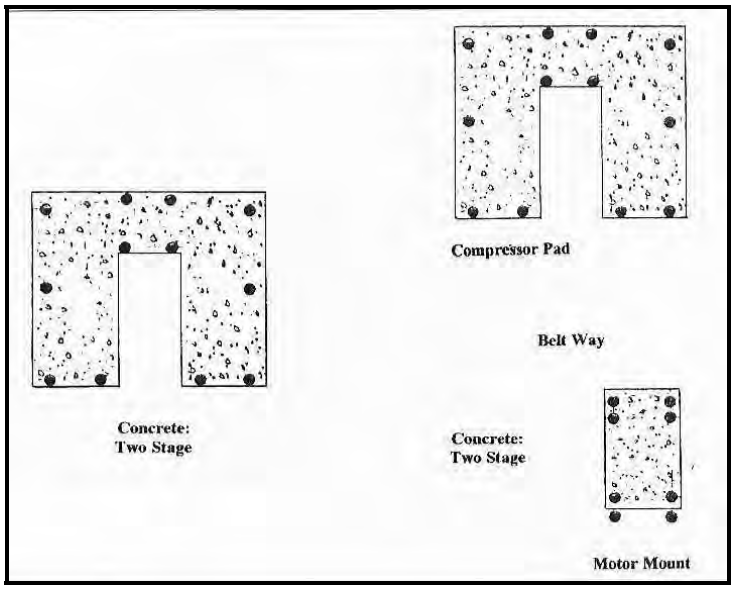


Figure E 71: Compact duplex compressors were mounted to foundations like those in the above plan view. The foundation at left anchored a steam-powered unit, and the one at right was for a belted version, which became popular by the 1910s. Source: Twitty, 2002:109.

Figure E 72: The V-cylinder compressor, similar to a large engine, became one of the most popular compressor types during the 1930s. Note the foundation. Source: Eric Twitty.

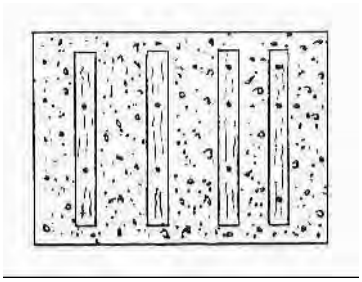


Figure E 73: The illustration at left is a plan view for a V-cylinder compressor foundation (see Figure E 72). Timber footers are embedded in a concrete rectangle around 3 by 4 feet in area. Source: Eric Twitty.

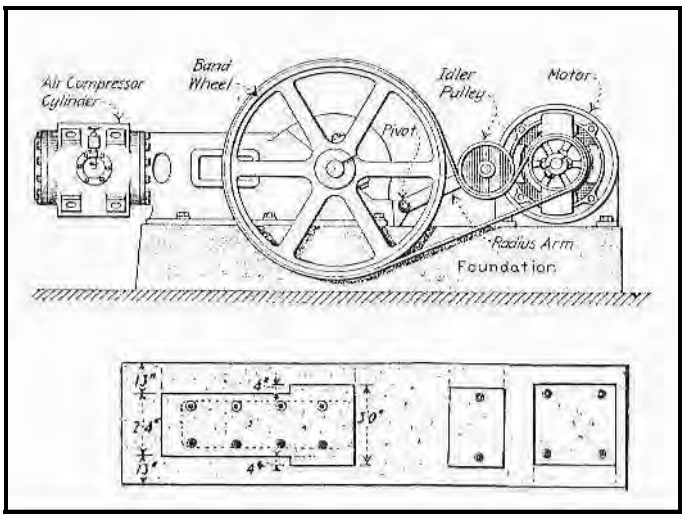


Figure E 74: The profile illustrates the type of small, belted compressor popular between the 1910s and 1940s. The plan view shows the foundation, which features mounts for the compressor and motor. Source: Eric Twitty.

Architecture

Figure E 75: The buildings at the North Star Mine, on Sultan Mountain in 1885, are typical of vernacular architecture specific to the mining industry. The building at left is a tunnel house enclosing a blacksmith shop, and the building at right is an ore sorting house. The buildings were probably custom-designed on-site by a company official for function and economy, rather than for appearance. The steep roofs are an adaptation to the heavy snows of San Juan County. The log cribbing was a structure designed to be filled with waste rock for a larger level area on the steep mountainside. Source: Denver Public Library, Western History Collection, X4570.

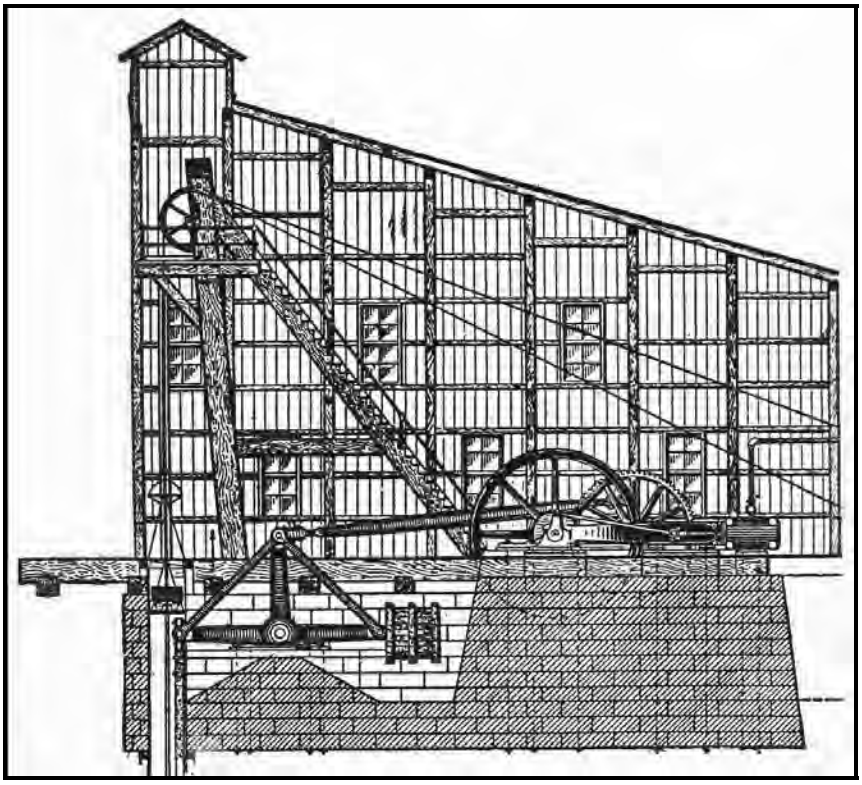


Figure E 76: Shaft houses enclosed the shaft collar, headframe, hoist, power system, and usually the blacksmith shop. The shaft house in the profile also features a Cornish pump and steam engine, rarely used in San Juan County. Source: International Textbook Company, 1899, A43:3.

Figure E 77: After shaft houses were outlawed during the 1910s, mining companies erected hoist houses to enclose critical facilities. In this example dating to the 1930s, the left roofline features an angled cupola for the hoist cable, which ascended to a headframe left and out of view. Source: Eric Twitty.

Aerial Tramways

Figure E 78: Aerial tramways played a significant role in the success of mining in San Juan County. They allowed many companies to overcome difficult terrain and ship high volumes of ore from remote locations. Without tramways, transportation costs would have been too high. The photo illustrates the Bleichert system that descended from the Iowa Mine to the mill, background. In the Bleichert system, the buckets coasted over a stationary track cable fixed to the tower top, and were pulled by a second, lower traction cable. Note the cross-member and rollers for the traction cable. The tower is a pyramid type, the most common in the county. Source: Denver Public Library, Western History Collection, X-62249

Figure E 79: The Bleichert tramway was a distinct system in many regards. Its buckets could be detached from the traction cable once in the terminal and moved at leisure. This increased efficiency and capacity, and decreased spillage. During the 1930s, Mayflower Mill workers receive a full bucket. The bracket suspended at upper center automatically released the bucket from the cable. Source: Denver Public Library, Western History Collection, X-62255.

Figure E 80: The through-type was the second most popular tower design in San Juan County. The structure was stout, resisted horizontal stresses, and even withstood minor avalanches. Intact towers such as this on the Gold Prince system are rare and important engineered structures. Source: Eric Twitty.

Figure E 81: Terminals for both Bleichert and Hallidie tram systems featured sheave wheels for the traction cable. A heavy frame braced the wheel against the pull of the cable. These vital components contribute integrity to a tramway resource when present. Source: Eric Twitty.

Figure E 82: Small-scale system aspects, such as these factory-made cable cradles, are important details. They are rare, meaningful for interpretation, and contribute integrity. Source: Eric Twitty.

Ore Beneficiation: Smelting, Ore Concentration, and Amalgamation

Smelters

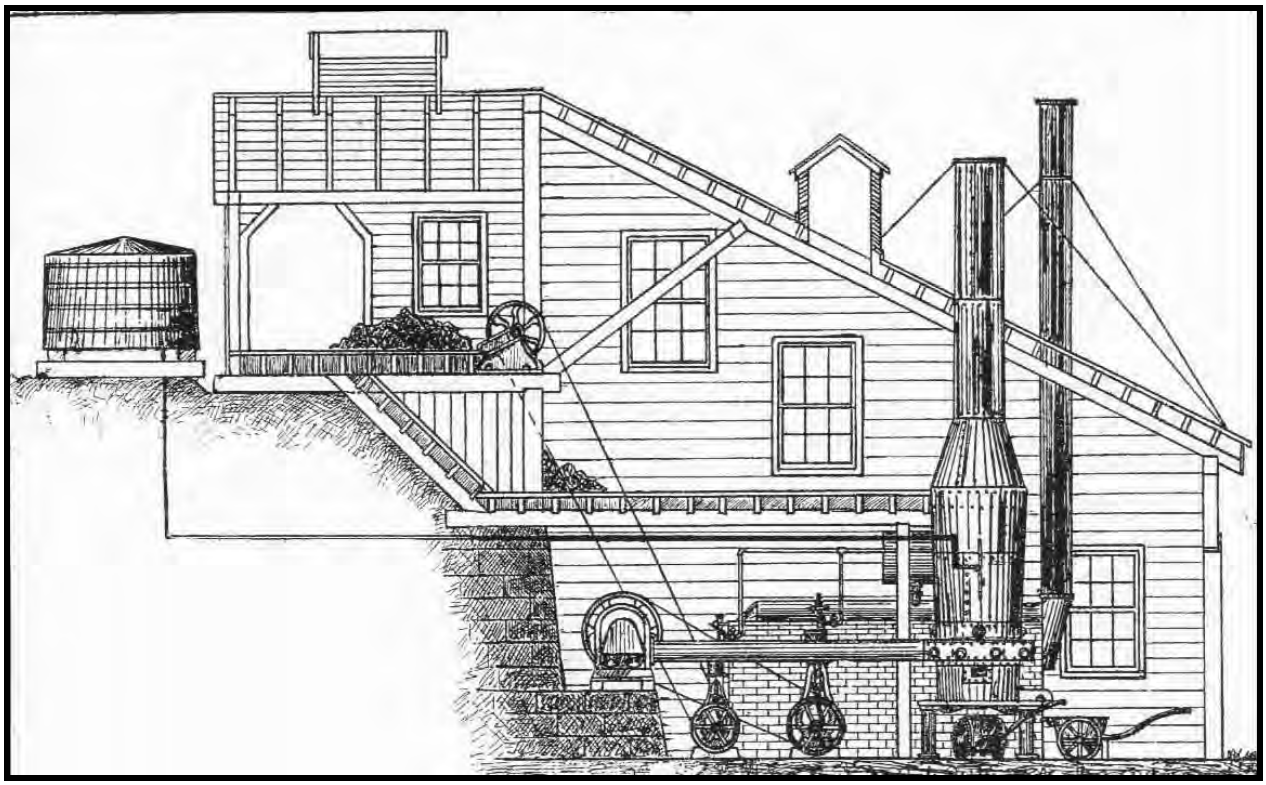


Figure E 83: The profile illustrates a small and simple smelter. Workers sorted crude ore at top left and then fed the material into a crusher marked by the upper wheel, which is a belt pulley. The resultant cobbles and gravel accumulated on the floor at center, and workers periodically fed the material into the furnace at lower right. The type of furnace, free-standing and pre-fabricated, was common by the 1870s. Note the blower system in front of the brickwork at bottom, which forced air into the furnace for great heat. In many cases, smelters also had concentration machinery to process complex ore in7 advance. Source: *Mining & Scientific Press* 4/28/83, p281.

Concentration Mills

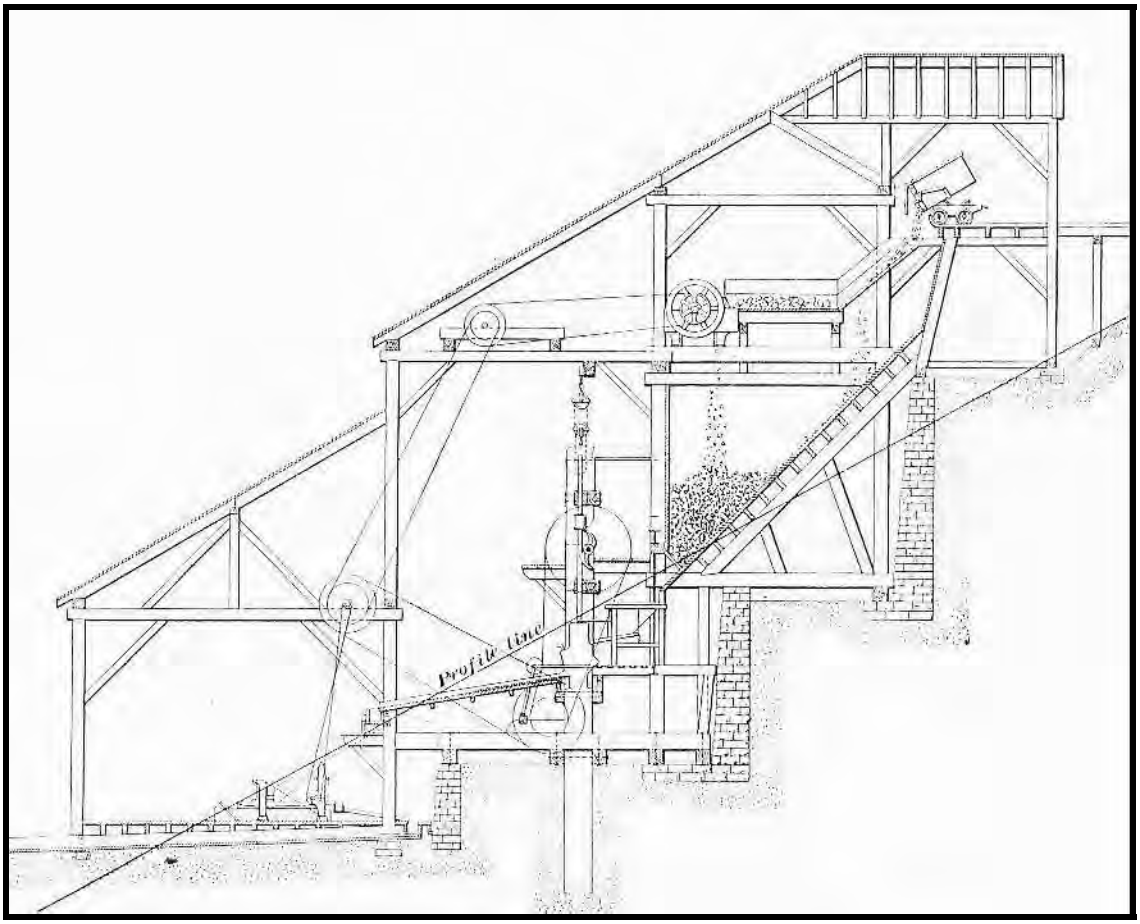


Figure E 84: The profile illustrates both the stairstep configuration of a typical concentration mill and the process flow path. Workers dumped ore onto a screen at top, and fine material passed through while course cobbles were diverted into a crusher. A stamp battery at center then pulverized the ore into a slurry, which passed over amalgamating tables that extracted free-gold and silver. The slurry then descended to concentration machinery on the lower platform. That machinery separated out the gold and silver that refused to amalgamate. Source: International Textbook Company, 1899, A43:214.

Crushing Machinery

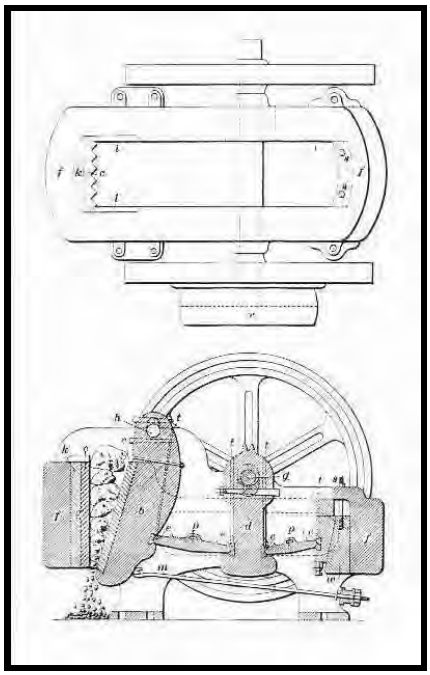


Figure E 85: The plan view, top, and profile, bottom, illustrate a jaw crusher, which provided initial crushing at most mills. Source: International Textbook Company, 1899, A43:2.

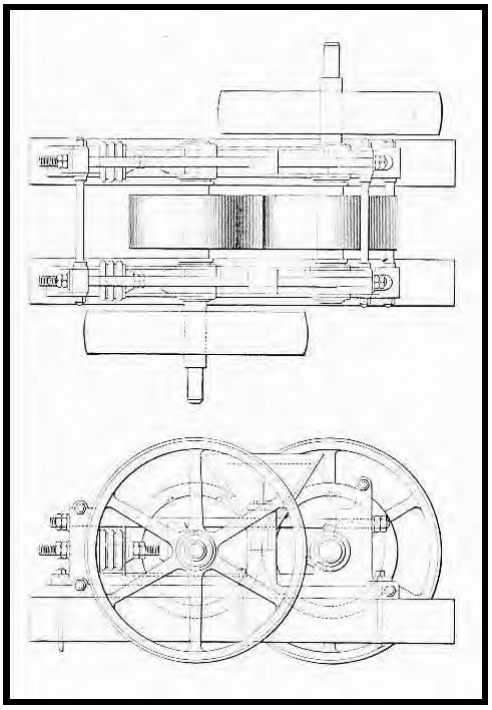


Figure E 86: The plan view, top, and profile, bottom, illustrate a device known as a crushing rolls, which was popular for secondary and tertiary crushing. Source: International Textbook Company, 1899, A43:12.

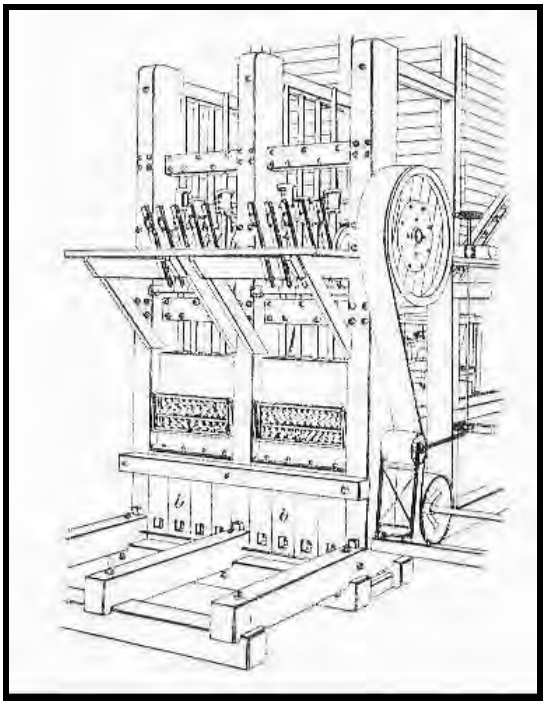


Figure E 87: The quarterview illustrates the front of a stamp battery, which provided secondary crushing at some mills. Stamp rods are visible between the timber posts, and their heavy iron shoes pounded ore in the battery boxes below. The battery boxes are bolted to pedestals of upright timbers, which are often the only remnants of stamp batteries today. Source: International Textbook Company, 1899, A43:27.

Figure E 88: When a stamp battery was dismantled, the pedestals for the cast iron battery boxes were often left in place. The pedestals consist of timbers on-end and feature anchor bolts on top, and each is around 2 feet wide, 3 feet high, and 5 feet long. Source: Eric Twitty.

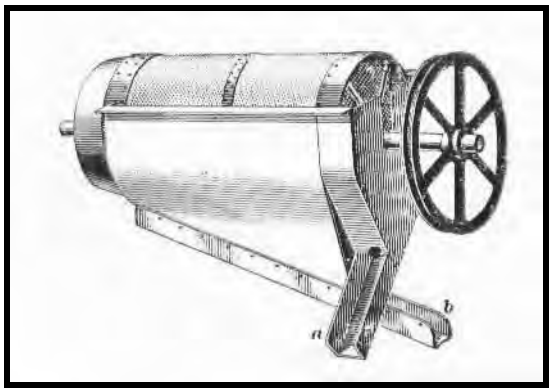


Figure E 89: Most mills relied on trommel screens to sort crushed rock between processing stages. Source: International Textbook Company, 1899, A43:12.

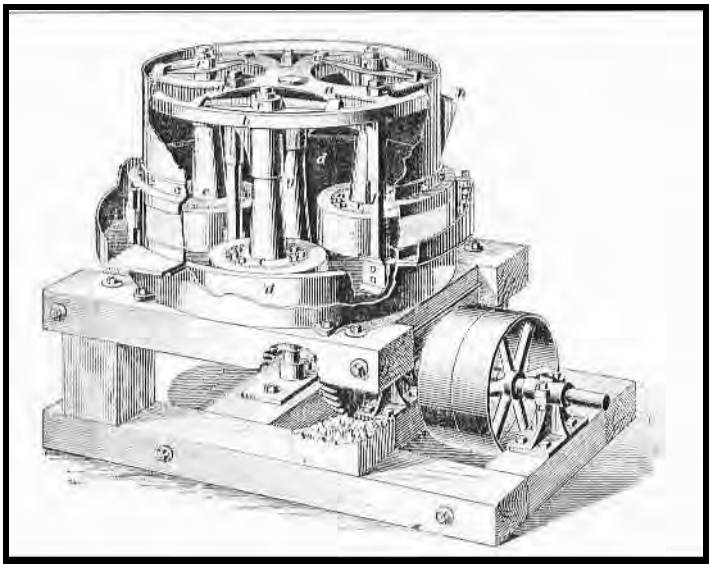


Figure E 90: The Huntington mill saw two applications. At concentration facilities, it provided secondary and tertiary crushing, and at amalgamation mills, the device simultaneously ground and amalgamated gold and silver ores. The driveshaft at right turned a capstan in the mill's pan, which caused the rollers to grind screened ore against the cast iron walls. Note the timber foundation. Source: International Textbook Company, 1899, Z43:47.

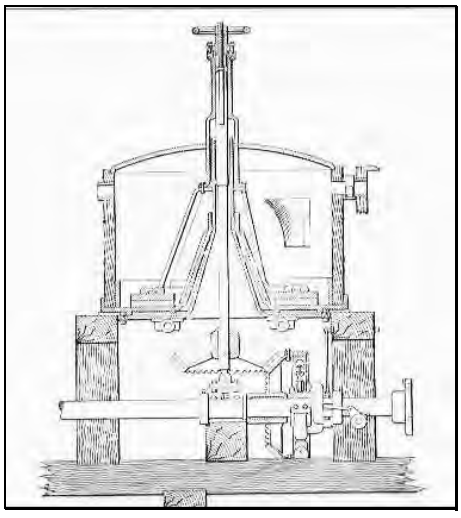


Figure E 91: The profile depicts a grinding pan, used for tertiary crushing and sometimes to amalgamate gold ore. Heavy shoes on a central axle rotated around the cast iron floor and ground ore. They were largely ineffective on complex ore. Source: International Textbook Company, 1899, A43:172.

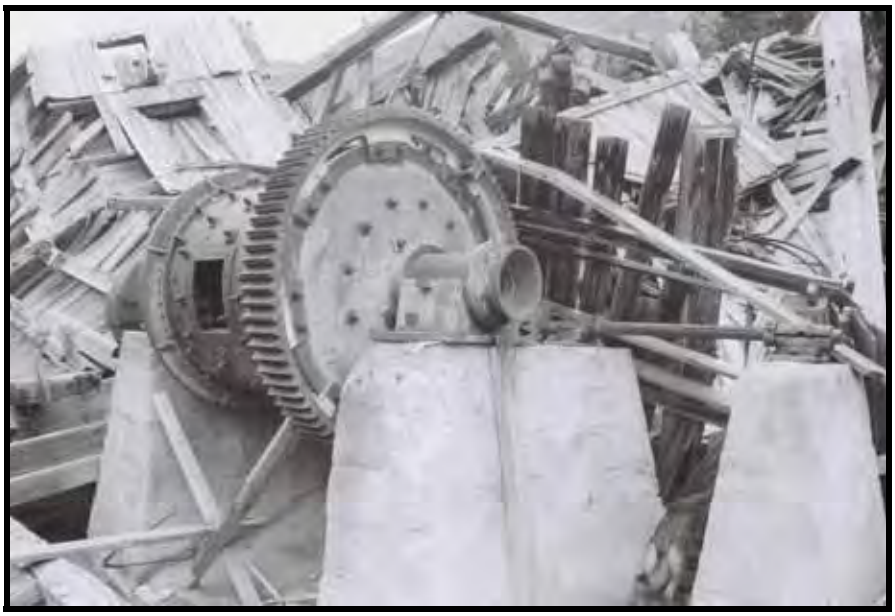
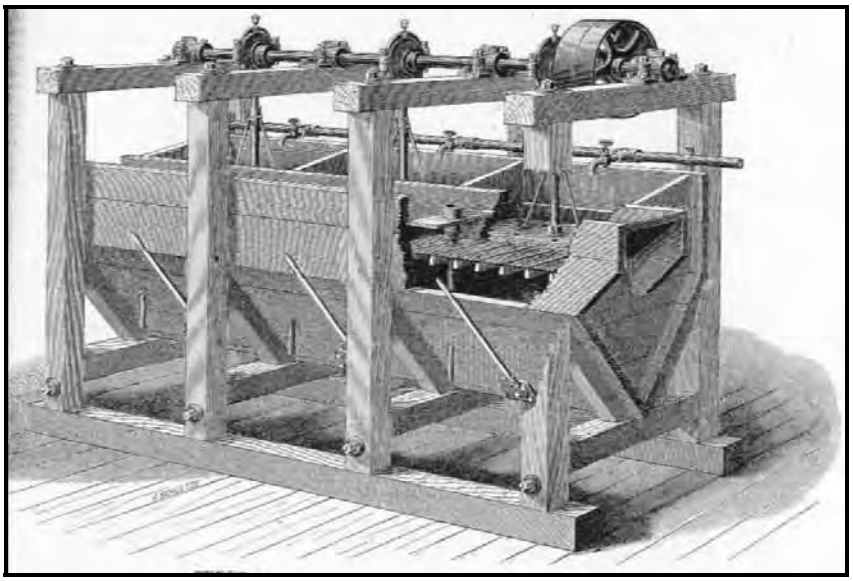


Figure E 92: Ball mills became popular for fine grinding by the 1910s. As the entire cylinder slowly rotated, tumbling steel balls in the chamber ground screened ore to a slurry. A hatch covered the opening.. Note the concrete foundation, distinct in footprint. Source: Eric Twitty.

Concentration Machinery

Figure E 93: The jig was an effective and popular concentration device from the 1870s through the 1900s. The crank at top moved screen plungers up and down in the slurry-filled cells. The agitating action classified ore particles by size or weight, depending on the application. Source: *Mining & Scientific Press* 8/9/90, p83.



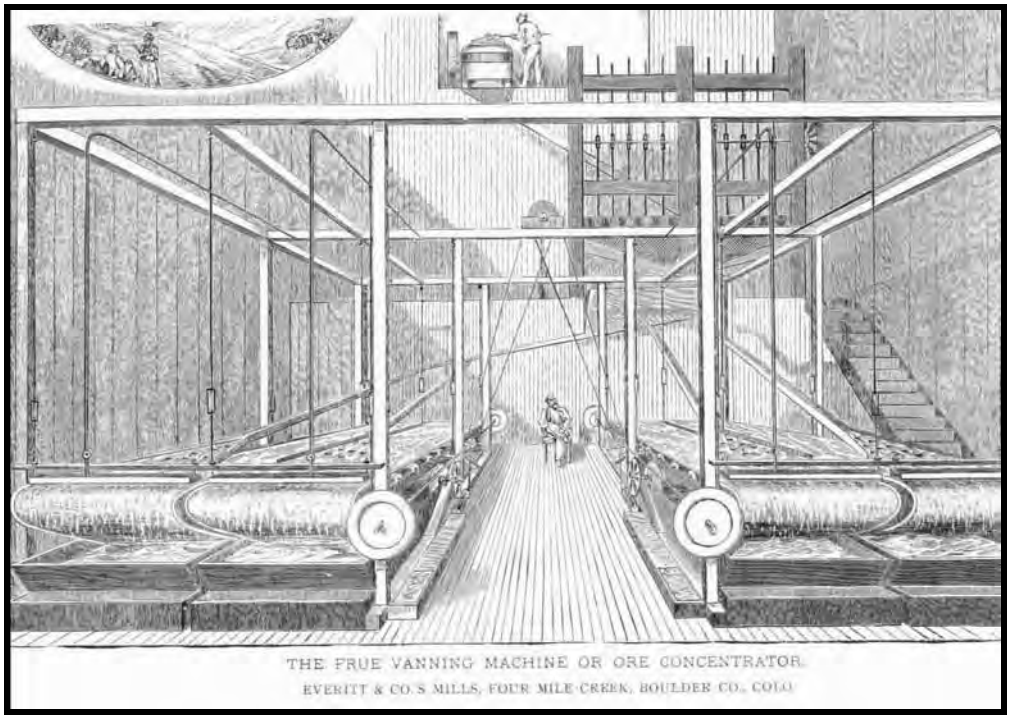


Figure E 94: Frue vanners were used with some success to concentrate complex silver ore prior to 1900, although the drawing is of the Everett Mill in Boulder County. As the vanner vibrated, finely ground ore settled against its broad rubber belt while water jets and a scraper removed light waste material. Note the stamp battery at upper right. Source: *Engineering & Mining Journal* 11/24/77, p387.

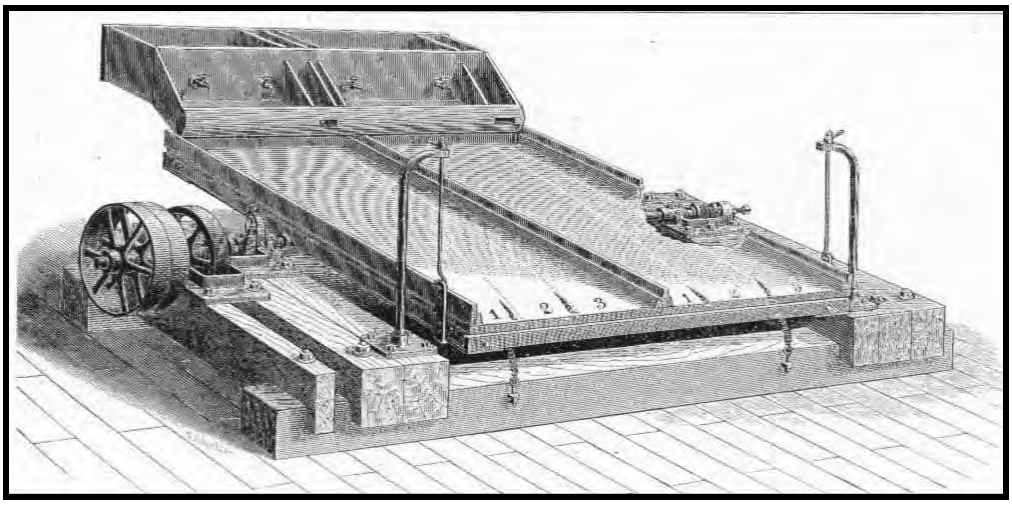


Figure E 95: Known as both a percussion table and a bumping table, this 1880s apparatus used vibratory action to concentrate finely ground silver ores. Source: *Mining & Scientific Press* 8/9/90, p83.

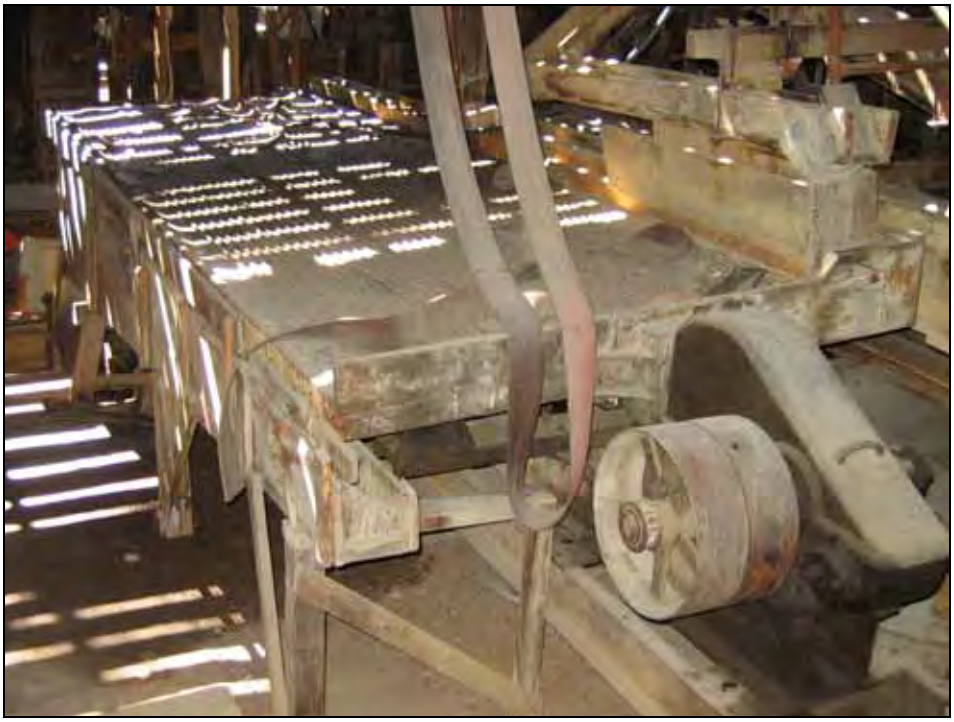


Figure E 96: Following its introduction around 1898, the vibrating table was one of the most popular and effective concentration appliances throughout the Rocky Mountain west. An eccentric cam under the guard at right imparted a vibrating motion to the tabletop, and the vigorous action caused heavy metalliferous material to settle against the riffles. Water currents washed the light waste off. Source: Carol Beam, Boulder County Parks and Open Space.

Figure E 97: Vibrating tables like the one in Figure E 96 above were anchored to foundations of three concrete or timber footers, often 5 feet wide and 15 feet long. Source: Eric Twitty.

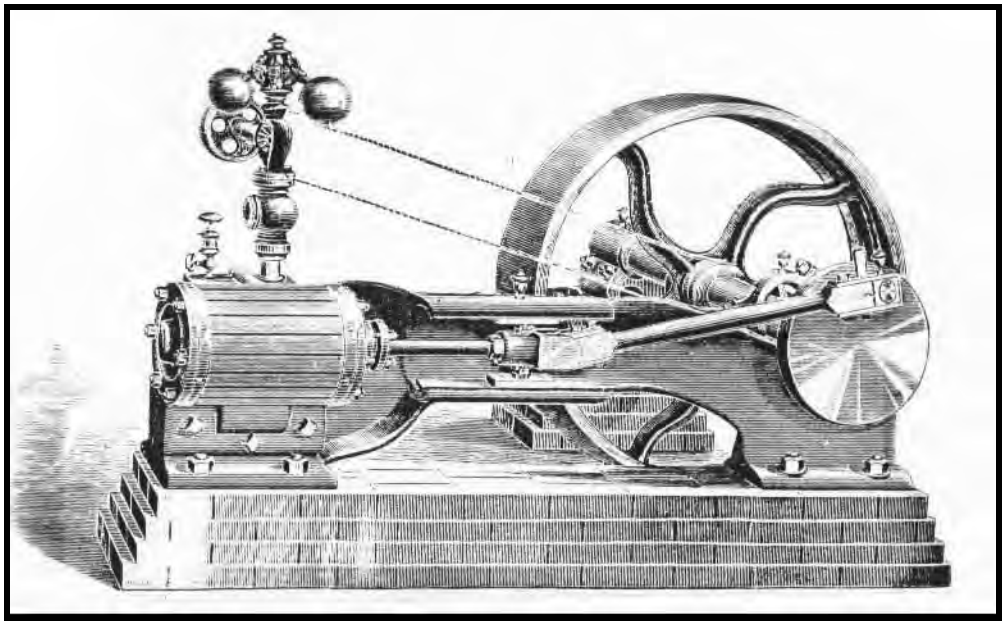


Figure E 98: Until electricity became available during the 1890s, horizontal steam engines powered nearly all concentration mills. A drive belt passed around the flywheel to a mill's system of driveshafts. Note the masonry foundation. Source: Ingersoll Rockdrill Company, 1887:53.

Figure E 99: By the 1890s, mining companies increasingly used electric motors to power their mills, provided electricity was available. This motor drove an air compressor at the Kittimac Mine. Source: Eric Twitty.

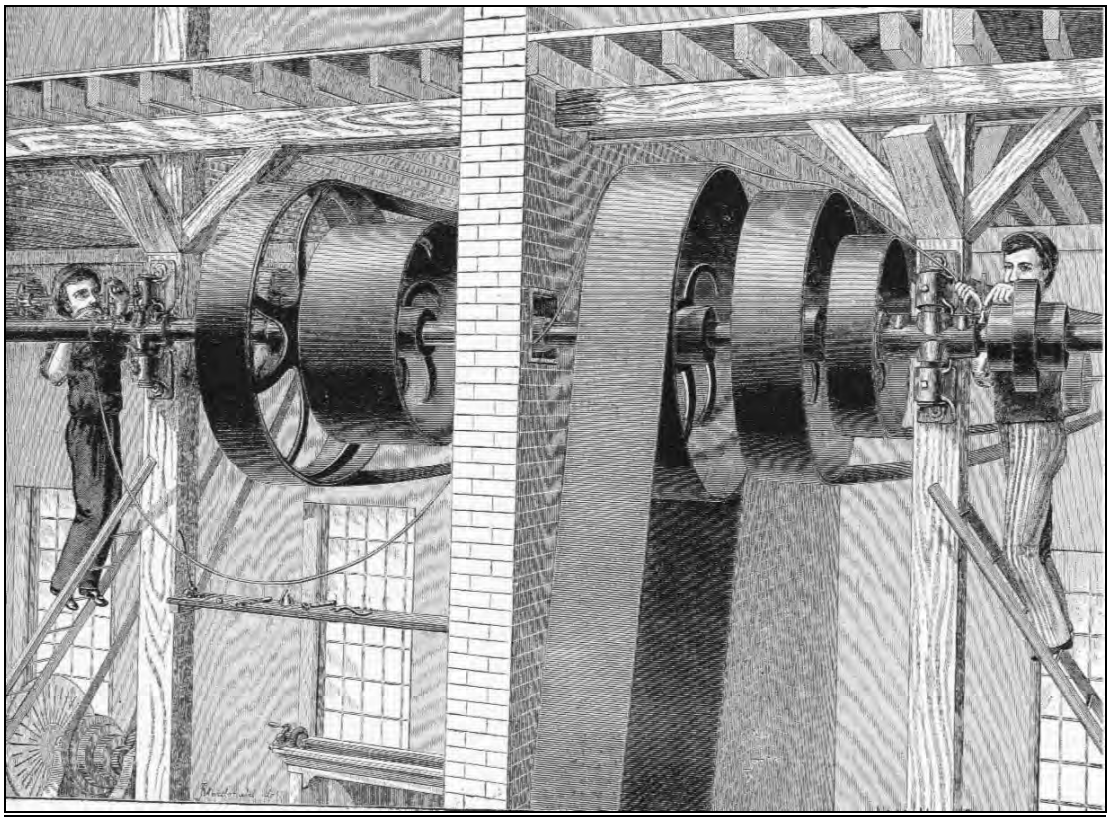


Figure E 100: A system of overhead driveshafts and belts was the most common means of transferring motion from a mill's engine to its various appliances. Source: *Mining & Scientific Press* 9/1/83, p129.

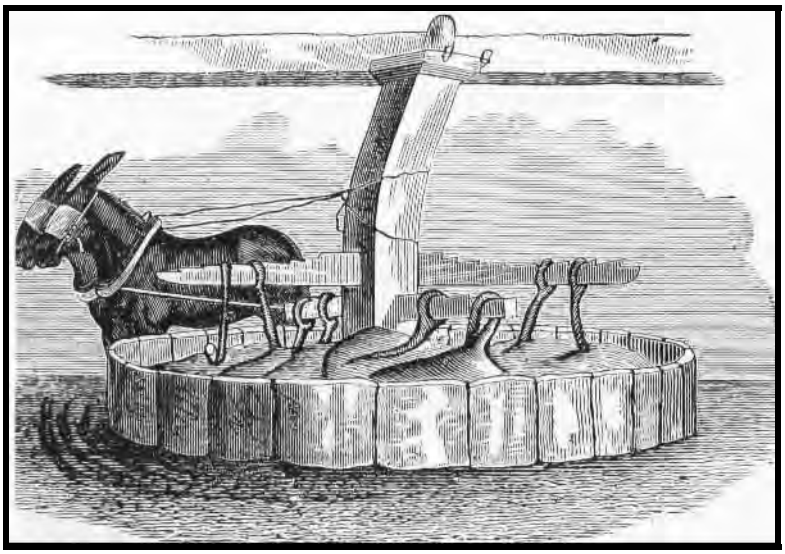


Figure E 101: The ages-old arrastra was used during the earliest years of mining in San Juan County to treat gold ore. The operator shoveled ore into the interior, added mercury, and waited for the rotating muller stones to grind the material into sand and slurry. As the ore fractured, mercury amalgamated with the gold. Because arrastras were simple and inexpensive, they were favored by prospectors. Source: *Mining & Scientific Press* 5/26/83.

Section F: Property Types and Registration Requirements

Property Type: Placer Mine

Figure F 1: The unidentified placer mine in San Juan County is a typical hydraulic operation. Miners use nozzles known as monitors to direct high-pressure water jets against gold-bearing gravel, liquefying the material. Water carried by a ditch then washed the gravel through a sluice, not visible, on the drainage floor. A flume at upper left traverses the mountainside and directs water into a penstock, the curved pipeline descending along the left edge of the photo. The penstock delivered the water, under great pressure, to the monitors. The buildings housed support facilities. The high cut-banks, infrastructure, and buildings are typical for hydraulic mining from the 1880s through the 1930s. Source: Denver Public Library, Western History Collection, X-60083.

Property Type: Hardrock Prospect

Figure F 2: By the early 1880s, the Belcher Mine recently joined the county's ore producers. In its primitive state, however, the mine resembled a deep prospect in many ways. The operation was small and simple, the underground workings were shallow, and the waste rock dump therefore small. In addition, the surface improvements were minimal, the structures few and crude, and access provided only by a packtrail. Although no buildings are evident, a blacksmith shop was probably nearby. Source: Denver Public Library, Western History Collection, C-77.

Property Type: Mine

Figure F 3: The unidentified 1930s operation in Cunningham Gulch illustrates a small, tunnel mine. The tunnel is well-developed, and the miners cached timbers and supplies on both sides of a rail line. The building at right is a blacksmith shop and probably houses an air compressor. The building, battered and clad with tarpaper, is characteristic of 1930s vernacular architecture at mines. Source: Denver Public Library, Western History Collection, X6195.

Figure F 4: The Sunnyside Mine, pictured in 1917, exemplifies the scale that some large mines attained in San Juan County. The mine, located above treeline on Lake Emma, had several tunnels, a complex surface plant, and massive boardinghouses for the crew. The surface plant included support facilities, machinery, a mill in the right background, and pump station on the lake. Although the plant evolved organically over time in response to need, it appears that the company engineer formally designed the buildings. Source: Denver Public Library, Western History Collection, X-62224.

Figure F 5: Although the Silver Ledge Mine, above Chattanooga, was idle and dilapidated by 1920, it represents a well-developed shaft operation. The surface plant consists of multiple buildings added over time, and they are vernacular in design and construction. A shaft house stands at center, a shop is to its left, and the partially collapsed building may be a tram terminal. Source: Denver Public Library, Western History Collection, X-62196.

Mining Settlement and Residence

Property Type: Prospector's Camp

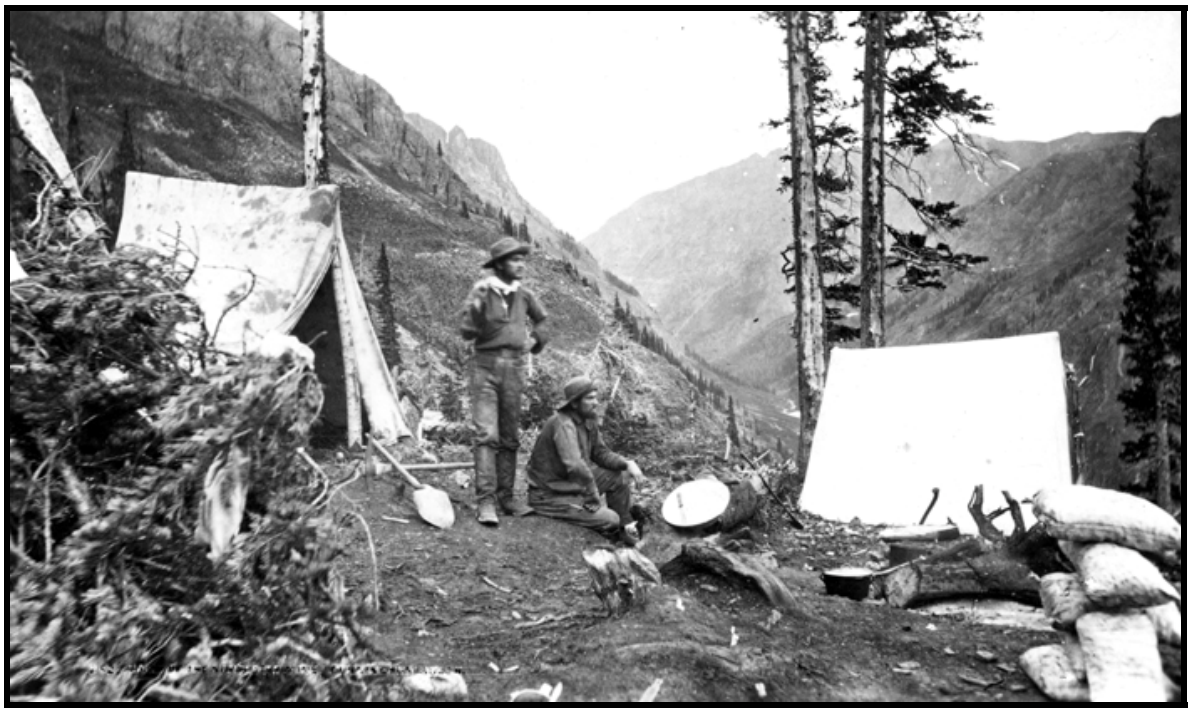


Figure F 6: A party of prospectors camps high on the west side of Cunningham Gulch, near the Highland Mary Mine in 1875. Archaeological features represent such sites today. Earthen platforms might represent the tents, the fire ring at right could be evident and overgrown, and a scatter of cans often extends downslope. Note the sacks of ore samples at right. Courtesy of U.S. Geological Survey, Jackson, W.H. 566.

Property Type: Workers' Housing

Figure F 7: Boardinghouses were the most common type of workers' housing in San Juan County. They ranged from the small and simple building at the Iowa Mine, top, to a large and well-built boardinghouse at the San Juan Chief, bottom. Most housing was vernacular in design and construction, influenced by available financial and material resources, perceptions of need, and skill. Mining companies adapted known building forms and methods of construction to the environment of the San Juans. Source: Eric Twitty.

Property Type: Unincorporated Settlement

Figure F 8: Unincorporated settlements were rarely planned in advance and instead grew organically in response to a local housing need. Gladstone, pictured around 1900, was a community of employees at the nearby Gold King, Mogul, and Fisher mills. Like most unincorporated settlements, Gladstone consisted of residences scattered around a core of basic businesses, including a mercantile, saloon, and hotel, along a main road. Source: Denver Public Library, Western History Collection, X-7513.

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(/)

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ENVIRONMENT

One Year After A Toxic River Spill, No Clear Plan To Clean Up Western Mines

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GRACE HOOD

FROM

Orange sediment laced with heavy metals is visible in the path of water coming out of the Natalie/Occidental Mine in southwestern Colorado. This mine is one of dozens on a proposed Superfund listing pending with the EPA. Several mines in the area have been leaching the tainted water for years — well before the Gold King Mine spill.

Grace Hood/Colorado Public Radio

One year ago — on Aug. 5, 2015 — an EPA crew at the Gold King Mine in southwest Colorado accidentally unleashed 3 million gallons of orange water filled with mercury and arsenic.

The toxic spill flowed into the Animas River, eventually running into New Mexico's San Juan River and into Lake Powell. So far, disaster response and water quality monitoring have cost the EPA about $29 million — and the problem isn't over yet.

Water laced with heavy metals continues to gush out of the mine, says Joyel Dhieux of the Environmental Protection Agency. That's why the EPA built a water treatment plant here last fall, at the cost of $1.5 million.

THE TWO-WAY

EPA Says It Released 3 Million Gallons Of Contaminated Water Into River

"Five hundred gallons a minute is what we're currently seeing coming from the Gold King Mine," Dhieux says. "It's a bit of an increase, as you might expect with all the

Some have been discharging the same kind of water for decades. And the water from those mines is not running through a treatment plant.

Joyel Dhieux, EPA on-scene coordinator, looks at an old water treatment plant that stopped operating near the base of the Gold King Mine in the early 2000s. The EPA built its own temporary plant in October 2015 after the Gold King Mine spill.
Grace Hood/Colorado Public Radio

In fact, this problem is at the heart of why the EPA was at the Gold King Mine last summer. And it's what prompted the local government here to apply for a Superfund listing this spring.

"There was a lot of sleepless nights," says Willy Tookey, administrator for San Juan County.

For more than a decade, the government here shied away from Superfund status. The two biggest concerns? It would cause a drop in property values and a drop in tourism.

Article continues after sponsorship

But Tookey says intense negotiations with the EPA over this past year led to new confidence and assurances.

"Because of the circumstances I think we were able to get these answers that we weren't able to before," he says.

AROUND THE NATION

Colo. Gold King Mine Continues To Leak Waste As Winter Sets In

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Answers for EPA critics and Republican lawmakers have been more elusive. The agency accepted full responsibility for the August 2015 spill. And samples show water quality in Colorado and New Mexico has returned to pre-spill conditions.

THE TWO-WAY

Rivers Shut Down Over EPA's Spill Of 3 Million Gallons Of Toxic Water

But critics point out no one within the EPA has been punished. A criminal investigation is underway, however. The state of New Mexico has enough unresolved

"There are still tens of thousands of those throughout the country that still need attention," says Doug Young, a senior analyst at the Denver-based Keystone Center, which focuses on science and public policy.

Three settling ponds are used at Cement Creek, which was flooded with millions of gallons of mining wastewater, on Aug. 11, 2015. The Environmental Protection Agency uses settling ponds to reduce the acidity of mining wastewater so that it carries fewer heavy metals.

Theo Stroomer/Getty Images

He says two key obstacles are funding and legal accountability.

"My original hope was that after the Gold King spill, it might cause people to rethink how we might be able to come up with a solution," Young says.

Historically, he says, Congress has considered two fixes: Good Samaritan legislation to encourage volunteer cleanups, and a reclamation fee for hard-rock mining companies.

But several Good Samaritan bills in Congress seem to be going nowhere. And the proposed fee is even more of a nonstarter.

THE TWO-WAY

Thick, Putrid Algae Bloom Overwhelms Miles Of Florida Coastline

"What we've seen, I think, is a going back to and resurrecting some of these old concepts that haven't received wide support," Young says. "And as a result I think we're seeing it getting bogged down again in those same debates."

In spite of the gridlock, Young says an answer will emerge. The leaking, tainted water from these mines will become more valuable with drought and climate change.

And when that reaches a crisis point, he says, lawmakers will really have something to talk about.

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VOLUME XIV — SILVERTON, COLORADO, MAY 2, 1903. — NUMBER 23

MINES AND MINING

Carver and Butler have cleared away the snow from their Bald Eagle workings and propose breaking a carload or two of ore during the next three weeks for the Durango market. The ore is of a high grade gray copper and lead and there are two big streaks of it.

The old Cleveland tunnel, Sultan, is being cleaned out and generally fixed up preparatory to the summer's campaign, which, according to rumor, is to be an extensive one. Twenty years ago Cleveland's primary workings were blessed with exceptionally rich silver ore.

There are nine people on the pay roll of the Stony Pass Mammoth tunnel, Cement creek. The bore was lengthened by about 45 feet last month. With the installation of power drills, which event is expected to occur by early June, the tunnel will get a "move" on at from five to eight feet per day.

Charles and B. Freeman are doing some work on the St. Louis in Prospect basin for the Colorado Copper-Gold Mining Co. The last work done on this property got the tunnel off the vein and now a crosscut is being driven back to the vein, after which the Messrs. Freeman will do 200 feet of drifting by contract.

Dave Heindel and Dan Pettyjohn are making preparations for tackling their Mazeppa group of four claims in Ice Lake basin. The claims are in good showing, the Mazeppa proper especially so, it being developed by several hundred feet of drifts, all of which are in ore, the various streaks measuring all the way from 6 inches to 4 feet in width. The ore is a lead sulphide and gives returns of about 34 ounces silver, a little gold and 20 to 35 per cent. lead.

The Ouray Herald last week contained favorable mention of the Gold King mine near Mineral Point and but 3,000 feet from the Old Lout. The property is owned by Gus Bruner and is one of the few prospects of the San Juan that has paid from the grass roots. The first ore shipped was from the surface outcroppings, which netted good returns after all transportation and treatment charges were paid.

It is pretty generally understood that the company putting in the power plant at Rockwood will furnish additional power in the winter months for the Silver Lake property. The Silver Lake uses from 700 to 800 horse power the year around if that much is available, but during the winter months the four water wheels are idle and that necessarily throws all the work on the 350-horse power engine. The power company will get to work on the plant at Rockwood just as soon as possible and it is believed that enough of the enterprise will be completed this year to furnish power here for the immediate demands of next winter.

All sales on the New York-Brooklyn are declared off by the owners and the mining of ore and further development will be vigorously prosecuted this year by Manion Bros. & Murphy, who know the true merits of the mine. Tim Manion, general manager of the property, was in Silverton this week and secured a lease on the Johnson mill at the Burro Bridge, North Mineral, for experimental purposes on the lower grade ores of the mine. Regular shipments of the richer gold ore will be commenced as soon as the Red Mountain railroad can be opened up.

Last week a second breaking record was made in rock breaking. In the Green mountain tunnel, Cunningham gulch, 31 feet was made with a Water Lyner drill during the seven day's run of one eight-hour shift for each day. The rock through which the tunnel is directed is a blue granite and as the miners would put it "is as hard as the hinges of hades." The Rand drill or slugger has a greater number of admirers though in the San Juan for its quality of endurance and simplicity of action in all kinds of rock. The Rand has even a better record than the above but in material not of the same hardness.

A telephone message from Ophir this morning says that town is all excitement over the rich strike last night of a three foot vein of gold, silver and copper ore which was encountered in the Badger tunnel which is being driven by W. J. Scoutt to tap the Suffolk vein at a great depth. The above strike is also pleasing news to a few Telluride people. The Badger tunnel is located just below the town of Ophir and starts into the hill below the outcroppings of the Santa Cruz property which is owned by Frank Brown, Thos. Thomas and other Telluride people and from the information received it is thought the strike is on Santa Cruz ground.—Telluride Journal, June 24.

Reed and Schmelzer, who own the Copper King group on Boulder mountain, are awaiting the going of the snow to commence work for the season on the property. The Copper King has been a small shipper for five years until 1902, when the ore opened up was left standing to do dead work. The development consists of a small tunnel, a 100-foot shaft and a 50-foot cross-cut from the bottom of this shaft to one of the leads of the large vein system. Gold, silver, lead and copper in variable quantities are each shown in the workings. Of the ore shipped there has never been anything less in value in carload lots that 100 ounces in silver and $5 in gold. At this time there are several tons of 300-ounce silver ore and several car loads of a lower grade awaiting shipment.

From what we consider a reliable source we learn that "Happy Jack" who's made more gopher holes in the San Juan, according to his inches, than most any other every day prospector you can stagger on to, is again in the swim. This time his field of operation being in Maggie gulch, near the Little Maud. The claim is known as the Monta Vista, the development thereon consists of a 68-foot tunnel driven on the vein which shows a streak of white quartz, specked with silver glance, etc. Assays from picked speciment have given returns of 1 to 16 ozs. gold per ton. Chas. Johnson, the Durango lawyer, is interested in the claim and we are told that a Mr. Joe Landers, who hails from Minnesota was in town a day or two ago negotiating for an interest in or the whole of the property.

Rumors has it that Manager Hallett of the Silver Lake mines has bonded a couple of the claims comprising the Gold Lake group in Spencer basin, the price stated being $21,000, and that development on the same will begin about July 1st. The group consists of some ten claims and is owned by Phillips, Renis and Fritz and is decidely a gold proposition. Free gold can be had from the outcrop of nearly any claim in the group. The basin is wet and the great quantity of water encountered by the prospectors through attempting to sink has sidetracked their enterprise. Twenty-five feet is the lowest depth that they have been able to get under ground. We are informed that a piece of ore broken from the Bumblebee, one of the principal claims last fall and thrown carelessly in a cabin was recently fished out and upon being assayed gave returns of nearly 14 ozs. gold to the ton. The piece represented a streak of 6 inches in width.

We learn from Mr. T. Jay Hurley, superintendent of the Natalie-Occidental group, that the big Magnolia vein has been cut and that its magnitude is more than was hoped for. The vein is 14 feet between walls and carries an average value of $9.60 in gold, copper, lead and silver. This we believe is the best strike that has been made in the district this season and as the Natalie-Occidental have been steadily working and developing their properties for the past six years and have opened up immense bodies of ore, it has been decided to put up a mill during the coming summer and Mr. Hurley leaves for Denver on Monday to confer with the large machinery houses there and get specifications, etc., for both mill and tramways and same will be submitted to the stockholders in the east for their approval. Mr. Hurley states that work on the Ruby Basin properties is progressing nicely under the foremanship of Mr. Ed Haas and that the bad ground is all caught up and work is going ahead in the tunnel again. In the next 100 feet it is hoped that the big December vein will have been cut. This vein carried excellent values on the surface; in fact, all the veins on this property carry very good values on the surface.

The sale of the Fisher mill and millsite and the Eveline group of five claims belonging to the Eveline Mining company of Denver, has been finally completed, the new owner being the Venetaian Mining company of Chicago, of which ex-Senator Mason of Illinois is one of the principal stockholders. The deal was made through Adna Lamson and the price was fixed at $15,500. The main purpose of the Venetian company's purchase was to secure what is said to be the best water right on Cement creek and to obtain deep entry of Peacock veins on Peacock mountain through a drive along the Eveline vein. The entry of this tunnel is situated in heavy timber and is but 300 feet from what is known as Henrietta switch on the Gladstone railroad. For the present ore will be packed or hauled to the Fisher mill. On the arrival of the members of the company they will no doubt enlarge the mill and move it to a point immediately under the Eveline tunnel entrance and by the extension of the water power a distance of 900 feet, provide an additional fall of 36 feet for the driving of air drills and the running of the mill machinery. A force of men is now engaged in repairing the mill to run on Peacock ore as soon as the snow is off the ground sufficiently.

Tuesday last Al Marshal, original locator of the Stony Pass group on Green mountain, accompanied by Mr. John Bubar, planted stakes on two more desirable locations of that section which he has tied up with the group. Both claims being densely timbered, therefore will prove valuable auxiliaries to the Stony Pass mining operations of the near future. Marshall reports that the snow in Stony Pass gulch is settling in good shape and that by the middle of the month no difficulty by way of getting in supplies to the properties can possibly be anticipated.

Continued on Page 5.

DID YOU HEAR ABOUT?

The Silverton postoffice has been allowed an extra $100 for clerk hire per month.

Dave Heindel sent his blooded stock to Rockwood for winter-herding Wednesday morning.

A contract for a new assay office will be let next week by C. A. Cooper, size 25x22. It will occupy the cite of the present old office on Fourteenth street.

The first "Choose your flavor" soda of the season in Silverton was drawn from the Molique fountain this week, and it snowed the next day.

Smith informed us that his wife has been all smiles since she selected her wall paper at Brockenaue.'s, such a fine stock to select from. Paints, glass, etc.

Little Steve Holman has secured another dog and already trained the animal to pull his little wagon or bicycle which obeys in harness as well as a well trained horse.

Durango people are again contemplating another railroad this summer to again connect them once more again with the Santa Fe again this summer once more.

Rev. J. L. Countermine occupied the pulpit at the Congregational church last Sunday. Mr. Countermine comes from Schenectady, N. Y. and is here on trial.

The May Day dance Friday night given by the Baker Park Temple, Rathbone Sisters, was largely attended, at least indications point that way as the STANDARD goes to press.

Those occupying the row of store buildings at Gladstone have been notified to vacate by the 15th of this month so as to make room for the new 100-stamp mill for the Gold King.

There are only two candidates in the field for school trustee (secretary of the board) who have filed their names as required by law, namely, Frank L. Palmer and W. M. Montgomery.

Surveyor E. W. Hunt of thi city possesses some valuable data in the shape of the complete files of all the papers published in San Juan county since 1886. He also has the files of the Rico papers for many years back.

Word has been received at Denver that W. D. Munsell, the defaulting clerk of the State Auditor's office, was living in grand style in the City of Mexico. Efforts will be made to bring him back.

Remember there are really two school elections Monday—the forenoon, from 9 to 12 o'clock, will be devoted to the amount of bonds to be issued, and the afternoon from 1 to 5 o'dlock to electing a trustee and deciding whether the amount of bonds selected shall be issued.

The handsome marble soda fountain of S. D. Cunningham was sold this week to Chas. Schutt & Co., who will turn on the "fiz" next week. The list of new drinks for the season of 1903 were coming in too fast for Dave and he disposes of the pretty thing to those who have patience and antiquated tastes, however Chas. Schutt will find it quite a source of revenue this summer.

Principal Fred Bunney of the Silverton Actual Business College, secured nine new members at the Gold King mine and an equal number elsewhere in the county last week. All will receive instructions by correspondence.

Next week Jones & Gannon will move their tailoring establishment into the building vacated by A. Grebles, while the room now occupied by them will be used by M. Brumfield who is enlarging his store.

John F. Sorge & Co., of the City Union Steam Laundry, have leased the Roberts building on Greene street and will occupy the same next week. New machinery will be placed sometime next month.

A party consisting of Mr. and Mrs. Doss, Miss Mattie Rickard, Mrs. Louella Shaw, Mr. Fred Bunney and Mr. Chas. Morris tried the ozone of Gladstone and tested their nerve by a ride over the Gold King tram line last Sunday.

Col. H. G. Heffron, who has been connected with the Brigham Consolidated Mining company since they first began operations at Bingham, Utah, has resigned and it is stated he will give his entire attention to personal interests, leaving shortly for California.—Mining Reporter.

The San Juan County Board of Trade met Tuesday night to consider the building of a public school and the following resolution was adopted: "That the Board indorse the building of a $40,000 school house and that bonds, not to exceed 5 per cent. interest bearing, be issued for that purpose."

Marriage license is of record in our county clerk's office issued to Mr. Wm. Tinsley of Pueblo, who married Miss Nettie McTaggart of Durango. The bonds that hold were made before Justice W. D. Watson last Tuesday afternoon and the new couple are now comfortably located on Reese street opposite the court house.

Stroble. Terry and Bordeleau owners of the Snow Bird group of mines sent up supplies this week. Chas. Carney's burro train succeeded in getting through the snow. Besides the price for packing Charley won $100 from the cook at the Wabuse mine, the wager being that they could not reach the Snow Bird mine within four days.

According to the secretary's of school board census of school there are 422 boys and girls in Silverton of school age, 224 of the former and 198 of the latter. Mr. Goble's report shows that there is an increase over last year of 84 on the basis of the total enrollment of 422, 53 have left the city, while 11 have passed the age.

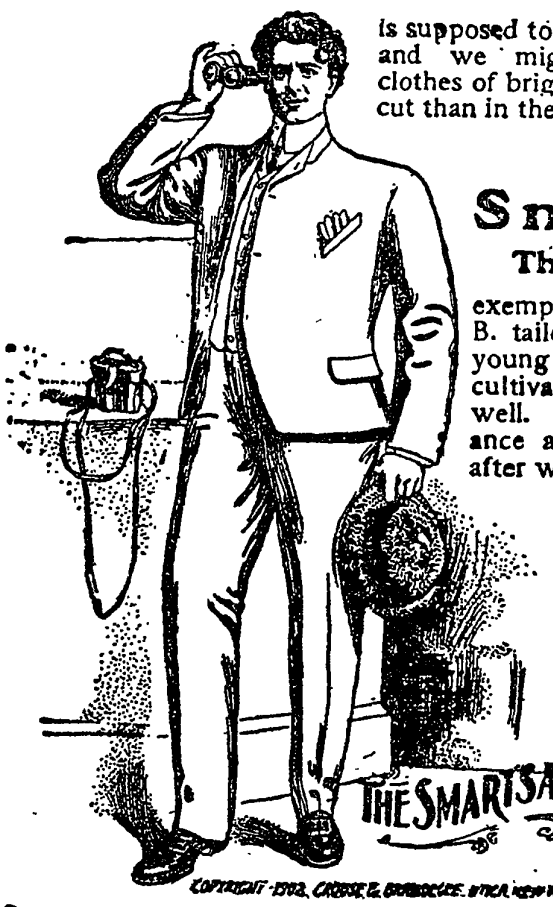
Cunningham's Drug Store

AMERICAN SILVER TRUSS.

In this Truse the principal heretofore so greatly desired, Has At Last Been Achieved, that of firmly and constantly holding the rupture with a gentle hand-like pressure.

Phone 6-f

The Young Man's Fancy



is supposed to turn to love in the spring, and we might add—to thoughts of clothes of brighter hue and more stylish cut than in the fall.

The **Smart-Sac**

Three Button Sack

exemplifies what the swell C. & B. tailoring does for the nobby young man of to-day who has a cultivated taste for dressing well. The fine tailored appearance at purchase is continued after wearing it. Made of well-shrunk selected fabrics, cut short-waisted and slightly full over the hips. The tailored touch in the design of the front and cut of the lapels makes it the select young man's expression of

Custom Tailor Style

as seen in the metropolitan cities. What does it cost to dress so well? CROUSE & BRANDEGEE, Manufacturing Tailors, Utica, N. Y., answer that question with garments that make possible the wearing of clothes of individual effect at fair prices.

STYLISH SPRING SUITS AT

$10.00, $12.50, $15.00, $18.50, $20.00 $22.50.

Hemphill & McCrimmon.

Mrs. Una Robbins of Cedar Hill, N. M., is in the city visiting her mother, Mrs. McCoin.

County Commissioner Ole M. Lee returned this week from a two months' visit to Denver and eastern points.

The Womens Union of the Congregational church will give a supper in the parsonage, the second week in Mav.

Wm. Marsh, the restaurant man, is in his new quarters opposite Ballou's grocery and will be ready for business Monday.

The Eagles' Lodge of Silverton is to have a public dance on the 12th inst. A 6-piece orchestra and other elaborate arrangements have been made to make the event the star one of the season.

A surprise party was given at the residence of W. D. Watson Thursday evening in honor of the 72d anniversary of the 'Squire's birthday. It goes without saying that a jolly good time was had.

Johnnie Higgins of this city fell 50 feet down a shaft at the Gold King mine last Saturday night and sustained a broken rib and other though not dangerous injuries. While being brought from the mine, however, the tram became tied up and Johnnie was suspended in the freezing air until he could be rescued from below by the use of ropes and ladders.

Among those registering at Durango as attending the celebration of the 84th anniversary of Odd Fellowship at that place from Silverton, last Monday, were: George Hemphill; Clarence W. Coburn, John Yager, Matt Clipper, T. J. Edwards, F. Brockenauer, H. D. Otte, Alex Klinger, S. U. Morris, Frank Wetzel, D. W. Williams, James Prechte, A. A. Lamont, Joe Maples and Mrs. Wm. Schulz.

The Silver Link Rebekah lodge No. 93, will be glad to welcome their friends to a dance and card party at the Miners' Union hall on Friday evening, May 8, beginning at 9 o'clock. A progressive card party with prizes will be held in the banquet room, tickets 50 cents per couple. The tickets for the dance will be $1.00 per couple. The orchestra that furnished music for the Trades Assembly dance has been engaged.

Before Josiah Watson in the County Court, last Tuesday, were arranged four or five Silverton boys ranging from the ages of 12 to 14 years for stealing a small case of dates from a railroad car last Saturday. All having pleaded guilty as being implicated directly and indirectly, three of the lads were reprimanded while the forth, Fred Jones, was sent to the State Industrial school for boys during his minority owing to the fact that Freddy had not only served a term in the reformatory but had been before the judge several times since his return home.

To the extent of a statement that musicians were charging $10.00 from 9 to 12 m., we stand corrected and are informed that the seeming fancy price of musicians that play for the different societies will be reduced in the near future. However, if there exists a schedule of prices there is no alternative but to stand by it, boys, for those "who dance must pay the fiddler."

LATER—A new schedule which has been formulated by the Musicians' Union and which the STANDARD will reproduce later on makes a price for three musicians from 9 to 2 o'clock at $25.00, which will certainly meet with the approval of societies' dances.

C. A. Cooper has planned a new building to take the place of the front portion of his present assay office building. The new structure will be built to conform to the rear portion of the present building, which contains the furnace.

Jack Slattery has started it again and will open the season, 1903, to-morrow (Sunday), having made arrangements to cross bats with Durango's "home" team. As a preliminary, Silverton's team will be a "pick-up" and it is not expected that Durango will be beaten very badly. But wait and when the "Slobs" will line up and the new San Juan ruling, viz: that all players must be bona fide residents of the San Juan towns, respectively, Silverton expects to carry away the pennant this season. Will John Barnett of Ouray please note this?

The Odd Fellows of this place returned from Durango singing loud praises for their brothers and sisters of the Smelter city in the manner in which they were entertained. The banquet, presided over by the Sisters of Rebekah was a grand affair and many a poor Odd Fellow from Silverton, who has been existing through the winter on snow balls and crystalized scenery gorged themselves to their heart's content. Their presiding officer, H. Garbanati is one of the oldest members of the order in the United States, being 84 years of age and 63 years of this time a member in good standing in the order. Sam'l Morris of Silverton was made president of the association for the fiscal year.

The home of Miss Mary Cole was the scene of a very enjoyable gathering of principally young people last Wednesday evening. The affair was a surprise party instigated by Misses Kittie Aylward and Lizzie Monahan and Mrs. Wm. Fancher and the occasion being the 20th anniversary of Miss Cole's birthday. It was a genuine surprise and the preparations previously made in the way of edibles were as delicious as they were extensive. Guests of the occasion were: Mesdames Clifford, J. Sullivan, J. Lonergan, M. Sullivan, C. Fritsch, M. Ganey, F. Brown, M. Coughlin, W. Callahan, P. Gillen, Mahin, Barbigiliti, P. Hughes, Ressouches, Higgins; Misses Eliza Lonergan, Mary Ressouches, Bernie Koehler, Gertie Higgins, Anna Martin, Mary Madden, Martha Hughes, Anna Castonguay, Violet Kramer; Messrs. P. Clifford, M. Clifford, J. Hughes, W. Lonergan, James Eveline, C. Fritsch, Charlie Damschroder, M. Coughlin, Martin, Mahin, Reed, Willie Lonergan, J. Cole, B. Cole.

Fred Brockenaur says he charges nothing to show his elegant stock of Wall paper.

Surprise Party.

Friends, both old and young, of James G. Aveline, gave him a surprise at the residence of A. A. Brown Tuesday evening. The merry-makers comprised the following: Mr. and Mrs. Charlie Hodges, Mr. and Mrs. C. S. Casad, Mr. and Mrs. Al Springer, Mr. and Mrs. Will Campbell, Mr. and Mrs. C. H. H. Kramer and daughter Violet, Mrs. McKim and son, Mrs. Lena Carr, Miss Holman, J. H. Bubar, West Campbell, Prof. McDonough and Frank Woodruff. Although taken by surprise, yet Mr. Aveline did not faint away and go all to pieces but braced up and kept his head intact and showed himself quite equal to the emergency, making his guests perfectly at home, in the meantime not being forgetful of himself. The evening was enjoyed at cards, 6-handed euchre, story-telling, etc. Among the pleasant features of the entertainment were the splendid quartette singing by Mrs. Springer, Mrs. McKim, Prof. McDonough and Mr. McKim and the well rendered recitation by Mrs. Carr. An elaborate lunch spread by Mrs. Kramer was given the undivided attention of all present.

CHURCH NOTES.

ST. JOHN'S EPISCOPAL CHURCH.

Church services will be held in St. John's Episcopal church every Sunday at 10:30 a. m. and 7 30 p. m. Sunday School immediately after the morning service. Mr S. S. Shindler, formerly of Durango, will conduct services.

On June 5th, at Miners' Union hall, the ladies of St. John's Guild will hold a Bazaar and Social Dance. The bazaar will be in the afternoon and refreshments will be served both afternoon and evening. They will have the best of music for the dance. All are invited to come and have a good time.

Guild will meet with Mrs. Airy on May 6th.

CONGREGATIONAL CHURCH.

Morning service—"Light in Darkness." 10.30 a. m. Evening—"Trust," 7:30 p. m. Sabbath School at 12 Everyone welcome. J. L. COUNTERMINE.

The day's wants. New ideas, new wants and continual thought of betterment enables us to fill your wants. The Mrs. W. T. Doss Millinery Store.

Mrs. Aurand solicits an extra number of students for her class in short hand at her residence on Tenth and Bluff streets. A general business course is taught at hours convenient for the scholar. Marked success was attained last season by Mrs. Armand and many of her students in Silverton are testimonials in their expression of the instuctor.

Card of Thanks.

For the kindness and assistance during the illness of my wife and the volunteer help towards my family of children since the death of their mother, I sincerely thank one and all. FRANK GOETZ,

Gladstone, April 25.

A Startling Test.

To save a life, Dr. T. G. Merritt, of No. Mehoopany, Pa, made a startling test resulting in a wonderful cure. He writes, "a patient was attacked with violent hemorrhages, caused by ulceration of the stomach. I had often found Electric Bitters excellent for acute stomach and liver troubles so I prescribed them. The patient gained from the first, and has not had an attack in 14 months." Electric Bitters are positively guaranteed for Dispepsia, Indigestion, Constipation and Kidney troubles. Try them. Only 50c at S. D. Cunningham.

Fifty Years the Standard

DR. PRICE'S CREAM

BAKING POWDER

Awarded
Highest Honors World's Fair
Highest tests U.S. Gov't Chemists

PRICE BAKING POWDER CO.
CHICAGO

Ernest Grill & Co.

Lumber and Feed,

wholesale and retail agents for

HESPERUS,
BLACK DIAMOND
ANTHRACITE
COAL

FOR RENT—821 Empire street. Elegantly furnished rooms; all modern conveniences. Gentlemen preferred.

A Sure Thing.

It is said that nothing is sure except death and taxes, but that is not altogether true. Dr King's New Discovery for Consumption is a sure cure for all lung and throat troubles. Thousands can testify to that. Mrs. C. B Van Metre of Shepherdtown, W. Va., says "I had a severe case of Bronchitis and for a year tried everything I heard of, but got no relief. One bottle of Dr. King's New Discovery then cured me absolutely." It's infallible for Croup, Whooping Cough, Grip, Pneumonia and Consumption. Try it. It's guaranteed by S D. Cunningham, Druggist. Trial bottles free. Regular sizes 50c. $1 00

NOTICE.—Notice is hereby given that I am sole owner and proprietor of the building and its contents known as the Diamond Bell hall. LOUISE MAURELL, Manager.

You have no idea of the fine line of wall paper carried by Fred Brockenauer. Its up to date and when hung on the walls of your home guarantees peace in the household.

Ladies Fine Tailoring at Mrs. Barnes' Dress Making Parlors on Thirteenth street.

A specialty of ours. We pride ourselves upon our large and elegant assortment of Wall Paper. The art of applying it is another good feature of the business.

W. T. Doss.

SILVERTON STANDARD.

KLINGER BROS., PUBLISHERS.

Entered at the Silverton, Colo. postoffice for transmission through the mails as second class matter

OFFICIAL PAPER OF SAN JUAN COUNTY

ONE YEAR $2.50.
SIX MONTHS, $1.25
THREE MONTHS, 75C

SATURDAY, MAY 2. 1903.

Silver has reached the 54 mark this week, a gain of eight cents from its lowest mark. This eight cents will increase the production or value of silver alone over $50,000 in this county per year.

When we want to exchange with a paper composed mostly of mail plates and mining advertisements, patent medicine ads., etc., we will put on our list the Mining News of Colorado Springs.

The recent great strikes in the Esmeralda and Gold King mines, the one at the Camp Bird, the Neglected find and the new and rich territory opened up at Burrows Park and Ophir, all presage a wonderful future for the mining industry in San Juan.

There is a spirit of unrest among the nations of the world, and all because the Russian Bear is reaching out his massive paw to grasp Manchuria, China's coveted possession. The territory is not of especially great value to anyone, but the grasping disposition on one hand and the jealous spirit on the other may plunge several nations into a war.

The attempt to inject politics into every happening of general interest has always been the pernicious failing of the Denver papers. Great metropolitan papers should be above such petty practices, but it doesn't seem to strike our Denver contemporaries in that way. Yet the journalistic field is filled with the graves of papers that found some partisan political significance in every passing breeze.

The steady rise in the market price of silver, if continued, or even if it shows no falling off, will give renewed energy to the mining industry in San Juan. The friends of the white metal have predicted with unwavering devotion a brighter day for silver, because they knew it must finally be accorded that place in the monetary world to which it is entitled, and while that happy consummation has not yet been reached, the upward tendency of the market price is evidence that silver is a too important commodity, if you please to so term it, to much longer owe its standing to financial manipulators.

Over in Ouray all talk in newspaper circles is centered upon the Socialist publication about to be launched in that city. But the Herald and Plaindealer folks need not worry. The backers of the new paper will only gain experience. The starting of another publication in a field already occupied is usually the scheme of some persons who have political axes to grind and not to further the interest of a party without newspaper representation, although that is the plea usually made to the "angels." There has been more well to do men in San Juan made nearly paupers through trying to back newspaper enterprises than any other agency we know of

Despite the efforts of papers on the outside to make it appear that Silverton is filled with labor agitators who seek only to start a rough house, there is every assurance of a prosperous season for this camp, a season free from labor disturbances of any kind. There is a three-year agreement in force in San Juan county and neither employer or employe is going to break that agreement. The little differences that might arise, and for which no provision is made in the compact, would be easily and quickly settled by the level-headed men representing each side to the controversy.

A Pleading Document.

It was a western man who leads a western life that constructed the following solicitation and the "plunks" will not be few in number that will find their way into the depleted till of Delos Lodge No. 28, K. of P. We publish it for the merit of composition it contains:

TO ALL TRUE KNIGHTS, GREETING:

Situated in the midst of the Great American Lava Desert, surrounded on four sides by sagebrush and broken lava, and on the fifth side by the most intoxicating climate this side of the "Moonshine District," (which climate is responsible for the whole thing), is the little village of Shoshone, Idaho.

Our little village holds, all told some eight hundred souls, fifty of whom are tried and true Knights, who like Damon, with the love of home in their hearts (and a little cash in their strong box) sought to create a home for themselves, or, in Pythian words, a Castle Hall, where they might meet, as it were, under their own "vine and fig tree." A home that should stand as a monument to the pluck and energy of this little handful of loyal Knights who have builded this Pythian Home to be handed down, for all time, to their Brothers who shall be on the scene of action after they have gone to their reward.

We started in to play "table stakes," four thousand dollars. Things seemed to be coming our way and we, so to speak, got gay and "took off the limit"—hence our little tale of woe. In other words, we over-sized our pile about four thousand dollars, for which the other fellow has our I. O. U., and we have not where to meet that we may call our own, and instead of looking upon our Castle Hall with all the pride of ownership and security, we see mortgage written over all. We have not the wherewithal to get into the final "jack-pot," hence it is by these presents we seem to take each Pythian Brother by the buttonhole, draw him aside and gently whisper—"help us out of the hole."

Now, if each Pythian Brother who is in the Pythian game would even take the top button from his "stack of whites" and toss us a few, we could paint the walls of our Castle Hall so thick with Pythian generosity that nevermore would show that nightmare word "mortgage" to haunt these faithful Knights.

Now, Brothers, we are not going to crawl behind a tree to talk.

Every Pythian Brother should help us a little.

When you have heard this letter read talk it over with the boys, and if you love one another, give us a "boost," or make a bluff anyway.

Consider this communication as an invitation for each Knight to chip in a bit, for it is his turn to "ante."

Yours in F. C. B.,
J. W. S. EMERSON, C. C.

DOUD BROS.
EXCHANGE LIVERY
OPPOSITE GRAND HOTEL.
SADDLE HORSES. DRIVING HORSES.
AGENTS FOR
HESPERUS COAL.

Fred Goble
Wholesale and Retail Dealer in
LUMBER AND COAL,
Screen Doors, Sash, Doors, Lime, Cement and Mining Timbers.
The Perins Peak Coal.
PHONE 46-A.

The World Moves
SO DO I
And if you wish a prompt delivery of goods or baggage see that you have WM. LESTER do it. Ring up Phone Silver 102. or at N. A. Ballou's Store.
All trains arriving and departing reached in due season and baggage carefully handled.
THE SILVERTON TRANSFER. W. E. LESTER. Prop.

THE LAST CHANCE!
MONDAY MAY 4 TO SATURDAY MAY 9, '03
We will have on display a big line of bargains in Ladies', Gent's, and Children's
SHOES
One entire room will be filled all this week with the biggest bargains ever shown in Silverton. Don's miss this chance to secure a fine pair of shoes, a nice hat, a fine dress shirt, or a nice handkerchief or pair of suspendes. Also an assortment ol Novelties, both useful and ornamental.
This sale closes our Clearing deal before commencing remodeling our store. Come early and get your choice of these great bargains.
Four Doors North of Postoffice — THE BRUMFIELD STORE — Main Street Silverton, Colo.

EXTRACTS FROM THE Gladstone Kibosh

The Kibosh office is financially all right. We have not received a single dun through the postoffice for seven days. Can any other country office say as much. Our paper, as a matter of course, last week failed to make a good appearance owing to the fact that no mail has arrived in this place for over a week.

****

Since silver is on the raise a new strike of high grade silver ore has been encountered in the breast of the tunnel of the All Gold Mining, Milling and Smelting company's property of which we are president and general manager. Call early for stock as we have only a few million shares left.

****

We are informed that the Salvation Army will give a dance in the near future for the purpose of raising money to purchase a new drum. Light refreshments such as cornbeef and cabbage, cornbread, bacon and army crackers will be served. Miss Lindy Sortey will serve sody water, four different colors at five cents per glass.

****

The famous brand of whisky, Demon Delight, has accomplished its desired purpose in this community. It has drove out competition and the Haven of Rest ralood has moved out. Its medicinal qualities are marvelous. Steady use has removed a pimple from Sam Beaver's nose and also part of the nose. One gallon in short doses caused Big Mike Conner to acquire enough nerve to propose to Widow Wentel. It brings peace to the household—Tie Choper Jim went home loaded to the brim intending to lick his wife. When Jim recovers he will no doubt sign a peace contract with his better half.

FROM TOWNS NEAR BY.

Today should be a happy day for Ike Kruschke as he was the first American to suggest the building of the cruiser Colorado. The gallant ship bearing the proud name of the Centennial state will have no more patriotic well wisher than Mr. Kruschke. May she never fight except to win.

All the men on the Neglected mine at Durango went out on a strike this week. Trouble over the wages of two of the employes is reported as the cause.

F. M. Austin of Ouray who has been very ill at that place is convalescent and will be able to resume operations on the stage line from the Camp Bird shortly.

According to the financial statement for the fiscal year ending April 12, 1903, the town of Silverton is in a flourishing condition. The indebtedness at the present time amounts to $43,499.75, against which the assets amounts to $91,659.47. The town owns its own water and light plants and on the whole its government is very economically, yet not niggardly, administered. — Ouray Herald.

Miss Margaret Wilson, a professional nurse who came here from Silverton the Monday after Easter, returned to Denver Tuesday last.. On the way over from Silverton her horse fell with her and trampled her in the snow, injuring her quite seriously, heart trouble setting in later, and on account of the high altitude decided it would be better to return to a lower altitude.—Ouray Herald.

Daniel murnane, a brakeman on the road between Rico and Telluride had his left leg mashed to a pulp, Wednesday, necessitating amputation. Murmaine resides at Rico.

MINES AND MINING.

Continued from page 1.

A great deal of work is mapped out for Stony Pass gulch the coming summer and several important changes as regards ownership of properties will assume the tangible. The Old Abe group, lying adjacent the Stony Pass, which last season under the management of Mr. Hollis panned out excellent results from a shipment or two to the Durango smelter, passes into the hands of the company that worked it last year under bond and lease, on or about July 1, at which time, the price agreed upon, some $16,000, is to be paid in full. John Sparks, J. E. Calibean and Geo. Jackson, former owners, hold the winning tickets. Other changes of properties that can be made to pay almost from the grass roots are in contemplation and the probability is that before the snows of another winter whiten up the dirty faces of the rugged mountains environing Stony Pass section several worthy prospectors thereabout will have met their reward and in the meantime capitalists will realize that their investments have been A-1. Nothing but companies, however, backed by capital, will ever develope Stony or any other mining country that we ever knew or heard tell of. Take the Gladstone district, for instance—had it not been for capital, the Gold King, etc., properties would not have amounted to a hill of beans early frost bitten.

Resolutions of Respect on the Death and for Brother David W. Evans.

Whereas, it has pleased Almighty God in His Infinite Wisdom to remove from our midst our esteemed brother, David W. Evans; therefore, be it

Resolved, that we, as members of Snow Flake Lodge No. 61, Knights of Pythias, tender our respects to the memory of our departed brother and our sincere sympathies to his relatives in their hour of bereavement.

Resolved, that the charter of our Lodge be draped in mourning for a period of thirty days and that these resolutions be spread upon the minutes of this Lodge; also that they be published in one of the local papers and Pythian Triangle, and a copy be sent to the relatives of our deceased brother

Committee:
F. J. MOLIQUE,
F. J. BAWDEN,
A. B. AVERY,

Silverton people will receive special consideration at the A. F. Hood's rooming house, one block north of depot, Durango. It is a home where Mr. and Mrs. Hood attend the custom. 4t-24

Quick Arrest.

J. A. Gulledge of Verbena, Ala., was twice in the hospital from a severe case of piles causing 24 tumors. After doctors and all remedies failed, Bucklen's Arnica Salve quickly arrested further inflammation and cured. It conquers aches and kills pain. 25c at S. D. Cunningham, Druggist.

WANTED — SEVERAL INDUSTRIous persons in each state to travel for house established eleven years and with a large capital, to call upon merchants and agents for successful and profitable line. Permanent engagement. Weekly cash salary of $18 and all traveling expenses and hotel bills advanced in cash each week. Experience not essential. Mention reference and enclose self-addressed envelope. THE NATIONAL, 334 Dearborn St., Chicago. Aug. 24, '03.

Made Young Again.

"One of Dr. King's New Life Pills each night for two weeks has put me in my 'teens' again" writes D. H. Turner of Dempseytown, Pa. They're the best in the world for Liver, Stomach and Bowels. Purely vegetable. Never gripe. Only 25c at S. D. Cunningham's Drug Store.

No blanks—every one draws a prize at Marsh's restaurant.

The best furnished rooms in Durango are those of A. F. Hood, one block north of depot. Steam heat. Baths. First-class in every particular. Stop with Hood and be at home. 4t-24

Our Lost Boy is found, and may be seen at our shop, 1314 Greene street, displaying our new 1903 Patterns of Wall Paper.— Williams the Painter.

Ever eat any of Marsh's lemon pies?

The "skinnies" go to Marsh's to get fat and the "fatties" go there to satisfy their epicurean appetites.

Pete Orella

Sole Agent for.....

ANHEUSER-BUSCH, LEMPS, and ZANGS BEERS—

Bottled & Keg

also agent for.....

The ORIGINAL MANITOU GINGER ALE & MINERAL Waters

****

PHONE 7-c P. O. BOX, 217

Silverton, Colo.

If you see a Painter with a blue ladder it signifies that he is a Mechanic and is working for Williams, The Painter.

THE CHICAGO SPECIAL.

Leaving Denver 1:10 p. m., arriving at 4 p. m. next day, is a fast, solid, vestibuled train via the Chicago, Union Pacific and Northwestern Line. Only one night enroute, service of the highest character. Pullman drawing room cars, dining and buffet library cars, free reclining chair cars, all the luxuries of modern travel.

A second daily train from Denver carries similar through service. D. W. Aldridge, General Agent, 801 17th St., Denver, Colorado.

SCHERER BROTHERS

Bottled Beer!

SCHLITZ'S BEER With the best of LUNCHES and CIGARS a SPECIALTY

UNION BOTTLING WORKS.

Holthoff Machinery Co.

MAKERS OF

Smelting Machinery,
Cyanide Machinery,
Chlorination Machinery,
Concentrating Machinery,
Amalgamating Machinery,
Lixivation Machinery,
All kinds of Milling Machin'y

THOS. FIELDING

GENERAL

Rand Drill Company.

MAKERS OF

Rand Cross Compound Air Compressors,
Rand Duplex Air Compressors,
Rand Straight Line Air Compressors,
Rand Slugger Air Drills,
Rand Little Giant Air Drills,
Rand Little Terror Air Drills

MINING MACHINERY

1711-13 Tremont St.

P. O. Box 1571. DENVER, COLO.

TAILORING

Makes or mares you. Your position often depends upon your TAILOR. Choose him with deliberation and to be on the safe side.

J. N. KLOSTER, = = THE TAILOR.

PURELY PERSONAL.

—B. B. Allen and wife returned from their Pueblo visit Wednesday.

—Mr J. B. Patterson and Jessie left last Saturday for Denver for a short visit.

—O. V. Kimball and wife returned last Monday from their three month's California trip.

—James Lanigan, one of the oldest timers in the Chattanooga district, was in Silverton this week.

—Henry Sherman and wife are reported in Denver and are expected to arrive home in the near future.

—Johnnie Wood returned from a three month's visit to Minneapolis and other eastern points Saturday last.

—A. J. Morgan has returned from the Blue mountains, where he has been prospecting in the copper fields of that section.

—Mrs. O. U. Franklin departed from Silverton Tuesday morning for a few month's visit with Mr. Franklin's folks in Kansas.

—A. J. Kirk, of the Minnie Gulch Mining company, returned to Silverton from Pagosa Springs Tuesday evening. He has been enjoying the waters of that resort for the past ten days.

—J. C. Bowman returned Tuesday from a two weeks outing at Pagosa Springs. Jim looks five years younger, that is, he doesn't look a day over seventy-nine.

Jess Herr, after an absence of four months visiting throughout the east and also relatives in Missouri and Kansas returned to Silverton, Wednesday.

—Wm. Dunlap, whose place was filled in the capacity of clerk at Ballou's by Claude Roberts of Crestone, departed for Alamosa last Monday.

—Rep. C. A. Cooper, Jake Sanger and Chas McKinney returned from a hunting expedition at Stinking Lakes, N. M., Tuesday and distributed ducks among their friends.

—John Barnett visited Silverton this week on his return trip from his old home in Virginia where he has been spending a few pleasant months.

—C. O. Finch, editor of the Miner, arrived Wednesday from Denver. He reports Mrs. Finch, who is now visiting in Kansas, as somewhat improved in health.

—G. P. Christie and wife, residents of Silverton about twelve months ago are now in Tucson, Arizona. Mr. Christie is employed at one of J. J. Henry's electric light plants.

—L. F. Lamb, chief clerk at the Brumfield store, was a visitor to Ouray this week. "Some snow and then some between Silverton and our sister town across the way" says Mr. Lamb.

—Geo. Rubrack returned to Silverton Wednesday after an absence of four months, dividing his time between Pagosa Springs, this state, and Maryland, his old home. This was George's first visit among the Maryland people for a period of fifteen years.

—Col. F. M. Snoden is spending a few days in the Smelter City departed Thursday morning.

—Mr. and Mrs R. McCrimmon, formerly of Silverton, but later of Florence are now residents of Manitou.

—Oliver Mathews of Colorado Springs is examining mining properties near Clifton, Ariz., for Colorado parties.—Mining Reporter.

—Clarence Finch, editor of the Miner returned to Silverton Wednesday. Mrs. Finch is at present with her parents in Kansas and is improving very fast.

—Gus. H. Malchus returned from his winter's outing, in New and Old Mexico and Texas last Saturday, releasing his brother, Casper, who departed for Denver, Tuesday morning.

—Paul Hanson departed for Denver on Mondays train for the purpose of shaking hands with Teddy. Wise ones state that Paul left in the interest of the Gladstone postoffice.

—Dr. H. E. Colby will depart tomorrow morning for Chicago, owing to the illness of his little daughter. He will return with his family to Denver or Pueblo where he will make his future home.

—J. M. Clifford and Martin Schmelzer, respectively secretary and president of Silverton Miners' Union, went to Durango Wednesday to assist the union of that district to settle a difficulty at the Neglected mine.

—S. M. Biggs, ex-postmaster of Durango, was in Silverton this week in contemplation of reaching some mines in Maggie gulch in which he is interested. The deep snow prevented his journey into that particular part of San Juan.

—Tim Manion and J. E. Foster were two among the very few others who came over the range from Ouray this week. They report their two days' trip a difficult one and that the snow is unusually deep for this time of the year.

—A. M. Reede, Chas. Leonard, Merrill Dond and T. J. McKelvey, will "do" Denver early next week The quartette of "not bad actors or players" may run against the real thing and have left with Moyne France and Billy Booker a telegraph code.

J. P. Bresnahan came in Wednesday, April the 22d, from Silverton to look after his mining interests.—Ophir Mail.

Advertised Letter List.

Following letters remain uncalled for at the postoffice in Silverton, Colo., for the week ending April 23, 1903

Blevins, Riley	Baldwin, Ollie
Cooper, L. P.	Craig, M. M.
Miller, Ben	McCune' Phil
Olson, John O	Ohlund, Nils
Philips, N. D.	Smith, J. M.
Samuels, H. W.	Lewkesbury
	Nelson, John

For the week ending April 30, 1903:

Brown, Mrs. C.	Knidt, Max
Howard, Chas	Smith, Mary L
Maggart, R (2)	Wolf, R

Parties calling for any of the above letters will please say "advertised" and give date of list. MATILDA MCCARTNEY, Postmistress.

A Free Commercial Course.

Will be given to the boy or girl who can compose the longest sentence from the letters contained in the following: "THE SILVERTON BUSINESS COLLEGE" submitting the same by June 1st, 1903. No letter is to be used twice in the sentence and the same must be correct.

N. A. BALLOU

:-Wholesale and Retail Grocer-:

Phone 52. 1157 Green Street.

Chase and Sanborn's Coffee

"Seal Brand" Java & Mocha

Best Coffee grown in the World

Perfection of strength & flavor

Guaranteed absolutely pure

No prizes go with our Chase & Sanborn 'high grade' Coffee, in fact, nothing goes with our coffee but cream and sugar and satisfaction.

The SILVERTON SUPPLY Co.

Grocery and Bakery. Exclusive Agents.

Our Tools have the good temper to

Keep Your Temper

And will not fly off the handle.

They are the tools that work, they make work a pleasure. that are easy to keep sharp and useful, are not very expensive just now.

Skilled Workmen prefer these tools to all others.

Stubbs & Jakway

Line Will Cost Immense Sum.

Projected Pan-American Railroad to Connect Systems of North and South America—Sure to Be Factor in Developing Southern Republics.

About 50,000,000 people live in America south of the United States and 35,000,000 of them live in South America. If the estimates made by the Intercontinental Railroad commission in 1899 are correct, it will cost $1.50 for every person in the United States and the Latin republics to build and equip the proposed trunk line connecting our railroad system with roads already built or being built from the chief ports of Chile and Peru on the west and Buenos Ayres on the east.

Mexico's railroad system has not yet been extended north and south beyond the city of Oaxaca, which is several hundred miles north of the Guatemalan boundary. The Intercontinental railroad will utilize existing roads as far as possible between New York city and Buenos Ayres.

The total length of the all-rail route from New York to the capital of Argentina will be 10,228 miles. Of this mileage the part yet to be constructed extends between Oaxaca, Mexico, and Jujuy, Argentina, a distance of 5,456 miles. This is merely the trunk line, as it does not include the branch lines which, it is hoped, some day to construct eastward to existing railroads running to Caracas, Rio de Janeiro and Santos and to Asuncion and Montevideo.

The Latin republics have not thus far contributed very much to the preliminary expenses. The three survey parties which performed the enormous work of tracing a route for the railroad through the mountain wilds of Central and South America carried out their mission at a cost of $288,000, of which $245,000 was contributed by the United States.

The small remainder was supplied by the South American republics interested, excepting Argentina, which declined to contribute to the expense of the preliminary survey, but promised to connect her railroad system with the proposed trunk line at her northern frontier. This means that she will extend her railroad between Buenos Ayres and Jujuy to the border of Bolivia.

No doubt seems to be felt in financial and commercial circles that this great enterprise would be a large factor in developing for their mutual benefit the vast potentialities of the Americas. The project has the approval of all the governments concerned, and it was indorsed by the two Pan-American congresses, the second of which appointed a permanent committee, with headquarters in Washington, to look after the interests of the enterprise there. Charles M. Pepper, who is going to confer with the governments of the South American republics in regard to carrying out the plans for the railroad, will therefore start on his mission under favorable conditions, and is confident of success.

Gov. Bachelder's First Veto.

The first bill vetoed by Gov. Bachelder of New Hampshire is that providing an appropriation of $50,000 to found a state sanatorium for consumptives. The governor's reasons are substantially these: That tuberculosis is decreasing in New Hampshire, that the projects for curing the disease in that climate are largely experimental, and that the state should not at present make such provision for the care of one class of sufferers.

No More Red Trousers.

If the recommendations of the French army committee with regard to uniforms be carried out the infantry soldier will change his appearance beyond recognition. There will be no more red trousers, blue tunics and red kepis; no more white gloves and stiff collars. Instead there will be a somber-colored dress and a soft hat. The French soldier will not look half so brave a man.

Women Make Money for Church.

The Rev. Walker D. Stirling, rector of St. John's church of Mount Morris, N. Y., hit upon a unique scheme of increasing the income of his parish. He gave to each of fifty women in his parish $1 a year ago for investment. The women turned over their earnings which amounted to $411.80. One member made $10 in popcorn and another $17 in eggs.

Bright Pupil.

A pupil in one of the rural schools of Lehigh county was told by his teacher to form a sentence with the word cuckoo in it. The youngster at once replied: "Chust because she made those cuckoo eyes."

The Vitality of Wheat.

Wheat seldom preserves its vitality for more than ten years. The stories, therefore, of Egyptian mummy wheat 4,000 years old growing when planted should be accepted with caution.

German Peasants Eating Dog.

Owing to the poverty existing in South Germany the peasants during the last three months have been compelled to eat the flesh of dogs. The government has now ordered a special slaughterhouse for dogs to be erected at Munich. In future all dogs before being killed will be examined by a veterinary surgeon, and if certified unsound will not be allowed to be sold. Dog meat will only be permittted to be sold by dealers in horseflesh.

Government Waste Paper.

Waste paper from the combined English government offices amount each day to no less than fifteen tons. The paper is taken off to a department officially known as the waste-paper office, and afterward sent to a mill, where it is reduced to pulp and made into paper again. All the paper ribbon from the government telegraph departments comes to the waste-paper office also.

London's Debt.

The growing debt of the city of London has recently been the subject of discussion in the County Council. It is now, or will be by the end of the year, $300,000,000, to which figure it has grown since the erection of the Council from $158,000,000. If the city were to stop borrowing it could, through its sinking fund, pay off the whole of the debt in thirty-five years.

To Publish Civil War Document.

A volume of civil war stories, just coming from the press in San Francisco, is said to contain a remarkable letter addressed by the (then) Pope to the president of the Southern Confederacy.

Hydrogen Gas Travels Fast.

The highest speed which matter has been known to reach is that attained by the eruption of hydrogen and other gases from the sun, which is, at times, several hundred miles a second.

An Early Skirt Dancer.

Kate Vaughan, who died recently in Johannesburg, is alleged by the English to have been the originator of the skirt dance. She was an all round actress and had been on the stage from early childhood, the parts of Little Nell and Little Em'ly, in "David Copperfield," being among her preliminary triumphs. She first attempted her dancing in the "tempestuous petticoat" so long ago that few living exponents of the art will care to contest the claim that she was first. It is said that the manager of the London theater in which Miss Vaughn first gave the dance cheerfully paid a weekly bill of $40 for the renewal of her skirts.

A Puzzling Calculation.

We all like to puzzle our brain over things which give certain and strange results, but which we cannot explain. Here's a puzzle that puzzles everybody: Take the number of your living brothers, double the amount, add to it three, multiply the result by five, add to it the number of living sisters, multiply the result by ten, add to it the number of deaths of brothers and sisters, subtract 150 from the result. The right-hand figure will be the number of deaths, the middle figure the number of living sisters and the left the number of living brothers.—Canton Saturday Roller.

Brains Cost Money.

This is the opinion of a large retail merchant on wage-earners. When an irate customer complained that the store was full of insolent chumps who did not understand the first principles of waiting on a patron he said: "If my clerks had brains enough to amount to anything they would not be working here at $7 or $8 per week." "Why don't you hire clerks with brains?" asked the customer. "Because brains cost more money than I can afford to pay," was the reply. "In our business we pay large salaries to slave drivers and nothing to the slaves."

Ill Omen at a Wedding.

A curious story is told by a person who was present at the marriage of the much-talked-of Princess of Saxony, who was divorced the other day. By some inexplicable error the box supposed to contain her wedding boquet, sent by a celebrated flower artist in Vienna, was found when opened to contain instead a large cross of white flowers, destined for the funeral of a well-known Austrian general just dead. The mistake was not discovered until within half an hour of the wedding, and the consternation of the superstitious Austrian court may be imagined.

To Encourage Tree Planting.

There are many historic trees in the country, and it is believed by the Department of Agriculture that interest in tree planting can be stimulated by distributing a limited number of these trees under proper direction. The seedlings, when grown, will be sent to schools in various parts of the country, and there will accompany each tree a concise statement setting forth the historic events connected with the tree itself, and the growing of the seedling.

Spooner Offered High Places.

In the new edition of the Congressional Directory Senator Spooner makes a revision of his biography, in which he furnishes a few items of news not heretofore known. He states that he was offered the position of secretary of the interior by President McKinley, to succeed Secretary Cornelius N. Bliss; that he was also offered the position of Attorney General, to succeed John W. Griggs, and that he declined the tender of a place on the United States and British joint high commission.

M. B. HOLT
Mining Engineer
U. S. Deputy Mineral Surveyor

FINNEY JONES
..CIVIL ENGINEER..
Cor. Reese and 13th
SILVERTON, COLO.

JAMES DYSON,
CIVIL AND MINING ENGINEER
U. S. Deputy Mineral Surveyor
Office on Reese Street between 14th and 15th near the county Offices.

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ASSAYER
Gold or Silver..... $ .75
Both 1.00
Copper ..... .75
Lead ..... .50
Complete price list on application.

A 26-page pictorial souvenir—11x16 inches (price 50c)—with every subscription to the Silverton Standard. It contains views of every town, mill and scenic points in the county of San Juan.

The Schulz Brewery
BREWER OF
HIGH-GRADE LAGER
WM. SCHULZ, PROPRIETOR.
Our new brews under the present management have reached a high grade of perfection. Its pureness is guaranteed. Ask for it, as it is sold by all first-class dealers.

Water Cure For a Broncho

How Major Pershing Subdued Bucking Steed That Had Been Given Up As Incorrigible—American Cavalry Officers Can Ride.

"Major John J. Pershing won fame when he captured the insurgent stronghold in Mindanao after a desperate engagement," said an army officer the other day. "Pershing is a remarkable fellow and a splendid officer, but I doubt if the best story on him has reached this country. He is a former cavalry officer and could give pointers to a Comanche on how to ride a horse.

"The South African war nearly exhausted our stock of cavalry horses, and the British agents were paying such big prices that we had to take what we could get in the Philippines. Consequently we received the scum of the Wyoming and Montana ranges, and a worse set of bronchos you never saw.

"One day Pershing's command got a drove of the beasts that had come over on a transport, and it was discovered that they had to be broken before the stock of mounts could be replenished. Our men were good riders, who had been put through the monkey drill until they could ride like Cossacks, but there was one flea-bitten roan that no one could 'stick' to for more than two minutes. He was pronounced an 'outlaw' or broncho that couldn't be ridden. The sergeant told Major Pershing that the animal was of no value and ought to be shot.

"'I don't believe you know how to ride him,' said Pershing.

"'Our best men have tried him for three days and he has thrown them all,' said the sergeant. 'He just dumped me.'

"'I think I'll try him,' said Pershing, as he walked out to where the roan stood with saddle and bridle still on, waiting for his next victim.

"Then the men gathered to see the fun. But the minute Pershing vaulted into the saddle the men began to feel sorry for that broncho. He was a big beast. He jumped into the air and came down, stiff-legged, in regular broncho fashion. But Pershing kept his head up and gave him the spurs until you could hear the brute squeal between lunges. Then the officer headed his mount for the river. When the horse struck the water up to his knees he didn't jump so much. He couldn't. He tried to lie down, but Pershing was off like a flash, and was in the saddle again as soon as the horse got on his feet. This went on for fifteen minutes, and then the roan gave up. Pershing rode him back as meek as a street car horse.

"'I don't think you will have any more trouble with that horse,' he said as he went into get some dry clothes.

"And they didn't. The water cure was effective."

THE MUCH-FEARED CENTIPEDE.

Sight of One Full Grown Gives a Shock to the Nerves.

The sight of a full-grown centipede is said by travelers in tropical lands to be enough to affect the strongest nerves. Ten to eleven inches is the average length, although larger ones have been seen. Lafcadio Hearn, in "Two Years in the French West Indies," says that the vitality of the centipede is amazing. He kept one in a bottle, without food or water, for thirteen weeks, at the end of which time it remained as active and dangerous as ever. The hen attacks the centipede with delight, and often swallows him head first, without taking the trouble to kill him. The cat hunts him, but is careful never to put her head near him. She has a trick of whirling him round and round upon the floor so quickly as to stupefy him; then, when she sees a good chance, she strikes him dead with her claws. If you kill a centipede you are sure to receive money soon and even if you dream of killing one it is good luck—at least so local tradition says.

THE ACME OF UNBELIEF.

"Close" Man's Reputation Must Have Been Well Established.

One day last week three members of the Stock Exchange, one of whom is generally reputed to be rather "close," were on their way to luncheon when they were met by three sisters of charity soliciting alms. Each one contributed something, but one of the sisters inadvertently solicited from the close one for the second time. Naturally enough he protested politely that he had done his duty.

"I believe him," said the first member in the ear of the second, "but I did not see it."

"Well," said the second, "I saw him do it, but I don't believe it."—New York Times.

BACK TO HIS OWN CHURCH.

Youth Had Gone Rounds of the Others and Was Satisfied.

Young Stanley McMinneman of Rumford Falls, the son of Mr. and Mrs. George McMinneman, is supposed to be an attendant at Father La Flamme's church.

For the past few weeks, owing to necessity, he has been sent to church alone. The other day he startled his mother by announcing, as he buttoned his collar under his chin:

"Well, I guess I'll go back where I belong to-day."

"What do you mean?" his mother asked in surprise.

"Why," the little chap answered calmly, "I've been going round to see what church I liked best. But the Universalists and the Baptists are no good. The Methodist church's on the bum—they have't got any altar, nor altar boys, and I'm just going back to where I belong!"

His mother took pains to assure herself that he did.—Lewiston Journal.

TRAINING THE HUMAN EYE.

Wonderful Possibilities of That Organ Are Little Known.

Unless we are color-blind we all can see the seven colors in the rainbow. That is ordinary eyesight, which may by careful training be wonderfully developed. The tapestry workers of France, for instance, by continued practice, learn to distinguish different shades of the same color in a truly marvelous way. Some of these men and women, by actual experiment, can perceive 1,500 different shades of a single color, and combine them in wonderful harmonies. Their eyes are ordinary human eyes, like those of other people; but they have trained their sight until it becomes almost unbelievably perfect. Their work is priceless, because they have raised an ordinary possession into an extraordinary endowment.

ESTABLISHED 1876

Silverton Meat & Produce Co.

DEALERS IN ALL KINDS OF

Fresh and Salt Meats, Ham, Bacon, Kettle Rendered Lard. Del Norte Creamery Butter, San Luis Valley Eggs and Vegetables of All Kinds

Supplying Mines in Any Quantity

AT BED-ROCK PRICES

Brick Building 1125 Green Street

Independent Meat Market

C. H. H. KRAMER.

Wholesale and Retail Butcher.

FRESH FISH. FRESH MEAT.

Vegetables, Cured Meats and Poultry.

Rohrig & Kramer's Old Stand.

THE KENDRICK-GELDER SMELTING CO.

F. C. KENDRICK, General Manager E. W. WALTERS, Supt. and Metallurgist

Purchasers of Gold, Silver and Copper Ores. Special rates on tonnage of low grade ores.

Sampling and Settlements Made Promptly

AND AT ALL TIMES

Joseph Bordeleau,

DEALER IN

HEAVY AND SHELF

HARDWARE

Stoves, Crockery, Tinware and Mining Supplies.

Agent for Hercules and Giant Powder Fuse, Caps, Etc.

SUMMONS.

STATE OF COLORADO, } ss.
COUNTY OF SAN JUAN. }

IN THE DISTRICT COURT.

Eudora F. Hatcher, *Plaintiff*,
vs.
The Congressional Gold Mining Company, a Corporation, Benjamin F. McMillan, Charles V. McMillan and W J. Shiek, *Defendants.* } SUMMONS.

The People of the State of Colorado,

To The Congressional Gold Mining Company, a Corporation, Benjamin F. McMillan, Charles V. McMillan and W. J. Shiek, the defendants above named, Greeting:

You are hereby required to appear in an action brought against you by the above-named plaintiff in the District Court of San Juan County, State of Colorado, and answer the complaint therein within twenty days after the service hereof, if served within this County, or if served out of this County, or by publication, within thirty days after the service hereof, exclusive of the day of service, or judgment by default will be taken against you according to the prayer of the complaint. And if a copy of the complaint in the above-entitled action be not served with this summons, or if the service hereof be made out of this State, then ten days additional to the time hereinbefore specified for appearance and answer will be allowed before the taking of judgment by default as aforesaid.

The said action is brought to quiet plaintiff's title to the Ariadne lode mining claim, U. S. Survey No. 2279, in Eureka mining district, San Juan county, Colorado, a patented lode, the amended location certificate being of record in the county clerk's office in book 66 at page 188, and to have the adverse claims of defendants, and each of them, decreed to be of no force and effect, and to secure a decree that plaintiff's title is good and valid, and for equitable relief and costs of suit, as will more fully appear from the complaint in said action to which reference is here made.

And you are hereby notified that if you fail to appear, and to answer the said complaint as above required, the said plaintiff will apply to the court for default and judgment according to the prayer of her complaint, all as by law provided.

{ DISTRICT COURT SEAL. } Given under my hand, Frank L. Watson, clerk of said court and the seal thereof, at Silverton, in said County, this 3rd day of March, A. D. 1903.

FRANK L. WATSON,
Clerk District Court.

First pub. May 2, 1903.
Last pub. May 23, 1903.

FORFEITURE NOTICE.

To Wm. McKay, his heirs or assigns:

You are hereby notified that we have expended the sum of One Hundred Dollars in labor and improvements during the years 1893, 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901 and 1902 upon the Yellow Rose of Texas lode mining claim, situated in the Eureka mining district, San Juan county, Colorado, the location certificate of which is found of record in Book 60 at page 252 of the records in the recorder's office of said San Juan county, Colorado, in order to hold said claims under the provisions of section 2324 of the Revised Statutes of the United States, and the amendments thereto, approved January 22 1880, concerning annual labor upon mining claims, being the amount required to hold said lode for the periods ending December 31, of each of the years above designated.

And if within ninety days from the service of this notice (or within ninety days after this notice by publication) you fail or refuse to contribute your proportion of such expenditure as a co-owner and the cost of this service notice, or the publication thereof, your interests in the claims or said lodes will become the property of the subscribers, your co-owners, by the terms of said section 2324.

C. ALLISON.
N. T. BORROUGHS.
W. A. LEYALLSON.
R. L. CLEAVES.

First pub. April 25, 1903.
Last pub. July 25, 1903.

Notice of Dissolution.

Notice is hereby given that the co-partnership heretofore existing between John F. Melton and Chas. A. Melton under the firm name of Melton & Melton is this day dissolved by mutual consent, Chas. A. Melton retiring. The said John F. Melton will continue the business and collect all accounts due and pay all bills of the late firm.

JOHN F. MELTON.
CHAS. A. MELTON.

Silverton, Colorado, April 23, 1903.

FORFEITURE NOTICE.

To Charles Jackson, his heirs and assigns:

You are hereby notified that I have expended the sum of One Hundred Dollars in labor and improvements during the year 1902, upon the Horse Shoe Lode Mining claim, situate in Eureka Mining district, San Juan county, Colorado, the location certificate of which is found of record in Book 97, page 471, of the records in the Recorder's office of said San Juan county, Colorado, in order to hold said claims under the provisions of Section 2324 of the Revised Statutes of the United States and the amendments thereto, approved January 22, 1880, concerning annual labor upon mining claims, being the amount required to hold said claim for the period ending December 31, 1902.

And if within ninety days from the service of this notice (or within ninety days after this notice by publication) you fail or refuse to contribute your proportion of such expenditure as co-owner and the cost of this service notice, or the publication thereof, you interest in the said claim or lode will become the property of the subscriber, your co-owner, by the terms of said section 2324.

JOHN M HOFFMAN.

First pub. Jan. 31, 1903.
Last pub. May 2, 1903.

Notice of Forfeiture.

To Chas. Webster, his heirs and assigns:

You are hereby notified that we have expended the sum of One Hundred Dollars in labor and improvements during the year 1902 upon the Plutark lode mining claim, situated in Minnie gulch, Eureka mining district, San Juan county, Colorado, the location certificate of which is found of record in Book 111 at page 626 of the records in the recorder's office of said San Juan county, Colorado, in order to hold said claim under the provisions of section 2324 of the Revised Statutes of the United States and the amendments thereto, approved January 22, 1881, concerning annual labor upon mining claims, being the amount required to hold said lode for the period ending December 31, 1902.

And if within ninety days from the service of this notice (or within ninety days after this notice by publication) you fail or refuse to contribute your proportion of such expenditure as a co-owner and the cost of this service notice or the publication thereof, your interest in the claim or said lode will become the property of the subscribers, your co-owners, by the terms of said sections 2324.

J. H. FOSTER.
J. M. FOSTER & Co.

First pub. March 21, 1903.
Last pub. June 20, 1903.

OCCIDENTAL MINING COMPANY

NOTICE IS HEREBY GIVEN that The Occidental Mining Company with The Natalie Mining and Milling Company, both corporations doing business in San Juan County, Colorado, have been consolidated. The name of the new consolidated company is THE NATALIE - OCCIDENTAL CONSOLIDATED MINING & MILLING COMPANY.

Dated Silverton, Colorado, April 17, 1903.

W. HAROLD COCKCROFT,
Secretary of the Consolidated Companies.

First pub. April 18, 1903.
Last pub. May 9, 1903.

NATALIE MINING AND MILLING COMPANY.

NOTICE IS HEREBY GIVEN that The Natalie Mining and Milling Company with The Occidental Mining Company, both corporations doing business in San Juan County, Colorado, have been consolidated. The name of the new consolidated company is THE NATALIE - OCCIDENTAL CONSOLIDATED MINING & MILLING COMPANY.

Dated Silverton, Colorado, April 17, 1903.

W. HAROLD COCKCROFT,
Secretary of the Consolidated Companies.

First pub. April 18, 1903.
Last pub. May 9, 1903.

Notice of Forfeiture.

To Thomas Long, deceased, his heirs, and to Benjamin Treloar and L. L. Bigelow, their heirs and assigns:

You and each of you are hereby notified that I have expended One Hundred Dollars in labor and improvements during each of the years 1899, 1900, 1901 and 1902 upon the Free Coinage lode mining claim, situated in Red Mountain mining district, San Juan county, Colorado, the location certificate of which is found of record in Book 82 at page 216 of the records in the recorder's office of said San Juan county, Colorado, in order to hold said claims under the provisions of section 2324 of the Revised Statutes of the United States and the amendments thereto, approved January 22, 1880, concerning annual labor upon mining claims, being the amount required to hold said lode for the periods ending December 31, 1899, 1900, 1901 and 1902.

And if within ninety days from the service of this notice (or within ninety days after this notice by publication) you fail or refuse to contribute your proportion of such expenditure as co-owners and the cost of this service notice, or the publication thereof, your interests in the claim or said lode will become the property of the subscriber, your co-owner, by terms of said section 2324.

A. JOHNSON.

First pub. Jan. 31, 1902.
Last pub. May 2, 1902.

FORFEITURE NOTICE.

To FREDERICK BRONK, his heirs and assigns:

You are hereby notified that I have expended the sum of One Hundred Dollars in labor and improvements during the year 1902 upon each the Fearless and Nevada lode mining claims, situated in Eureka mining district, San Juan county, Colorado, the location certificates of which are found of record respectively in Book B-3 at page 343 and in Book B-2 at page 449 of the records in the recorder's office of said San Juan county, Colorado, in order to hold said claims under the provisions of section 2324 of the Revised Statutes of the United States and the amendmedts thereto, approved January 22, 1880, concerning annual labor upon mining claims, being the amount required to hold said lode for the period ending December 31, 1902.

And if within ninety days from the service of this notice (or within ninety days after this notice by publication) you fail or refuse to contribute your proportion of such expenditure as a co-owner, and the cost of this service notice, or the publication thereof, your interest in the claims or said lodes will become the property of the subscriber, your co-owner, by the terms of said section 2324.

FRANCIS A. GIBSON.

First pub. April 11, 1903.
Last pub. July 11, 1903.

Forfeiture Notice.

To Gid Herbert, his heirs, administrators and assigns:

You are hereby notified that I have expended during each of the years 1898, 1899, 1900, 1901 and 1902 One Hundred Dollars in labor and improvements upon the "Ade eide A" lode mining claim, situated in Eureka mining district, San Juan county, Colorado, the location certificate of which is found of record in Book 96 on page 550 of the records in the recorder's office of said San Juan county, Colorado, in order to hold said claim under the provisions of section 2324 of the Revised Statutes of the United States and the amendments thereto, approved January 22, 1880, concerning annual labor up mining claims, being the amounts required to hold said lode for the periods ending December 31, 1898, 1899, 1900, 1901 and 1902.

And if within ninety days from the service of this notice (or within ninety days after this notice by publication) you fail or refuse to contribute your proportion of such expenditure as a co-owner and the cost of this service notice, or the publication thereof, your interest in the claim or said lode will become the property of the subscriber, your co-owner, by the terms of said section 2324.

H. D. OTTE.

First pub. March 14, 1903.
Last pub. June 13, 1903.

I have added a Jewlery line to my business and shall carry a complete line of high grade watches and jewelry.

Mr. Crocker will have charge of my repair and Optical Work.

It will be our endeavor to give first-class work and satisfaction in every way. Special attention given to making new Jewelry in fine quartz, Charms etc.

F. J. MOLIQUE.

L. G. PROSSER,

Furniture Dealer

AND UNDERTAKER.

The Best line of Sewing Machines in the world.

The

STANDARD ROTARY,
WHITE ROTARY,
NEW HOME,
HOUSEHOLD,
IDEAL.

Sold here on time at Denver prices.

Fire, Accident, Life, Health and Employers Liability Insurance.
R. H. COOPER.

IF IT'S

"HERALD WHISKEY"

It's all you want to know about it.

FOR SALE BY

John Walter,
Giacomelli & Gallo,

CHAS. SCHEER,

PRACTICAL PLUMBER and Steam Fitter.

Headquarters at
Joseph Bordeleau's

O. U. FRANKLIN,

EXPRESS

And all kinds of Haulin promptly attended to.

HOME MADE

Our candies are delicious as well as healthful.

Fresh & Pure.

HONEYCOMB

THE NEW PERFORATED CANDY. TRY IT.

CHAS. SCHUTT & CO,
Postoffice Store.

AN ORDINANCE

Creating an Electric Light Department, Regulating the Use of Lights, Fixing the Rates Therefor, Prescribing the Manner for Payment and Penalties for Violation.

Be it Ordained by the Board of Trustees of the Town of Silverton:

SECTION 1. **Electric Light Department Created.**—An Electric Light Department of the Town of Silverton is hereby created and established, subject to such rules and regulations and changes as may be from time to time prescribed by the Board of Trustees.

SECTION 2. **Manager, How Elected.** The office of Manager of the Electric Light Department is hereby created. The Manager shall be elected by ballot by the Board of Trustees of said Town and shall hold his office until one week after the next annual Town election, unless sooner removed according to law. The salary of the Manager shall be fixed by resolution by the Board of Trustees at the time of his appointment.

SECTION 3. **Duties of Manager.**—The Manager is to have charge of the entire Electric Light Plant under the direction of the Board of Trustees, to purchase the necessary supplies and to employ at such wages as shall be fixed by the Board of Trustees necessary laborers; and in employing such laborers, vacancies shall, whenever practicable, be filled by the promotion of competent men already in the service. Such Manager, or his duly authorized representative, are hereby autorized and empowered to enter at any time upon any premises connected with or using any power or light from the electric light plant or containing fixtures belonging to the said plant for the purpose of wiring, inspecting, removing or repairing said connections or fixtures. He shall inspect all wiring and make all connections hereafter made and shall neither introduce light or power in any premises unless said wiring and fixtures conform to the rules and requirements of the National Board of Fire Underwriters concerning the installation of electric wiring and appurtenances.

SECTION 4. **Permits—How Obtained.**—All applications for Electric Light or Power shall be made in writing to the Town Clerk by the person desiring such connection. The Town Clerk shall then issue an order in writing to the Manager of the Electric Light Plant authorizing such connection. The Manager shall, as soon as said connections are made, report to the Clerk the number and kind of electric lamps and hours of service, and size and number of meter installed. If at any time any consumer becomes delinquent the Town Clerk shall issue a written order to the Manager of the Electric Light Plant to discontinue service, and the order so issued shall have date of such discontinuance endorsed thereon, and filed with the Town Clerk, and no service shall be continued until all back dues are paid to the Town Treasurer, and a written order from the Town Clerk to the Manager of the Electric Light Plant has been issued authorizing the continuance of said service. The Water Superintendent shall have general supervision over the commercial lighting and see that abuses are prevented and report to the Clerk such abuses, and shall read all meters and render such assistance to the Clerk and Treasurer as may be necessary.

SECTION 5. The Town will, at its own expense, run service wires from its lines to any building to be supplied with light or power.

SECTION 6. No special contracts departing from the rates and conditions provided in these rules shall be valid unless signed by the Mayor and Chairman, or acting chairman, of the Committee on Lights, and any such contract shall be liable to revocation by the Board of Trustees on thirty (30) days notice.

SECTION 7. A consumer is strictly forbidden to interfere with a meter or any other appliance of the department, and in case of defective service must immediately notify the Manager.

SECTION 8. In no case shall the Town be liable to any person for any damage because of any pretended or actual inefficiency of service, or defective equipment or insulation.

SECTION 9. The Town reserves the right to require a deposit from any consumer in an amount sufficient to insure the payment of accruing bills, meters or other property of the Town in possession of the consumer.

SECTION 10. The Town reserves the right to discontinue the lighting or any premises at any time and at its pleasure. It also reserves the right to attach a meter and charge at meter rates regardless of any other rates in effect.

SECTION 11. No contract shall be made with any person or corporation to furnish light or power at extra hours or at such rates as to make the cost of furnishing same, including a reasonable amount of incidental repairs, greater than the price received therefor, and no expectation that the introduction of such hours or rates will build up a remunerative business shall justify the suspension of this section.

SECTION 12. All rates for light or power are hereby declared to be due and payable monthly, on the first day of each month to the Town Treasurer, and in case any party shall neglect or refuse to to pay the same within ten (10) days thereafter, the Manager shall cut off the service from such premises and not turn it on again until all back rates are paid. A discount of five per cent. (5 per cent.) will be deducted from all bill paid on or before 4.00 p. m. the fifth day of each month.

SECTION 13. **Rates.**—All service shall be paid for at the following rates:

1-CANDLE-POWER LIGHTS.

	Residence.	9 o'clock business.	Midnight business.	All Night business.
1—	$ .65	$ .60	$ .90	$ 1.20
2—	1.20	1.10	1.80	2.40
3—	1.65	1.80	2.70	3.60
4—	2.00	2.40	3.50	4.80
5—	2.25	2.90	4.30	5.85
6—		3.40	5.05	6.90
7—		3.85	5.80	7.95
8—		4.30	6.55	9.00
9—		4.75	7.35	10.00
10—		5.20	8.05	11.00

Each additional 16 C. P. residence light above 5, 25 cents.
Each additional 16 C. P. 9 o'clock business light above 10, 40 cents.
Each additional 16 C. P. midnight business light above 10, 70 cents.
Each additional 16. C. P. all-night business light above 10, 75 cents.
8-Candle Power lights one-half the above rates.
32-Candle Power lights twice the above rates.

ARC LIGHTS.

9 o'clock.	Midnight.	All-Night.
$4.00	$6.00	$9.00

METER RATES.

50,000 or less Watt hours, 1.c per thousand.
50,000 to 75,000 Watt hours, 9c per thousand.
75,000 to 100,000 Watt hours, 8c per thousand.
100,000 or over Watt hours, 7½c per thousand.
Where meter is used the minimum charge shall be $1.50 per month.
All arc lamps shall be purchased and be the property of the consumer.
Meters will be furnished by the Town.

SECTION 14. **Injuring Light Property—Interference—Penalty.**—It shall be unlawful for any person to throw any stone or other missile at any electric light fixture or apparatus belonging to the Town, or otherwise carelessly or maliciously to injure the same; or to climb any electric light pole without authority from the Manager of the Electric Light Works, or to nail, paste, or attach thereto any sign or other object, or to paint any sign or other device thereon. It shall also be unlawful for any person in any way to obstruct, hinder or interfere with the Manager of the Electric Light Plant, or any of his assistants or employes under him in the performance of his or their duties or any work connected with said light plant. It shall be unlawful for any person or corporation to attach any light or other device for using electric light or power from the Town plant without having first made application to and received permission from the Town Clerk for the same. Any person violating any of the provisions of this section or of any other section of this ordinance shall, upon conviction thereof, be fined in a sum not exceeding fifty dollars ($50.00) and shall stand committed until such fine and costs are paid.

SECTION 15. **Electrician—Licensing—Powers.**—Any practical electrician may make application to the Board of Trustees for a license as a Licensed Electrician, which license shall authorize and license any such person to carry on the business of a general electrician and to place electrical wires and fixtures and devices in any building in the Town of Silverton. Any such person may receive such a license from the Board of Trustees only on making application therefor and paying the sum of $25.00 therefor, which said license shall continue for the period of one year from the date of issuance thereof. No person unless thereunto duly licensed by the Board of Trustees as hereinabove provided shall place or cause to be placed any electrical wires, fixtures or devices in any buildings in the Town of Silverton or carry on any electrical business in said Town of Silverton. No such license shall be issued unless and until such licensee shall have given to said Board a good and sufficient bond in the sum of one thousand dollars ($1,000.00) conditioned for the good and faithful and proper performance of all work and duties by him undertaken or performed as such electrician, and that all wiring and fixtures by him placed in any building shall conform to the rules and regulations and requirements of the National Board of Fire Underwriters concerning the installation of electric wiring and appurtenances.

Passed and approved this 19th day of January, A. D. 1903.

N. A. BALLOU, Mayor.

[L. S.] R. H. COOPER, Clerk and Recorder.

First pub. April 18, 1903.
Last pub. May 2, 1903.

TRUSTEE'S SALE.

Whereas, John H. Paul and Mary Paul by their certain deed of trust, dated October 14th, 1902, and recorded in the office of the Clerk and Recorder of San Juan county, Colorado, in Book 110 at page 147, did convey to the Public Trustee of said county lot No. 22 in Block No 25 in the town of Silverton, according to the plat of said town in the office of the Clerk and Recorder of San Juan County; together with all buildings thereon, in trust to secure the payment of their certain promissory note to Fred Brockenauer, of even date with the said deed of trust for the payment of the sum of Eight Hundred Dollars ($800), interest payable as follows: Eight per cent. per annum on the balance of said note which remains due after April 10th, 1904, the intention being to charge no interest on any of said note except the part thereof which may still be due and payable on and after April 10th, 1904.

And whereas, It is provided in said deed of trust, that in case of default of payment of the said note, or in case of the violation or breach of any of the terms, conditions, covenants or agreements therein contained, then upon notice and demand in writing filed with the said Trustee, by the beneficiary under the said deed of trust, or by the legal holder of said indebtedness, secured by said deed of trust, that said beneficiary, or legal holder, has declared a violation of any of the covenants contained in said deed of trust, and has elected to advertise said premises for sale, and demands such sale, it shall and may be lawful for said Trustee to sell said premises and all the right, title and interest of the said John H. Paul and Mary Paul, their heirs and assigns therein, at public auction, at the south front of the County Court House in Silverton, Colorado, for the highest and best price the same will bring in cash, four weeks public notice having been previously given of the time and place of such sale, by advertisement, weekly, in some newspaper of general circulation at that time published in said San Juan County, and by notice by mail as in said deed of trust also provided, and to make and give to the said purchaser, or purchasers, of said premises at said sale a certificate or certificates in writing containing and setting forth the matters and things in said deed of trust specifically provided, at which sale the holder of said note may become the purchaser of said premises, or any part thereof.

And whereas, the conditions of payments of the said promissory note have been violated, and are now past due, and wholly unpaid, and the said Fred Brockenauer is still the owner and holder of said note and beneficiary under said deed of trust, and has notified me of default in payment thereof, and by notice and demand in writing filed with me, the undersigned, Public Trustee, has declared a violation of the covenants in said deed of trust contained, and has elected to advertise said premises for sale, and has demanded such sale in conformity with the provisions of said deed of trust.

Now, therefore, in pursuance of the said notice and demand in writing of the said Fred Brockenauer upon me, and under and by virtue of the power and authority in me vested by and in accordance with the terms and provisions of said deed of trust, and the laws of the State of Colorado in such case made and provided, I, Nellie Tulley Cunningham the duly qualified and acting treasurer of said San Juan County, and Public Trustee thereof, do hereby give public notice that I will, on Monday, May 4th, 1903, at the hour of 2 o'clock in the afternoon of said day, at the south front door of the County Court House, in Silverton, San Juan County, Colorado, as such Public Trustee, sell all the above described land and premises, and all the right, title and interest of the said John H. Paul and Mary Paul, their heirs and assigns therein, or so much thereof as may be necessary, at public auction, for the highest and best price the same will bring in cash, for the purpose of paying and discharging the said promissory note, and the costs of this trust and the expenses of executing the same.

Dated at Silverton, Colorado, March 30th, 1903. NELLIE TULLEY CUNNINGHAM, Treasurer and as Public Trustee of said County as aforesaid.

First pub. April 4, 1903.
Last pub. May 2, 1903.

Notice of Forfeiture.

To A. A. Martin, his heirs or assigns:

You are hereby notified that I have expended during the year 1902 the sum of One Hundred Dollars in labor and improvements upon the Esmaralda lode mining claim, situated in Eureka mining district, San Juan county, Colorado, the location certificate of which is found of record in Books 95 and 123 on pages 356 and 162 of the records in the recorder's office of said San Juan county, Colorado, in order to hold said claims under the provisions of section 2324 of the Revised Statutes of the United States and the amendments thereto, approved January 22, 1880, concerning annual labor upon mining claims, being the amount required to hold said lode for the period ending December 31, 1902.

And if within ninety days from the service of this notice (or within ninety days after this notice by publication) you fail or refuse to contribute your proportion of such expenditure as a co-owner and the cost of this service notice, or the publication thereof, your interest in the said claim or said lode will become the property of the subscriber, your co-owner, by the terms of said section 2324.

HENRY SHERMAN.

First pub. Feb. 14, 1903.
Last pub. May 17, 1903.

CIGARS

Pure Tobacco and
Clean Manufacture
is why Andre's Cigars are the

BEST.

An Industry in Silverton.

NOTICE OF FORFEITURE.

To Patrick Lyons, his heirs and assigns:

You are hereby notified that I have expended the sum of One Hundred Dollars in labor and improvements during the year 1902, upon each of the following mining claims: Bonanza King Lode Mining claim, and Bonanza Queen Lode Mining claim, situate in Eureka Mining district, San Juan county, Colorado, the location certificate of which is found in book 99, page 336, and book 99, page 337, respectively, of the records in the Recorder's office of said San Juan county, Colorado, in order to hold said claims under the provisions of section 2324 of the Revised Statutes of the United States and the amendments thereto, approved January 22, 1880, concerning annual labor upon mining claims, being the amount required to hold said claims for the period ending December 31, 1902.

And if within ninety days from the service of this notice (or within ninety days after this notice by publication) you fail or refuse to contribute your proportion of such expenditure as co-owner and the cost of this service notice, or the publication thereof, your interest in the said claims or lodes will become the property of the subscriber, your co-owner, by the terms of said section 2323.

SALMON RECKARD.

First pub. Feb 21, 1903.
Last pub. April 25, 1903.

NOTICE OF SCHOOL ELECTION.

Notice is hereby given that the Annual Election of SCHOOL DISTRICT NO. 1, IN THE COUNTY OF SAN JUAN AND STATE OF COLORADO, for the purpose of electing one School Director for SECRETARY of said School District, will be held at the large two-story School House in the town of Silverton, said County and State, on MONDAY, the Fourth day of May, A. D. 1903, and the ballot box for said election will be opened at thirty minutes past one o'clock in the afternoon of said day and will be closed at the hour of five o'clock in the afternoon of said day.

NOTICE IS HEREBY FURTHER GIVEN, that at the same place and on the said MONDAY, the Fourth day of May, A. D. 1903, at said School House, the question of the AMOUNT OF INDEBTEDNESS, if any, of said School District to be created for the purpose of ERECTING and FURNISHING SCHOOL BUILDINGS and PURCHASING GROUNDS will be submitted to the voters of said School District qualified to vote thereon, this ELECTION will be by ballot, and the ballot box thereof will be opened at the hour of nine o'clock in the forenoon of said day and closed at the hour of twelve o'clock, noon, of said day.

NOTICE IS HEREBY FURTHER GIVEN, the election in the forenoon of said day having determined the amount of indebtedness, if any, of said School District to be created, the question of CONTRACTING A BONDED INDEBTEDNESS and of ISSUING BONDS of said School District for the purpose of ERECTING and FURNISHING SCHOOL BUILDINGS and PURCHASING GROUND will be submitted to the voters of said School District qualified to vote thereon. The election on this question will be held in the town of Silverton, San Juan County, Colorado, at the large two-story School House in said Town, and the ballot box for said election will be opened at thirty minutes after one o'clock in the afternoon of MONDAY, the Fourth (4th) day of May, A. D. 1903, and will be closed at the hour of five o'clock in the afternoon of said day.

Dated and posted this fourteenth day of April, A. D. 1903. FRED GOBLE,
Secretary of said School District.

THE BERT BROWN MARKET
AND
LIVE STOCK COMPANY.
Wholesale and Retail dealers in
MEATS AND PRODUCE.

Beef, Pork, Mutton, Veal. Dry and Green Vegetables Butter, Eggs, Cheese, Salt and Fresh Fish, Oysters, Game Poultry

Sugar Cured Hams and Bacon. Pickles and Kraut.

TRY OUR OWN MAKE Breakfast Bacon, Kettle Rendered Lard, Corned Beef, Pickled Pork, Dry Salt, Sausage of all kinds

WE GUARANTEE SATISFACTION.

Supplying Mines a Specialty. Give us a Trial.
Cor. Green and 11th St. SILVERTON, COLO.

W O Ferrill curator
Nat. history society

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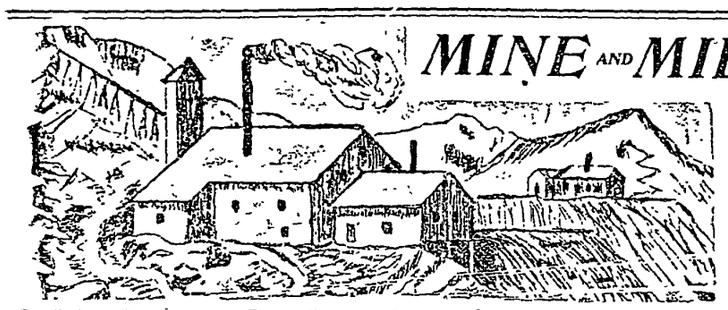
Silverton Standard

VOLUME XII | SILVERTON, COLORADO, JUNE 8, 1901. | NUMBER 30



MINE AND MILL

Gold, Silver, Lead and Copper.

Ira Torrey, et al, of Deer Park, are rolling in mining supplies. Snow for the greater part has disappeared from that section and the trails are in fair shape.

North Star, Sultan mountain, is in the sulks. Small force employed there for the past three months, cleaning out the tunnel, are taking a respite from their labors. Temporarily it is supposed.

Contractor Canavan, running the Big Five tunnel, Tower mountain, opposite Howardsville has made 49 feet during the past 17 days. Working eight men. Size of tunnel 7x8 in the clear.

John Odonetto has secured a 200 foot tunnel contract on the Occidental; tunnel on breast. Started in Tuesday with a force of five men. During the last eighteen months Mr. Odonetto has completed Occidental contracts to the extent of 1050 feet.

Herman J. Van Dieron's bond and lease on Bear Breek, Calaverite properties, which comprise six claims, also takes in another group viz., Western Boy, Eastern Girl, Golden Eagle. Monarch, Olympia and Brooklyn.

E. E. Seybold of Durango has a couple of good prospects in Deer Park and will hit 'em good and deep and plenty this summer. Work is to be inaugurated on the claims by Mr. Seybold and his big boy Fred next Monday.

On Boulder mountain, the Bald Eagle's annual assessment has been completed by Carver and Butler. The W. S. Hancock, a patented claim, which shows considerable mineral, is to be tackled next for a whole lot of development.

Queen of Boulder, Crystal, Crogan, Buttress and Bruttress mill site have been bonded by E. L. Roberts to Mrs. Mary B. Murrell. Bond covers two years. Work to begin July 1. Mammoth veins, developed by a good many hundred feet of tunnels with large bodies of milling ore in sight. Crystal and Crogan are in Boulder gulch, which divides Boulder and Tower mountains; Queen and Buttress occupy a big slice of Boulder. Possibilities are great.

Last Sunday a streak of quartz literally blazing in free gold was uncovered in the very lower working of the Ridgway. The new find, which varies all the way from 3 to 6 inches in width lies along side a good sized streak of brittle silver and sulphuretts.

Conyers Bros. are working their tungsten claim, Boulder mountain. Tunnel on lead 30 feet. The tungsten streak varies all the way from 6 to 10 inches in width. A few tons of the of the mineral is on the dump awaiting bids from some eastern steel firm, we believe.

Mining experts under the guidance of Fred Grebles examined the Snowshoe group of mines on Lookout mountain, Tuesday. The claims are under bond and lease to Jim Culbertson, one of the owners thereof. Fine showing for undeveloped properties, yet we are neither expert nor mining operator.

Yukon tunnel is now 800 feet under cover with about 3,200 feet to run to hit the Uncle Sam. Three shifts of two men each are pegging away. It is said that the placement of machine drills is contemplated by the Boston Silverton Syndicate. Uncle Sam, when hit 1,000 or 2,000 feet below the belt. which it will be at the intersection of cross cut, should pan out.

It is said that the North Star, Solomon mountain properties are to be turned over to the Smuggler Union people the 10th inst. A cash payment of $35,000 will be in order and merchant creditors elated thereby. Smuggler-Union is to be congratulated on the acquisition of a group, which upon being operated upon the grand scale contemplated, will pan out millions.

Bear Creek.—Through a conversaation with Mr. Hermann Van Dieron, metallurgist, etc., of Denver, who is operating a group of properties on bond and lease, we learn that a force of eight men are employed on the Sylvanite, most prominent claim of the group with a big show for success. It appears that Mr. Van Dieren abandoned the old and threadbare workings of the mine and ran a cross-cut from the No. 2 level, the result being some 20 inches of sylvanite of a very high grade, sandwiched between about three or four feet of vein matter showing well defined walls. The gentleman is confident that the new discovery embraces the lead proper..... Mike Coughlan, Wisebecker's right hand man at the Gold Bug-Repeal mines departed for his petzite stamping ground Wednesday morning. A dab of rich ore broken during the winter and spring awaits shipment, which will be made just as soon as the snow leaves the upper or mesa trail.

The Ben Franklin and four sister claims in Eureka gulch are having their merits investigated by Messrs S. D. Niles and F. A. Ingersoll, who recently came in from Idaho. Showing, price, etc., proving satisfactory means a deal right in the heart of the big Sunnyside gold belt. Franklin isn't more that half a mile from the Sunnyside and one or two of the group are still nearer. Terry made the Sunnyside a paying proposition and we confidently believe that Ingersol and Niles will do the same thing by the Franklin and sister claims, all of which are big mineralized leads and have been shippers, although for a few years past they have lain in a dormant state. Enterprise thick and plenty to follow in the Sunnyside is just what's wanted in that neck of the woods known as Eureka gulch.

The Denver Post asks the following question: "Does it pay to invest in mining stocks?" It does and does not. It does when one thoroughly knows the country where the property stocked is located, the amount of development required to make a producing and dividend paying mine or mines and above all the personnel of those in charge. It does not when all you or your broker knows of the property is that some outside paper contains a glaring report of the mine at so much a glare. It is really amusing to read in some eastern paper an account of a rich group of mines where thousands of tons of rich ore is in sight in every claim, and millions would be taken out of mother earth with very little expense. Stock is selling for a mere trifle with only a few million shares to dispose of, when in fact the same property has no ore to speak of and is a mere prospect. Looks better on paper than to the eye.

W. B. Boardman has just returned from Silverton, where a recent deal was consummated by which Eastern parties purchased considerable mining property in that district for approximately $50,000. Mr. Boardman was instrumental in closing the transaction. Active operations will start at once, $110,000 being the sum to be expended on the work. A $15,000 mill will be erected when enough preliminary work has been accomplished. Two tunnels are in the property, one 210 feet, the other 80 feet.—Denver Republican.

At the big Hurley tunnel the new boarding and bunk house, compressor room, etc., are steadily growing in proportion day by day. By July 1st everything will be in first-class shape for house movin' all 'round and the occupancy of a greatly increased force of miners. The buildings auxilliary to the Natalie-Occidental workings will represent quite a settlement. Grading for the 8,000 foot spur which is to connect the tunnel with the S. G. & N. Ry, at the Gold King mill is in progression and striding along at a rapid rate. Two months hence will witness the completion of the side track and trains laden with ores rolling out to milling and smelting centers. The big air compressor, dynamo, power drills, etc., gotten up by special order of T. J. Hurley, at several manufactories in the east, are now enroute and will be put in place immediately following arrival. A good many thousand dollars have been poured into the ground, figuratively speaking, by the great Occidental-Natalie incorporations, but what is already in sight will easily round up a thousand for one as per estimate of moneys expended. The progress of the Hurley tunnel which is now a good many hundred feet advanced in to Sampson mountain, may be likened unto a triumphal march over rocky roads, with an occasional crossing paved in gold and silver. Blind leads, which unexpectedly "come in the way" have been gone through, with never a barren one. San Juan county is justly proud over the success of the Occidental Exploration Co. in this section. Money invested in proper soil invariably reaps a prolific harvest. Mining operations conducted hereabouts by T. J. Hurley have been on sound business principles, with no gilded misrepresentations to stock holders and no quill wheel mills to rot down from disuse in the perpespoctive.

Martin H. Schmelzer, who made a mine of the Ridgway, has taken a three month's bond and lease from P. A. Burke and D. R. Neville on the following named properties which are situate on Galena mountain, northerly from the Veta Madre: Valetine lode, Corsicand lode, Hot Tamale and Total Wreck. Consideration $6,000, to be divided into three payments; one of which was made upon the bond's going into execution May

—Continued on Page 8.—

DID YOU HEAR ABOUT

All the Latest Local News of the Town and County.

Snowed just a "twinkle" Tuesday night.

Walter Kimball is working for Joe Bordeleau again.

Trains will commence rolling over the Red Mountain railroad next Monday.

Arthur Malchus now belongs to Arastra Basin. Got a job up there in the Iowa commissary.

Judge Taft is to be inaugurated governor of the Philippines in August. Just at present the names of his understrappers remain incog.

Inference of Durango Herald is that otherwise than the Pioneers' reunion, Silverton wont celebrate the Fourth of July. Come up and give us a try.

There are plenty of working men in Silverton to fill every job open. The STANDARD has called attention to this fact before. Take heed and abide accordingly.

Services will be held at St. John's Episcopal church at 11 o'clock a. m., and 8 o clock p. m. Sunday, Rev. W. H. Hoff officiating. All are cordially invited.

During the past two weeks 40 tons of North Star, King Solomon mountain, ore has been landed on the shipping platform Eureka branch by packer Thos. Brew.

At Silver Plume, this state, June 5, Anna Clark, Aged 14 years the daughter of Editor Clark of the Silver Plume Standard, was crushed to death by a pilo of falling lumber.

A regular old fashioned thumpin' bee recently occurred in one of our up town stores. Store keeper wielded the fist on the fellow, who we understood, was the traducer of all woman kind.

Squire Watson "isn't doing a thing in the building line. Another cottage situated on 14th St. and alley, along side the Watson family residence, is rapidly assuming proportions. It will be a neat structure, size 14x28.

Trimble Springs have been opened up since May 16, under the management of C. C. Murray. The waters are medicinal, with properties unexcelled in rhoumatism and kindred diseases. Prices at the big hotel are reasonable and board exceptionally good.

Needle Mountain Blunt didn't do a thing on his last trip to Silverton. He owned a good many thousand shares in the Four Metals Mining Co. Unloaded, they call it, for $6.000. Stock cost Blunt $2.000. The business was transacted at the First National Bank in this city.

The force of sixteen men employed on the water-main ditch are throwing dirt lively. The old five-inch pipe to be taken out and replaced by new 10-inch extends from Thirteenth to Tenth street. At the rate the work is being pushed the job should be finished in about ten days.

Mat Chino, prostrated from paralysis and sent to Durango for treatment a week ago, was placed on board the outgoing train for Denver Tuesday morning. He will receive the best of medical attendance in the hospital at Denver.

Wednesday morning, Ralph Surcumb, an emyloye on the water-pipe ditch got caught by a cave-in and was taken to Trimbath's boarding house suffering from a dislocated knee. Another employe working along side Mr. Surcumb escaped with a few bruises and the loss of a shoe.

The members of Silverton Federal Union, No. 112, W. L. U. will give a social at the Miners Union hall Wednesday evening. Program will consist of instrumental and vocal music, recitations and games, after which light refreshments will be served, all workingmen and their families in Silverton are cordially invited to be present on this grand occasion. Everything will be free.

Old timers are fast pegging out. Speaking with Billy West in regard to Bob Bastian—Billy and Bob discovered the phenomenally rich Bonita deposit at Bear Creek seven or eight years ago. "Why, Bob joined the Angels from Phoenix, Arizona, and you didn't know that he was dead?" Peace to the ashes of poor old Bob; no greater hustler, no better hearted man ever hunted the traditonary philosopher's stone and ultimately found a 6x6 resting place in Arizona's sea of sand.

The N. E. W. Club had a delightful innovation on Tuesday evening by changing their meeting until evening and thereby entertaining their husbands. Mr. and Mrs. F. C. Kendrick entertained the club on this pleasant occasion. Progressive whist was the game of the evening and prizes were awarded to the following, ladies first prize—Mrs. C. A. Tooke—second prize, Mrs. C. H. H. Kramer, gents first prize—Geo. A. Watson—second prize, R. J. McNatt. After the close of the games elegant refreshments were served. Among those present were: Messrs. and Mesdames Tooke, Watson, McNutt, Kramer, Wyman, Umbel, Avelin, Cooper, G. A. Watson, Potts and Miss Lena Watson of Ashley, Ill., and John H. Watson of Ouray, Colo.

Wednesday morning, John McMahon, a kid of about 20 years, was arrested by Sheriff Casad on a charge of grand larceny; warrant sworn out by A. G. Robin. Tuesday night Mr. Robin's room at the Commercial Hotel was ransacked of a suit or two of clothes, a new hat, several neckties and a pair of tan colored shoes, value of which aggregated sixty or seventy dollars. Suspicion pointed to McMahon and the warrant was issued. Search instituted brought to light the stolen goods smuggled away in McMahon's room in the Commercial. Hearing came off before Police Magistrate Watson, Deputy District Attorney Russell for the prosecution Wednesday afternoon at 3 o'clock. Defendant pleaded guilty and was bound over to the next term of the District Court which convenes September 16, in

T. SHEAHAN'S

A full line of Ladies Summer Wearing Apparel.

Orders taken for Ladies' and Gentlemen's Tailor Made Suits.

GENTS' CLOTHING BOOTS SHOES ETC., ETC.

New Quarters. Thirteenth St.

A. HIELSCHER,

Watchmaker and Jeweler.

All Work Guaranteed.

Goods at Reasonable Prices and as Represented.

Greene Street. Molique's Stationery Store
Silverton, Colo.

New Location. NEW STOCK.

DO YOU NEED?

Paint for your House
Ash Cans for your Alley.
Brick or Lumber.
Harness for your Horse.
Dishes for your Wife.
A Range for your kitchen.
In short, if you need anything from a tack to a steam engine, we are the people to see.

We have them in abundance at low prices.

ALSO

We are equipped with for plumbing and tin work in all their branches.

MINING MEN should get our prices on Powder, Fuse and Caps, Iron and Steel, Ore Cars, Machinery, T-Rail, Pipe and Fittings. We can make bottom brices on these goods.

STUBBS & JAKWAY,

the sum of $500. The boy said that he had no friends who would go on the bond and was committed to the care of the sheriff.

The two miners, a Swede and a German who were injured by a falling rock in the Gold King Thursday were brought to town same afternoon had their heads fixed up and were out on the street Friday morning.

Levi Smith of Warren, Penn., was in Silverton this week investigating the property of the company of which he is president, The Minnie Gulch M. & T. Co. Some interesting news may be our possession latter on.

James Conway, an employe on the Red Mountain railroad who has for several days past been lying at Mrs. Hughes' Alma House prostrated from a disease termed aneurism of the abdominal aorta, will be placed on board the outgoing train for his home in Durango today. Dr. Pascoe, his attendant physician states that the disease is an exceedingly rare one, and the case severe.

At a meeting of Silverton school board Wednesday night, Mr. A. R. Lynch, late principal of the Rico schools, was elected principal of the Silverton schools for the coming term which is to commence on September 16. The gentleman comes to Silverton highly recommended from Rico and also Durango, he having occupied the position of school principal in the latter named city for two years.

Henry Sherman, J. T. Whitelaw and W. C. Fischer have completed the sale of the San Juan Queen group of mines up Picayune gulch to a syndicate of capitalists headed by John Usher, son of former secretary of the interior in Lincoln's cabinet, John P. Usher.—Durango Democrat's Silverton Correspondent. June 4.

Henry Sherman, upon being interviewed in regard to the above item, informed the reporter that positively no such sale had come off; if it had he would have been very liable to have known something about it.

John Scott.

John Scott died at the Barmouth hotel evening of Saturday, June 1. The disease was tumor of the stomach from which Mr. Scott had suffered untold misery for the past four or five years. Most assuredly with death came relief. Deceased was born in Yorkshire, England, some 60 years ago and served in the British navy, marine service, in the Mediterranean sea during the sixties. He had been a resident of San Juan county since 1877, and, up to the time when failing health claimed him, followed the occupation of ore sorting. John Scott was honest, industrious, quiet and inoffensive—a man who plodded along in the daily walk of life attending strictly to his own affairs. He was highly respected by everyone with whom he came in contact in these parts, and passed over the range leaving no enemy behind him. An amount sufficient to defray funeral expenses was found among his effects. He belonged to neither sect nor creed. Sunday afternoon old time friends of Mr. Scott laid the remains away to rest.

STANDARD is enlarged this week to ten pages—all home print.

Parson Lou Smith has hung out his shingle in Durango as a full fledged lawyer. "Why doth the little busy bee, etc."

A communication from Mr. J. C. McMullen, dated Chattanooga, June 6, states that STANDARD of June 1, was in error in the placement of the ownership of the 16 to 1 mining claim to Mr. Dan Sheridan, as Mr. McMullen was the original discoverer and is at present a one-third owner in the property. The report published was taken very hastily from Mr. Sheridan, who very likely correctly placed 16 to 1 under McMullen ownership. Mistakes frequently occur and we are confident that Mr. Sheridan was in no way to blame in regard to the matter.

Silverton Federal Union, No. 112, W. L. U. Wednesday evening elected the following as officers for the ensuing six months: William Jones, president; Filmore Hand, 1st vice-president; Fred Kunz, 2d vice-president; Chas. L. Valiton, recording secretary; B. L. Gilbert, secy-treas; Timothy Malone, sergeant-at-arms; J. H. Meager, inside guide; R. E. Goodwin, outside; William Palmquist, M. J. Sullivan and Fred Carlis, trustees.

CHURCH NOTES.

PEOPLE'S CHURCH.

The Ladies Aid Society of the People's Church will give a Strawberry Festival on July 3. All friends coming down for the celebration on the 4th should plan to take in the Festival. There will be a musical program, in which it is expected that some visitors of well known power will participate.

Morning service at 11 o'clock. Sermon topic, "The Price of Discipleship." Sunday school at 2:30. Evening service at 7:30. Fifteen minutes' song service. Sermon on "The Curse of Meroz."

Junior Endeavor Wednesday at 4 p. m. Topic, "Kingly Men."

Young People's Society Friday at 7:45.

GEO. EAVES, Pastor.

Advertised Letter List.

Following letters remain uncalled for at the postoffice in Silverton, Colo., for the week ending June 6, 1901.

Christenson, C. P.	Davenport, J. P.
Foncannon, Floyed	Fothergill, Jos.
Hill, Dr. R. D.	Hahn, Oscar
Harvey, D. L.	Hansen, J. P
Hayes, Elmer	Landquist, J. G. F.
Marshall, Mrs. Geo.	Mammoth Tunnel Co.
May, Forest	Mary, James
Meyers, H. N.	Mills, Joe E.
Miller, Peter (2)	Montgomery, Ray
McCalla E. B.	Pernie, Wm.
Rose, Jno. C.	Swanson, Chas.
Schmartz, Wm.	Velaide, Jubencio (2)
Wood, Warren	Zancanella, Miss

FOREIGN.

Hughes, Isaac E. Mantain, Alva Feecey, Henry

Parties calling for any of the above letters will please say "advertised" and give date of list. MATILDA MCCARTNEY, Postmistress.

Filed for Record.

May 30 to June 6, inclusive.

Richard Sleep to Notaway G. and Copper Mining Co., mining deed—A. J. Vivian and Mayflower.

County Treasurer to C. E. Robin, tax deed—Pentillion.

Clarence O. Finch to J. N. Kloster, chattle mortgage—personal property.

Annie M. Shaymaker to C. O. Robin, quit claim deed, Silverton property.

Mrs. Meggie Parker, same.

P. A. Burkee, et al to M. H. Schmelzer, bond and lease—Hot Tamale, et al.

Everett M. Harmon to Kate N. Lower, mining deed—Denver Bell, et al.

Cora Bellinger to Mrs. M. J. Hopkins, chattle mortgage filed—personal property.

W. C. Fisher to S. C. Usher, mining deed—San Juan Queen.

E. E. Amsden vs. D. R. Neville, writ of attachment—Valentine, et al.

Ben Johnson to Amanda Johnson, warranty deed—Silverton property.

Public Trustee to Peter Henderson, release deed of trust—Silverton property.

E. W. Walter to A. L. Brown, et al, warranty deed—Silverton property.

Fredrick Brockenauer to John Lonergan, mechanic's lien notice—Silverton property.

Blacksmithing. Horseshoeing.

Having re- fitted my shop, added new machinery and employed two of the best mechanics to be found in the state. I am now prepared to handle anything that may come my way.

Special attention paid to the repairing of heavy machinery. Mining machinery repaired on short notice. Only shop in the county making a specialty of fine horse shoeing.

Work guaranteed.

Wagon Making. Gen'l Repairing.

JOHN PINYAN,

Shop Corner Green and Eleventh Street. Opposite Brown's Meat Market

AT Van Slycks

Just Received--

A Large Stock of Hats.

Some regular $3.00 grades at special price of $2.00 while they last—bearing the Union Lable. Also better qualities at equal good values. The most complete line of **Gloves** in town. I now have an **extra value** of Asbestos at 50c. 75c, 85c $1.00 and $1.25, also full line of **Busby's Hand Sewed** and double welt Gloves; these goods are so well known that they need no praise. You will find that I have the best values for prices asked in **Shirts** both in fine dress and working grades. I handle **Wilson Bro's Dress Shirts** in coat and regular styles; none better in the world in quality and fit; made in soft or stiff bosoms. Some Extra Good Working Shirts from 50c up. Underhill's Union Label Overalls and Jumpers kept in stock. I believe in patronizing home industries and Union Lable wherever possible.

I specially invite your patronage when in need of-

FIRST CLASS CLOTHING
UNION MADE and
the BEST on EARTH.
AT
Van Slycks.

KENDRICK-GELDER SMELTING CO.

F. C. KENDRICK, Gen. Mgr. E. W. WALTERS, Supt. and Metalurgist

Purchasers of Gold, Silver and Copper ores. Special rates on tonnages of low grade ores.

SAMPLING AND SETTLEMENTS

MADE PROMPTLY AND AT ALL TIMES

SILVERTON STANDARD.

KLINGER BROS., PUBLISHERS.

ONE YEAR $2.50.
SIX MONTHS, $1.25
THREE MONTHS, 75C

SATURDAY, JUNE 8, 1901

Entered at the Silverton, Colo. postoffice for transmission through the mails as second class matter.

Colorado Springs is on the verge of a strike. Cooks' and Waiters' union will demand a uniform scale of $12.50 per week.

Denver has been selected by the Western Federation of Miners' as their permanent meeting place and President Boyce was re-elected.

Cattlemen of Gunnison and sheepmen of the land of the milk and honey, Utah, are slightly at outs. Big band of Utah sheep crossed the Gunnison dead line on the 4th inst., and were butchered by a gang of masked men.

Yankee Constitution as well as her British opponent Shamrock came to grief. Steel mast snapped like a pipe stem and went by the board. Sir Thomas Lipton of the badly demoralized Shamrock didn't do a thing when he heard the news—only shed brine by the quart.

The last great victory in South Africa was gained by the Boers who hoisted the skull and cross bones over Jamestown. Battle raged for about four hours. English loss was terrible—three men killed and two wounded. Boer loss is estimated to have been double that of the English.

The Portland company at Victor and its employes have buried the tomahawk of dissension in an amicable settlement. Details involve the following: No compulsory insurance. No discrimination in the hiring of union or non-union men. Secretaries of unions must not solicit members for the union at the Portland mine.

Mountain and Plain Maid of Honor racket is on the tapis. Our Hon. Board of County Commissioners have been appealed to by the executive committee of Mountain and Plain and doubtless will take action in the matter. The STANDARD declares off from putting its finger into the pie ballot in any way shape or manner.

A certain parasitical denomination of yawping preachers in the east have put their iron heel of obliteration on secret societies and labor organizations in general. These psalm singing men of God, for revenue only, have evidently strained to a gnat in the vain attempt to swallow a full grown camel with an exceedingly long reach. Ring tail sanctimonious monkeys who depend upon the credulity of their followers for household necessities should not attempt solar plexuses over the outer walls of the corral of hypocrisy vs. salvation.

Some day, when the present aggregation and consolidation of capital has been perfected, as current indications seem to suggest it will be, the American people may get tired of seeing all the wealth and all of the resources of the land monopolized by a few persons more powerful on account of their wealth than any European potentate, and take the whole business away from them.—Washington Times.

It's the red Arapahoe of Wyoming who is using vehement language against the whites of that section, implying the garnering of many scalps in the near future. June 3, the copper colored braves put a sheep herder out of his misery and since that time have openly defied the Indian Agent and everybody else connected with Uncle Sam's junketing department. Perhaps the Indians objected to taking old hand me downs for tailor made suits, figuratively, you know. Our troopers under Gen. Merriam. the bull pen herder, already sniff danger and are preparing for battle.

The Mountain and Plain Festival is to be held in Denver on September 1, 2, and 3. Dates are unwise, as they interfere with the interests of business men in general. Monthly collections invariably occur on the first of the month and business men usually like to be on hand for that important event. We would respectfully suggest to our Denver friends that the dates for the big show be changed to 4, 5 and 6, instead of the dates appended. In regard to Mountain and Plain we have nothing to say about many debtors in our humble mining camps, away back in arrears, who forget or ignore their responsibilities and slide off to Denver to "blow in." It takes either money or deep seated gall to buy the necessaries of life or even rum and gum with soda on the side. Denver invariably reaps a plethoric harvest from the mining camps tributary and should remember them in her prayers. There are many people in Colorado far removed from the metropolis who would like to visit it in the very hey day of sight seeing. September is too late as Elich's and other places of public resort will at that time be closed down. Why not have billed Mountain and Plain for August? We don't want to be too exacting in the matter but the railroads should charge no more than half fare for the round trip.

Attention Knights of Pythias.

Members of Snow Flake Lodge, No. 61 K. of P. are requested to meet at their hall Sunday May 16, at 2 p. m. sharp for the purpose of observing Memorial Day. Visiting members are cordially invited to participate. 29-2t.

Attention Knights Loyal.

Special order No. 1.

You are requested to report at the Armory Sunday June 16, at 2 p. m., sharp in full dress uniform for the purpose of joining Snow Flake lodge in observing Memorial Day.

H. A. HANSEN, Capt.

Attest: JAMES CLIFFORD, Guard.

NOTICE OB UNION MEETINGS.

Silverton Federal Union No. 112, W. L. U., meets in Miners' Union hall every Wednesday evening, at 8 o'clock. Visiting members are cordially invited to attend.

G. W. ALEXANDER, Pres.
CHAS. L. VALITON, Rec. Sec.

R. W. HOLLIS,
CIVIL and MINING ENGINEER,
U. S. DEPT. MINERAL SURVEYOR,
Office—Wingate Block.

HAVE YOU BOOKS OR MAGAZINES TO BIND?

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JAMES DYSON,
Civil and Mining Engineer
U. S. DEPUTY MINERAL SURVEYOR,
Reese Street, between 14th and 15th, near the County Offices.

SAN JUAN MINING CO.
A general assay, promotion and experting business.
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CYANIDE TESTS A SPECIALTY.

GEO. C. FRANKLIN,
Assayer and Chemist
Block above postoffice. Greene Street. Kennedy's Old Stand.
Mines Reported on and assaying promptly attended to

O. U. FRANKLIN,
EXPRESS
And all kinds of Hauling promptly attended to.

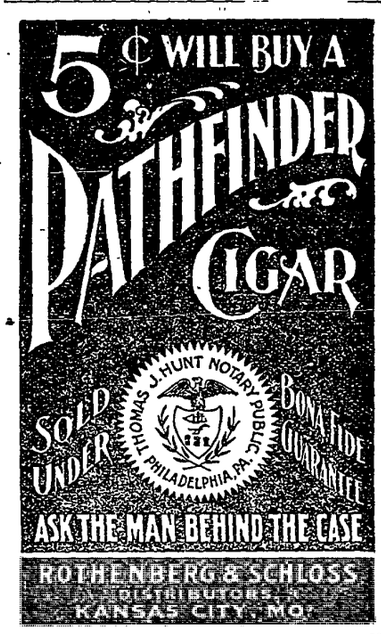
KROEGER & WOOLERY
Transfer, Baggae and Express.
Office on 13th, between Green and Reese Sts. COAL and FEED

N. ANDRE,
CIGARS,
Pure Tobacco and Clean Manufacture is why Andre's Cigars are the

Patronize Home Industry. Send nothing out.

Henry Dietrich,
Manufacturing Jeweler AND Diamond Setter,
Old Gold and Silver worked over and repairing of all kinds.
Specialty in Mounting and Setting Precious Stones.
POSTOFFICE BUILDING.

CENTRAL HOUSE.....
A Home Place for All.
Commercial and tourist trade Solicited.
A first-class hotel
First-class beds.
First-class tables.
Rates reasonable.
Mrs. Geo Nolls.



Ernest Grill & Co.
Lumber and Feed,
wholesale and retail agents for
HESPERUS,
BLACK DIAMOND
ANTHRACITE
COAL.

From Towns Near By,

Telluride is making preparations for the entertainment of the Masonic brethern of the San Juan district next month. —Ouray Plaindealer.

We are informed by the Creede Candle that that city posesses two strong base ball teams.

Geo. Heiden and John Scarff left for Silverton Tuesday morning, May 28, to remain for the summer. They took along a driving horse for Geo. C. Franklyn.—Prospector, Del Norte.

Ophir is to have a new concentrating plant. Capacity not given. Ground is to be broken.

Telluride's base ball team is getting into fine shape—practicing daily.

Miss Mable P. Brown, the Ophir school teacher left Saturday, 1st inst, for Silverton. Miss Brown has filled the position to the satisfaction of all the patrons of the school and we hope to see her again.

The school entertainment last Thursday evening May 30, given by the scholars was a surprise to all. Miss Brown devoted much time and patience in drilling the little ones and they were as near perfection as could be desired. All were so near perfect that to mention one, we would have te say something about all of them, but the lack of space compels us to mention the teacher and school as one, and to say that it was one of the best entertainments ever given in Ophir. —Ophir Mail.

—The city council of Ouray has decided to put in a new sewer system for that city. The work will be done under the supervision of the city surveyor by day's pay.

Ed. Gibson, the original locator of the famous Sunnyside Extension property, San Juan county, has been spending the week in town. Mr. Gibson carried the mail from this place to Animas Forks along in the 70's, and is well known by the old-timers here.—Lake City Phonograph.

Col. W. A. Dempsey was relieved of $700 in cash and a diamond stud and gold watch about 11 o'clock last night at the Palace bar. Mr. Dempsey was balancing accounts for the day, preparatory to closing for the night, when he faced a 45 Colt's with a request for his dough, which amounted to above tidy sum. Mr. Dempsey was then marched to the railroad track at the rear of the saloon where he was relieved of his gold watch and diamond stud. Then he was given orders to depart up the track. Col. Dempsey notified officials from the nearest telephone but by the time the officers were at the scene of robbery the robber was nowhere to be found. The robbery was the work of a professional—some Denver or outside crook who is onto his job. He was perfectly cool and deliberate and worked single-handed. So far no clue as to the individual or present whereabouts, although the officials are keeping a close lookout.—Durango Herald, June 5.

CITY COUNCIL PROCEEDINGS.

Meeting called to order Monday night June 3, by Mayor Ballou. Those present were: Aldermen Cooper, James, Helmboldt, Patterson, Gainey and Lacey. Minutes of last meeting and also those of special meeting read and approved.

Treasurer's report was read and referred to finance committee and reported as being O. K.

The report of the Police Magistrate was read showing $182 collected at an expense of $154.

The following bills were then read and by motion allowed.

Silverton Trans. Co	$230 75
Electric Light & P. Co	87 80
Geo. Bausman	2 50
Silverton Miner	6 50
Silverton Standard	30 00
R. W. Hollis	25 00
W. T. Doss	10 00
D. M. Swan	235 00
F. J. Molique	7 50
Silverton M & P Co	42 37
Wm Cole	4 95
T. Shehan	30
Fred Brockenaur	57 30
Fred Goble & Co	331 00
W. D. Watson	133 65
Mrs. Geo Noll	15 00
B B Russell	34 60
John Dryer	102 00
Chas Leonard	115 50
B. T. Conway	25 00
Joseph Bordeleau	65 00
W. N. Searcy	40 00
Dr. J. N. Pascoe	331 00
B. L. Grebles	31 80
Total	$1,926 92

The clerk was instructed to make out bill against all property holders who refused to comply with the ordinance and remove ashes, rubish, etc., in cases where the same was removed at the expense of the city.

The sidewalk committee was instructed to build a sidewalk adjoining the new Benson block.

By motion the insurance on city property, to be insured for a term of three years, was given to Frank Watson and Josiah Watson.

Street and Alley committee reported the arrival of the new street sprinkler.

The committee selected to ascertain the price asked for the water works system reported that they had failed in receiving any reply from the owners.

Council adjourned.

SPORTING.

Arrangements are being made by a local sport to bring Seamon and Martin together in a twenty-round boxing contest. A large circus tent has been secured and the men will come together on the afternoon of July 4th. Seamon will train in Pueblo and Martin here in Silverton. This pair have already gone ten rounds to a draw, and no doubt it will be a treat to the lovers of the boxing game to witness a twenty-round contest. Both men are as good, if not better exponents of boxing than any that have ever been seen in Silverton and the management will guarantee the public a clean clever go and a run for their money.

What's the matter with a good ball game for the 4th of July. It is rumored that Telluride has subscribed by public subscription something like $600 for the purpose of securing a battery. What's the matter with Slattery rejuvenating his "slobs" and inviting Telluride here the 4th. As good a base ball game as was ever played in the San Juan country would result.

Denver and Des Moines of the Western League appear to be struggling for the Lobster championship with the chances in favor of Denver the way they keep losing games. Both teams are something like 200 per cent behind the leaders.

The weather of the past two weeks appears to have put a hole in the calculations of Silverton's champion bicycle riders. Ross Landerman says he can't get in shape as his trainer "The Barber" has left town. A five-mile road race for the 4th between Landerman and Jack Cole would be an attraction.

Frank McDonald received by D. & R. G., express, a fine specimen of a Bull Terrier the other day. He expects to have trouble on his hands for the next few weeks or until the Bull has whipped all the other dogs in town.

MOSES LIVERMAN ARTHUR G. ROBIN

LIVERMAN and ROBIN

YE JEWELLERS · NEWSDEALERS · STATIONERS

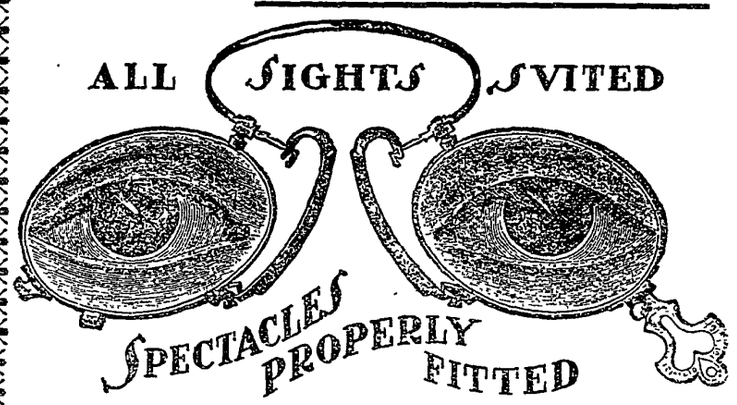
PIPES · TOBACCO · CIGARS

KANDY & SWEET GOODS · MERCHANTS

ALL KINDS OF NOVELTIES

Watches TO Peanuts.

Soaps TO Diamonds.

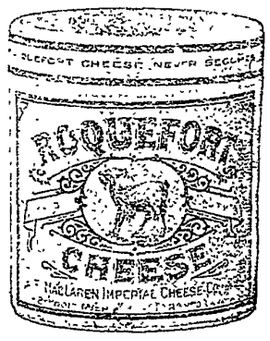


WATCH REPAIRING a specialty. Our watch doctor is a sure cure for all watch ills--thoroughly expert and experienced in every watch operation.

Latest Cloth Bound Books, All the latest Novels, Periodicals and Papers

All kinds of Cheese--

IN FACT



Everything in the way of Fancy Groceries can be had If not in stock we will gladly order for you.

Silverton Supply Co.

J. H. ROBIN, President
A. M. ROBIN, Vice-Pres.
A. H. MUNDEE, Cashier.

(Organized Under The State Laws.)

BANK of Silverton,

CAPITAL STOCK PAID IN $30,000.

Transacts a General Banking Business. Issues Domestic and Foreign Exchange. Acts as Fiduciary Agents for persons or companies having Mining Interests in the San Juan Mining District.

Correspondence will receive prompt attention

SILVERTON, SAN JUAN COUNTY, COLORADO

PURELY PERSONAL

Caught by Our Local Gatherer as They Come and Go.

—W. Z. Kinney returned from Denver Wednesday.

—Lem Smith, of Warren, Pennsylvania, came in during the week.

—Chris Dowd, wife and child returned from Pagosa Springs Sunday evening.

—Frank Alpin returned from a two month's Denver outing Sunday evening.

—Mrs. W. H. Lockwood will depart for Buffalo, N. Y., on or about the 10th inst.

—Mrs. J. Ed. Leslie is visiting Mrs. J. Owens at Trimble Springs on a few weeks.

—Chauncey Hollis departed Thursday morning for Denver for a short vacation.

—Fred Stroup returned from a weary pilgrimage, Denver-Kansas wise Wednesday evening.

—E. S. Richner, who meandered over to Pueblo about a month ago, returned Monday evening.

—John T. Holmes of the Holmes Promotion company, of Detroit, was an arrival Tuesday.

—Fred Carbis jr., came in from Boulder Wednesday, where he has been attending school.

—Pauline Worth, recently of Delta, now answers to "Central" in telephone office, Wingate Block.

—J. H. Watson, son of the city squire, was over from Ouray Tuesday and Wednesday of this week.

—Harry Hilderman leaves for Guttenberg, Sweden, Sunday. A three months stay is contemplated.

—Mr. A. Day and wife, bag and baggage, boarded Friday morning's train for agricultural Delores.

—George Barber came in from Florence Wednesday and will remain in this section for some time.

—Miss Mabel Brown, having completed a term of school teaching at Ophir, returned to her home in Silverton, Sunday last.

—Martin Tulley having resigned his position in the Silver Lake commissary, departed for his old home in Tonawanda, N. Y., Tuesday morning. He will return to Silverton about July 1.

—John W. Wingate of Durango was looking over matters and things in town, principally real estate, early in the week.

—Theodore Benjosky went over the range to Creede Friday. Business with old man Wasson of the Dives, Shenandoah, etc.

—Amos Rae, who bears the record of having punched cows with Ollie Lockhart in '77, of late an employe at the Unity tunnel, enjoyed a holiday in town Sunday.

—John Annear returned Wednesday evening from Boulder where he has been attending the State University. He is now a full fledged chemist and metallurgist.

—A. Gottlieb and Chas. Koenneker returned from their southerly trip through Arizona and Utah where they have been sight seeing for the past six months Wednesday.

—N. A. Ingersoll and S. D. Niles were arrivals from Marsh, Idaho, Sunday evening. Old timers here, both of 'em and old acquaintances are glad to see 'em back. Nine years since they left.

—Cal Copeland and wife, after a good deal of house huntin' succeeded in renting a place from Mrs. John C. Kane. Cal's going to write up National Protective Accidental, invalid policies for the summer.

—Lou R. Smith, of the Prudential Life Insurance Co., whose headquarters are at Durango, paid the STANDARD office a visit Monday. He's so busy writing up policies that he hardly knows which way to turn.

—Pierre Clark and wife were arrivals from Denver Monday and will locate here permanently. A new rooming house, on one of Mr. Clark's lots on Greene street, above the Hoffman House, will soon assume the tangible.

—Mr. Elijah Palmer, representative mining writer of Denver's Post, came in from the metropolis Wednesday. The gentleman will make Silverton his headquarters for a period indefinite. From now on the vast mineral resources of San Juan county will be ably shown up in the Post.

—Uncle Daniel Shea, J. J. Sullivan, Neeley Carver and Robt. Hallahan are shedding at Pagosa Springs, and sightseeing at Durango. The boys are enjoying the transformation, but the waters, O, my soul! There are a lot of old stiffs, newspaper stiffs, who also should, by right get parboiled.

—Chas. Casad of Durango is in town for a few days.

—Dan'l Conway is conductor protem on the Durango spur.

—Thomas J. Hurley sr., of The Occidental and Natalie Mining companies will be in this evening from New York City.

—Charles Cochran, superintendent of construction on the trunk railroad line between Silverton and Gladstone is trying the medicinal properties of Pagosa Springs.

—David R. Jones and wife came up from Durango Tuesday evening and will establish a permanent home here. Mr. Jones owns several promising mining claims in the ranges environing Silverton and will either develop or sell during the season. Pleased to welcome Mr. Jones and his new bride.

—W. L. Ferguson and W. R. Reese, employed on the Golden Fleece, Picaygulch, operated by the San Juan Fleece Mining Co., were in town early in the week and reported an exceedingly rich strike in that property.

DENTISTRY.

Dr. B. Barnes, Dentist, is permanently located in Silverton. Office on Reese St. between 12th and 13th streets.

Winchester Club Whiskey.

The Winchester Club Whiskey acts upon all who drink it like the mellow moonlight on the landscape. It touches and subdues as with a magic wand the rugged roughness of life's dreary waste and enriches it with a golden halo.

It generates life, and beauty and grandure to the darkness that envelopes. It carries joy and gladness in its touch. It cheers and sweetens by its embrace. Drink it and the clouds of trouble, dispondency and dispair are dispelled, and as they float out over the landscape they appear to the vision as glittering ornaments to a magnificent picture. For sale by all first-class dealers in original bottling. None sold less than eleven years old.

SOL BLOCK & GRIFF,
Kansas City, U. S. A.

Neckwear and Hats received every week in newest styles at Van Slyck's.

Fred Goble & Co.

Dealers in

LUMBER AND COAL AND ALL KINDS OF BUILDING MATERIAL.

PERRINS PEAK Coal

Telephone, 21—2.

OFFICE:—Franklin's Assay Office.

San Juan MEAT MARKET

Bert Brown & Co., Proprietors.

Vegetable and Produce. - - - -

Fresh and Salt Meats.

Satisfaction Guaranteed. -:- Give us a trial. -:- Supplying mines a specialty.

Cor. Greene and 11th Streets

Here's a Snap!

Four lots and a 6-room house

Water in house, piped from spring on premises (the old Puckett place) for sale at a bargain. Cheaper than renting, terms to suit.

Also, ½ interest in house and 2 lots on 8th and Reese Streets

Also, mining claims on Brown and Los mountains for lease and bond.

F. T. NEELY, Administrator. C. E. ROBIN, Agent.

DRY GOODS CLOTHING

IT PAYS TO TRADE AT

Hemphill & McCrimmon's

SHOES FURNISHINGS

Continued from Page 1.

30, the final payment. $2,500 to occur Sept 1. Mr. Schmelzer is at all times reticent in regard to his mining schemes as also to the glory he has attained as a successful mining operator in everything he has tackled. Having been squeezed down to about the thickness of a jack knife in the vise of reportorial stick-to-it-iveness, for reliable mining items, Martin reluctantly flung aside the sombre cloak of secrecy and volunteered the information as above given and also the following: "I think I've got hold of some of the best claims in the county and am going to work them for all they are worth. Galena mountain is too well known to require any special commendation from me or in fact anybody else. Veta Madre many years ago panned out big stakes right from the surface; depth attained that mine will be a world-beater; I think I've got in my new acquisition just as good. One of my properties, the Valentine, is the north extension of the Madre, and is situated considerably lower down the mountain. There are a good many feet of excellent galena ore in sight in the old-time shallow workings of this claim and used to be a shipper on a good pay basis. The other properties will bear scrutiny under an X-ray machine without blushing. I'm going to work the properties through a cross-cut tunnel which will be commenced in a week or two. The Valentine will be intersected at 100 feet from getting under cover with a gain in depth of foot for foot. Ground is good breaking and forty to fifty days will have accomplished the work to the first terminal. All then's easy and means a carload of good lead to the smelter a day. Working of the group having been fully inaugurated I will be prepared to give you a full report of all our doings."

T. J. Edwards and W. J. Aurand who are to operate mining properties on Tower mountain, came in from Denver Sunday.

"NERVE WASTE."

One of the most helpful books on nerve weakness ever issued is that entitled "Nerve Waste," by Dr. Sawyer of San Francisco, now in its fifth thousand. This work of an experienced and reputable physician is in agreeable contrast to the vast sum of false teaching which prevails on this interesting subject. It abounds in carefully considered and practical advice, and has the two great merits of wisdom and sincerity.

It is indorsed by both the religious and secular press. The Chicago Advance says: "A perusal of the book and the application of its principles will put health, hope and heart into thousands of lives that are now suffering through nervous impairment."

The book is $1.00, by mail, postpaid.

One of the most interesting chapters—chapter xx, on Nervines and Nerve Tonics—has been printed separately as a sample chapter, and will be sent to any address for stamp by the publishers, THE PACIFIC PUB. CO, Box 2658, San Francisco.

W. of W. Dance.

One of the coming events and one of the best features of the coming Fourth of July at Silverton, will be the grand ball given by Camp No. 230 W. of W. Extensive preparations are already under way for this entertainment. tf.

See the New Mercetized Satine Petticoats.

Hemphill & McCrimmon.

BOBBY SAILS FOR THE POLE.

Arctic explorer Bobbie Vinyard, who is getting his stomach in condition to digest blubber rare, and polar bear slightly warmed up, said adios to his friends in this city Thursday and departed for Edna, Kansas to join Ivey Baldwin, the aeronaut, who is to have charge of the balloon observatory department of the expedition. R. La Vinyard leaves New York with Peary one week from today, Saturday June 15. Appended herewith are some very interesting facts connected with the enterprise.

It will surprise no one who knows the uncertainties of Smith sound navigation to learn that Mr. Peary was unable last year to force the Windward, carrying his supplies, nearer than 300 miles of the point he hoped to reach as his winter quarters and base of operations for his attack upon the pole. The Greely relief vessel Proteus was crushed and sunk at the south end of the channel in 1883. Sometimes the channel may be navigated with great difficulty, as in 1875, when it took Nares' vessels 20 days to advance 230 miles from Cape Sabine to Lady Franklin bay. Sometimes again the channel is comparatively free from ice, as in 1881, when Greely made the same journey in six days.

During the year his vessel was beset in the ice Peary was very busy with his sledge expeditions, and he has again justified the compliment which Sir Clements Markham paid him when he called the American explorer "the greatest of Arctic sledge travelers." His routes have extended over 1,500 miles, and he has covered much new ground and obtained most interesting knowledge about the geography of the region near Smith sound. Hayes sound, northwest of Cape Sabine, was thought to penetrate through the land mass to the Arctic ocean on the west, and thus separate Grinnell land from Ellesmere land. Peary has discovered that the so-called sound is merely a narrow inlet, and that Grinnell land and Ellesmere land form one land mass. The explorer has also surveyed and mapped some of the larger indentations on the west coast of the Smith sound route to the north; he has crossed the northern part of Ellesmere land, a journey never before made, and has connected his surveys of its western coast with those of Lockwood on the north, thus revealing a stretch of unknown coast line. From a geographical point of view there is no doubt that the large amount of accurate information Peary has collected for the enrichment of our maps fully justifies all his expedition has cost.

But he has done much more. The far north is his goal, and with enormous labor he has cached four tons of provisions for 250 miles along the channel he must ascend to reach the north of Greenland. These caches are not more than 50 miles apart, and the supplies they contain, with others he will move north, will enable him to reach a high latitude even if the Windward, next year, is unable to push on to Sherard Osborn fiord with the three years' stores she will carry to the explorer. He will thus make himself partly independent of his steamer, for even if she is unable to reach his northern base, the line of caches he has planted and will extend farther north may be replenished by such sledge journeys as he has made in the past year.

The explorer has thus done a large amount of successful work, both in extending exploration and in furthering the interests of his enterprise, which may keep him north for several years to come. None but the most dauntless of men could achieve what Peary has done in the past year, handicapped as he was by an unusually bad season, and by a serious accident that temporarily crippled him. His results thus far justify the hope that his further efforts will be crowned by the rich additions to geographical knowledge which this great explorer seeks to add to the work he has already done.

Fought For His Life.

"My father and sister both died of Consumption," writes J. D. Weatherwax, of Wyandotte, Mich, "and I was saved from the same frightful fate only by Dr. King's New Discovery. An attack of Pneumonia left an obstinate cough and very severe lung trouble, which an excellent doctor could not help, but a few months use of this wonderful medicine made me as well as ever and I gained much in weight." Infallible for Coughs, Colds, and all Throat and Lung trouble. Guaranteed bottles 50c and $1.00 at Cunningham's drug store. Trial bottles free.

Ladies Spring Jackets.

Hemphill & McCrimmon.

A Horrible Outbreak.

"Of large sores on my little daughter's head developed into a case of scald head" writes C D Isbill of Morgantown, Tenn., but Bucklen's Arnica Salve completely cured her. It's a guaranteed cure for Eczema, Tetter, Salt Rheum, Pimples, Sores, Ulcers and Piles. Only 25c at S D Cunninghams.

Piano For Rent. Address
SILVERTON STANDARD.

FOR SALE.—First-class business and resident properties. ROBIN, BROS.

For some nice bargains in vacant lots residences and dwelling houses see W D. Watson.

Littleton Creamery, Butter for sale at Moliques. Try it. It's the best in the market.

Leave orders at Moliques' Bakery for Ice Cream, Cake and Home Made Candies.

Late Style Ladies' Shoes now here.

Hemphill & McCrimmon.

THE
NEW ENGLAND JOURNAL
FOR
Investors
Reaches every week 10,000 persons interested in Financial matters.
$1.00 a year.
OFFICE: Room 408 Worthington building, 31 State street.
Boston, Mass.

MINING APPLICATION NO. 1489.

MINERAL SURVEY NO. 14634.

UNITED STATES LAND OFFICE,
Durango, Colo., April 16, 1901.

Notice is hereby given that Robert Glatzel, whose postoffice is Howardsville, San Juan county, Colorado, has made application for a patent for 1500 linear feet on the

HEMATITE LODE

bearing gold and silver, the same being 155 feet n 44° 36' w and 1345 feet s 44° 36' e from discovery cut thereon, with surface ground 300 feet in width, situate in Animas mining district, San Juan County, State of Colorado, and described in the plat and field notes on file in this office, as follows, viz:

Beginning at cor. No. 1 an inaccessible point whence cor. No. 3 sur. No. 381 Cimmarron lode bears s 53° 50' e 761.5 feet U. S. L. M. "Veta Madre" bears n 84° 18' e 3108.9 feet; Thence—Va. 14° 20 e—n 44° 36' w 1500 feet to cor. No. 2 an inaccessible point; Thence s 45° 24' w 11 feet to witness corner to cor. No. 2 a post marked W. C. 2x14634, 300 feet to cor. No. 3 a post marked 3x14634; Thence s 44° 36' e 1500 feet to cor. No. 4 a post marked 4x14634; Thence n 45° 24' e 210 feet to witness corner to cor. No. 1 a post marked W. C. 1x14634, 300 feet to cor. No. 1 the place of beginning.

Containing 10.331 acres, and forming a portion of Suspended Township 41 n, Range 6 W. of the N. M. principal meridian. Said location being recorded in Vols. 82 and 92, pages 320 and 169 of the Records of San Juan County Colorado.

Adjoining claimants none.

F. C. PERKINS,
Register.

First pub. April 20, 1901.
Last pub. June 22, 1901.

The PALACE Restaurant.

IS still catering to the inner wants of all.

Oldest established and neatest in the city.

Short order and regular tables.

Choicest delicacies of the season and prices in moderation.

MRS. N W. SAVAGE.

Houses to Sell.
Houses to Rent.

FOR RENT.

Nicest Residence Property in Silverton.

ONE SEVEN ROOM HOUSE with convenient sheds, out houses, etc., 1½ lots, lawn, neat fence, — $750 cash secures this.

ONE THREE-ROOM HOUSE and lot, $400 and many other bargains in residences and business properties.

I want to buy your house or lot.

W. D. WATSON

Real Estate, Loans, and Insurance.

CHAS. SCHEER,

PRACTICAL PLUMBER

AND

STEAM FITTER.

Headquarters at Joseph Bordelenu's

L. G. PROSSER,

Furniture Dealer

AND UNDERTAKER.

The Best line of Sewing Machines in the world.

The
STANDARD ROTARY,
WHITE ROTARY,
NEW HOME,
HOUSEHOLD,
IDEAL.

Sold here on time at Denver prices.

Monarch Shirts in all the new patterns.

Hemphill & McCrimmon.

SHORT STORIES.

WIDOW SAVES HER HOME.

A Brave Chicago Woman Secures 1,000 Subscriptions and Lifts a $500 Mortgage.

South side women are just now talking about the feat of a plucky woman in saving her home. She is a widow, and her husband left her a house and lot incumbered with a $500 mortgage. She had no way to lift the incumbrance, and when it came due she could do nothing but throw herself upon the mercy of the holders of the paper. They were decent people, however, and agreed to give her three months' extension of time. Two months of this respite was wasted in attempts to secure assistance from acquaintances.

Just about the time the widow had given up hope she saw the offer of a woman's periodical agreeing to give $500 to anyone who should secure 1,000 annual subscriptions within a specified time. The time expired in just a month, and the task seemed hopeless. But the woman seized the chance and went to work that very day.

She had fair success from the first day. When she thought it would do any good she told her story, and many people who cared little or nothing for the magazine subscribed to help her along. She visited residence districts only, and appealed to the woman of the house almost entirely. As the days went by many women grew interested in her brave effort, and little clubs and societies did what they could to help her. Many women would say this: "Now, if you find at the last minute that you are a few dollars short, come to see me and I'll subscribe again. I can send the paper to a country cousin."

The woman had many ups and downs. Some days subscriptions were secured easily and rapidly; other days she made little or no headway. As the end of the month drew near things grew less encouraging. Her acquaintances had long ago been exhausted. The available territory in the vicinity of her home had been thoroughly gone over, and people living at a distance, she found, were much less apt to lend a sympathetic ear. Still, the list grew steadily, and there was always a fighting chance. The last day found her just a dozen subscriptions short, tired out and nearly hopeless. She was casting about in her mind for some way to raise the money necessary for the 12 subscriptions, when the door bell rang. It was a note from a woman who had already subscribed, but contained a dollar and warm words of encouragement. This note was the first of many such messages. And before evening the list of 1,000 names was complete.

Out of the woman's brave effort has grown a double result. She was not strong physically when she began her canvas, but the exercise unavoidably connected with her work has made her a healthy woman. She got the $500 and she saved her home.—Chicago Inter Ocean.

MORE WAYS THAN ONE.

A Smart Boy's Clever Scheme for Buying Stamps at the Post Office.

The proprietor of a well-known hotel in the center of the city sent one of his office boys to the post office for postage stamps. The cash drawer contained $1.50 in pennies, and the proprietor wanted to get rid of them. Bundling them up into neat packages, he dispatched the office boy to Ninth and Chestnut streets with them.

"Get 75 two-cent stamps," the hotel man said, "and hurry back."

Well, the boy got back, but not in a hurry. In fact, he was gone so long that his employer called him down when he did return.

"Where on earth were you?" the hotel man asked. "Go over to Chicago for those stamps?"

"No, sah," replied the boy. "I only went to de post office. But they don't seem to like pennies there very much, sah."

"Why not?" demanded the hotel man.

"'Cause the young woman at de window wouldn't take more'n 24 cents' worth at a time, sah."

"Then you didn't get the stamps?"

"Oh, yes, sah. Indeed I did git de stamps, sah."

"How did you get them if the stamp clerks wouldn't take the money?"

The young fellow grinned.

"Worked a scheme on 'em, sir, worked a scheme on 'em. She said she wouldn't take more'n 24 cents' worth of the stamps at a time. See?"

His employer nodded in the affirmative.

"Well," continued the young fellow, 'I scratched my head after she told me that, but pretty soon I tumbled to a scheme. I fishes out 24 cents and lays em down on de stamp window."

" 'Gimme 12 twos,' I said.

"The twos were laid out on the counter. 'Gimme 12 more twos,' I added, when I had the first lot safely tucked in my pocket. I got 'em, and also enough more bunches to make up the $1.50 worth I wanted before I got through. Of course, the young woman was mad all over, but I couldn't help that, sah. I was there to get you de stamps, sah, and I had to do it."—Philadelphia Inquirer.

Chicken with Macaroni.

Cook one chicken or fowl until tender, saving the stock therefrom; remove all bones and chop into dice, not too fine; boil two cups macaroni in salted water until tender; strain and chop into inch lengths; then putting butter in your baking dish, have a layer of chicken, layer of macaroni and one of bread crumbs; pepper and salt. Continue alternate layers until dish is nearly filled, having bread crumbs on top. Now take two cups of the stock and one-half cup cream and thicken with flour until like thick cream. Pour this over chicken and macaroni and bake about three-quarters of an hour. —Cincinnati Enquirer.

Big Line of Ladies' Sacques.
Hemphill & McCrimmon.

DANDRUFF WON'T WASH OUT.

The Germ That Causes It Has to Be Destroyed to Cure Dandruff.

Many a woman spends an hour twice a week scouring her scalp, thinking scrubbing off the scurf will cure the dandruff. Two hours a week, at the age of 40 years, she has spent 260 days of 12 hours each, or two-thirds of a year of her life, in that vain hope; vain, because you can't cure dandruff without killing the dandruff germ, and the only hair preparation on earth that will do that is Newbro's "Herpicide"—also a delightful hair dressing, and thorough antiseptic against all contagion from use of others' hair brushes. It is also a delightful hair dressing. For sale by A. Taft. 86

SPRING HAS COME

So has the New and exceedingly Fine Cloth Goods arrived at the

Silverton Tailoring Establishment,

If you want to be in style and strictly in the "swim," by all means secure your next suit of tailor-made clothes at the SILVERTON TAILOR.

No such Goods.—No such fit can be secured elsewhere.

J. N. Kloster.

When You Buy Drugs
Buy the Pure Article.

Drugs loose their strength by remaining on the shelves for year.s Reliable service in putting up subscriptions is worth one-half the purchase price.

CUNNINGHAM

Sells Fresh Drugs and keeps a first-class graduated pharmacist.

Stationery and Toilet Articles.

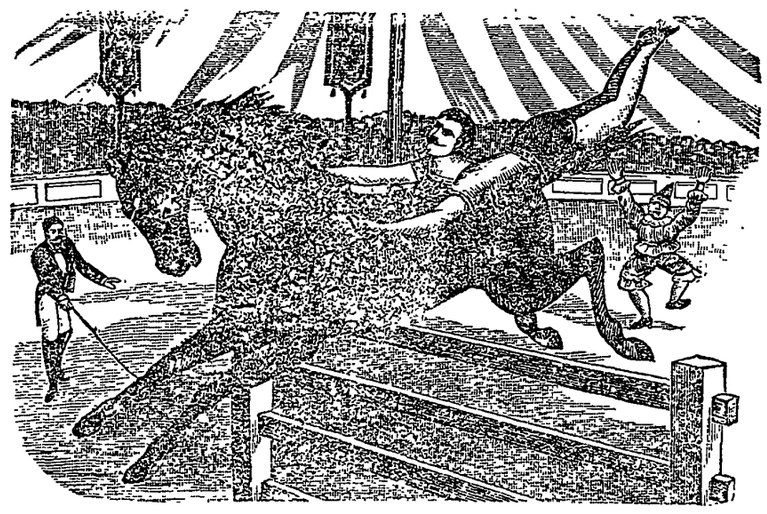
When desiring a cold refreshing drink in soft beverages patronize the new soda fountain.

S. D. CUNNINGHAM, - - - - Grand Hotel Block.

THE GREAT EASTERN RAIL ROAD SHOWS

AND COLUMBIAN EXPOSITION, CIRCUS, MUSUEM AND MENAGERIE.
will exhibit at

SILVERTON, Saturday, June 15.



Huge Monster Menagerie of Rare Wild Animals, Seven Large Troupes of Educated Horses and Ponies. Best Arenic Performers of Europe and America. The D. & R. G. Ry. will sell excursion tickets from all points at one fare round trip, good to return the following day.

FREE Morning Exhibition on Show Grounds after the Grand Srteet Parade. TWO Grand Performances, afternoon and evening. Doors open at 1 and 7 p. m.

BARNES & BARNES,
Lawyers,
GEO. W. BARNES, H. H. BARNES, Notary Public

BUCHANAN & SEARCY
Attorneys and Counselors
Mining and Corporation Law. Office over Frst Nat. Bank.

T. M. TRIPP,
CIVIL ENGINEER,
HOWARDSTILLE, COLO.

FINNEY JONES,
CIVIL ENGINEER,
SILVERTON, COLO.

Seventh Reunion of Old Timers—Silverton Preparing for Gala Days.

Old Timers San Juan Pioneer Association, first annual reunion held in Silverton July 4, 1894.

Subsequent meets at Del Norte, Durango, Lake City and Telluride fill up the interval.

July 4 and 5, 1901 is the appointed time and Silverton the appointed place for the Seventh Annual of the old trail blazers some of whom came in on prairie schooners, some astride of mules and others on foot, on the go as you please plan, their only stock in trade being pick, shovel and gold pan.

Seventh Annual of the S. J. P. A., in combination with the Fourth of July celebration will be one of the grandest events ever known to the San Juan country.

It will be rousing, old fashioned fraternal.

From the entire section comprising that vast tract of mountain country known as the San Juan, old timers will pour in.

No cards of invitation have been issued, yet posters announcing the event have been sent to all our sister camps.

Come one, come all, new timers as well as old, Silverton hospitalities are broad.

First Big show Coming.

Dont fail to see the Great Eastern show which will be in Silverton, Saturday, June 15. They have a menagerie of rare and costly wild animals. A congress of novelties and the best troupes of trained horses, ponies and dogs in the world, besides having acrobats and gymnasts from all parts of the globe.

In view of the coming Fourth of July celebration, action should be taken next week in the organization of committees, financial and otherwise. We want a live man for the main push. The STANDARD respectfully suggests Col. B. B. Galvin.

Satisfaction Guaranteed

Dr. Dowdy

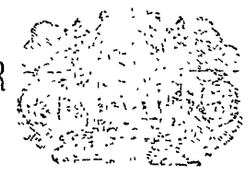
is the only graduate Dentist and Oculist in

Durango.

A. GREBLES,

PACTICAL WATCHMARER

A TRIAL AL-WAYS BRINGS CONVICTION.



I guarantee every article sold by me. { **Watches, Diamonds, Jewelry and Silver Knives, Forks and Spoons**

Gold Quartz cutting and setting and strict attention given to the repairing of Watches and Jewelry.

Next door to Brumfield's Studio.

He Is A Wonder.

All who see Mr. C. F. Collier, of Cherekee, Iowa, as he is now, cheerful, erect, vigorous, without an ache, could hardly believe he is the same man, who, a short time ago, had to sit in a chair, propped up by cushions, suffering intensely from an aching back, in agony if he tried to stoop—all caused by chronic kidney trouble, that no medicine helped till he used Electric Bitters and was wholly cured by three bottles. Positively cures Backache, Nervousness, Loss of Appetite, all Kidney troubles. Only 50c. at Cunninghum's drug store.

Mining Application No 1479.

Survey No. 14626.
United States Land Office,
Durango, Colo., April 5, 1901.

Notice is hereby given that Philip E. Kuhl by Ollie Lockhart, his attorney in fact whose post office address is Silverton, Colorado, has this day filed his plat and application for patent to 1500 feet in length on each the Excelsior, 16 to 1, Ben Butler, Park View, Pride of Boulder and Jenkins lodes, together with surface ground 300 feet in width on each except the Ben Butler which is 2187 feet wide, situate in Animas Mining District, San Juan county, Colorado, and described by the official plat herewith posted, and by the field notes on file in the office of the Register of the Durango Colorado Land Office as follows, to-wit:

SURVEY NO. 14626.
EXCELSIOR LODE.

Beginning at cor. No 1 whence U. S. L. M. Uncle Sam bears n 21° 26 30" w 1301.56 feet.
Thence s 7° 15' e 1500 feet to cor. No. 2.
Thence n 82° 15' e 300 feet to cor. No. 3.
Thence n 7° 15 w 1500 feet to cor. No. 4.
Thence s 82° 45' w 300 feet to cor. No. 1 the place of beginning.

16 to 1 LODE.

Beginning at cor. No. 1 whence U. S. L. M. Uncle Sam bears n 9° 53 w 2.84 47 feet.
Thence s 7° 15 e 1500 feet to cor. No 2.
Thence s 82° 45 w 300 feet to cor. No 3.
Thence n 7° 15' w 1500 feet to cor. No 4.
Thence n 82° 45 e 300 feet to cor No. 1 the place of beginning.

BEN BUTLER LODE.

Beginning at cor. No. 1 whence U. S. L. M. Uncle Sam bears n 21° 26' 30" w 13.1.56 ft.
Thence s 7° 15 e 1500 feet to cor. No. 2
Thence s 82° 45 w 218.7 feet to cor. No. 3,
Thence n 7° 15' w 1500 feet to cor. No. 4.
Thence n 82° 45' e 2 8.7 feet to cor. No. 1 the place of beginning.

PARK VIEW LODE.

Beginning at cor. No. 1 whence U. S. L. M. Uncle Sam lode bears s 73° 16 30' w 827.13 ft.
Thence s 11° w 1.00 feet to cor. No. 2.
Thence n 82° 45' e 321.8 feet to cor. No. 3.
Thence n 11° e 15' w 1500 feet to cor. No. 4.
Thence s 82° 45' w 321.8 feet to cor. No. 1 the place of beginning.

PRIDE OF BOULDER LODE.

Beginning at cor. No. 1 whence U. S. L. M. Uncle Sam lode bears n 33° 23' w 1405.32 feet.
Thence s 7° 15' e 1500 feet to cor. No. 2.
Thence n 82° 45 e 300 feet to cor. No. 3,
Thence n 7° 15' w 15.0 feet to cor. No. 4.
Thence s 82° 45' w 3 0 feet to cor No. 1. the place of beginning.

JENKINS LODE.

Beginning at cor. No. 1 whence U. S. L. M. Uncle Sam lode bears s 75° 55' 3" w 1145.77 ft.
Thence s 14 w 15 0 feet to cor. No. 2.
Thence n 82° 45' e 321.8 feet to cor. No. 3.
Thence n 14 e 1500 to cor. No 4.
Thence s 82° 45' w 321.8 feet to cor. No. 1 the place of beginning, containing an area of 59.066 acres exclusive of the conflict with sur. No. 2681, Sunnyside lode.

The Excelsior vein runs n. 7° 15 w 502.8 feet and s 7° 15 e 997.2 feet from Discovery cut.

The 16 to 1 vein runs n 7° 15 w 146 5 feet and s 7° 15' w 1353.5 feet from the discovery cut.

The Ben Butler vein runs n 7° 15' w 476.8 feet and s 7° 15 e 1023 2 feet from discovery cut.

The Park View vein runs n 14° e 1139 feet and s 14° w 329 feet from discovery cut.

The Pride of Boulder vein runs n 7° 15' w. 1070 feet and s 7° 15' e 430 feet from discovery cut.

The Jenkins vein runs n 14 e 1188. ft. and s 14 w 312 ft from discovery cut.

The location certificates are recorded in the Recorder's office of San Juan county, Colorado, as follows: The Excelsior lode in Book 97, page 193; the 16 to 1 lode in Book 96 page 193; the Ben Butler lode in Book 97, page 52; the Park View lode in Book 97, page 236; the Pride of Boulder lode in Book 97 page 141; the Jenkins lode in Book 1.1, page 73.

The adjoining claims are the Sunnyside lode and the George Reed lode

F. C. PERKINS,
First pub. April 6, 1901. Regis.er.
Last pub June 8. 1901.

Mining Application No 1490.

MINERAL SURVEY, No. 118 0.

U. S. Land Office, Durango, Colo., May 9, 1901.

Notice is hereby given that J. N. Kloster and Mary Kloster whose postoffice is Silverton, Colorado, have made application for a patent for 1500 linear feet on the

HOBSON LODE

bearing gold and silver the same being 1100 feet n 66° 08' e and 400 feet s 66° 08' w from discovery tunnel thereon, with surface ground 300 feet in width, situate in Eureka Mining District, San Juan county, State of Colorado, and described in the plat and field notes on file in this office, as follows, viz: Beginning at cor. No. 1 a post whence U. S. L. M. "Florence" bears n 61° 33' w 3115.2 feet; Thence—var. 14° e—n 66° 08' e 1500 feet to cor. No. 2 an inaccessible point; Thence s 23° 52' e 34 feet to witness corner to cor. No. 2 a post, 300 feet to cor. No. 3 a post; Thence s 66° 08' w 1500 feet to cor. No, 4 a post; Thence n 23° 52' w 300 feet to cor. No. 1 the place of beginning.

Containing 10.331 acres and forming a portion of Suspended Twp. 42 N Range 7 W. of the N. M. principal Meridian. Said location being recorded in vols. 99 and 92, pages 432 and 489 of the records of San Juan County, Colorado.

Adjoining claimants none.

F. C. PERKINS,
First pub. May 11, 1901. Register.
Last pub. July 13, 1901.

NOTICE OF FINAL SETTLEMENT.

In the matter of the estate of Peter Wolski, deceased.

Notice is hereby given, That on Monday the 1st day of July, A. D. 1901, being one of the regular days of the June Term of the County Court of San Juan County, in the State of Colorado, I, Theo. Grabowsky, Administrator of said estate, will appear before the Judge of said Court, present my final settlement as such administrator, pray the approval of the same, and will then apply to be discharged as such Administrator. At which time and place any person in interest may appear and present objections to the same, if any there be.

Dated at Silverton, Colorado, June 5th, 1901.

THEO. GRABOWSKY,
Administrator of the Estate of Peter Wolski, deceased.
First pub. June 8th, 1901.
Last pub. June 29th, 1901.

NOTICE OF FINAL SETTLEMENT.

In the matter of the estate of Jonathan Davis, deceased.

Notice is hereby given, That on Monday the 1st day of July, A. D. 1901 being one of the regular days of the June Term of the County Court of San Juan County, in the State of Colorado, I, T. J. Davis, Administrator of said estate, will appear before the Judge of said Court, present my final settlement as such Administrator pray the approval of the same, and will then apply to be discharged as such Administrator. At which time and place any person in interest may appear and present objections to the same, if any there be,

Dated at Silverton, Colorado June 5th, 1901,

T. J. DAVIS,
Administrator of the estate of Jonathan Davis, deceased.
First pub. June 8th, 1901.
Last pub. June 29th, 1901.

Have you seen the magnificent lines of coating and trouser materials, latest spring styles, in Kloster the tailor's show window? Call and investigate. No such goods, no such fits can be secured elsewhere.

Trimble Hot Springs Hotel.

This resort with its hot medical springs is now open for the season under new management, refitted with first-class accomodations; best of table board for rates. Address,

C. C. MURRAY, Mgr,
30-4t Trimble Springs, Colo.

Is your Hair worth One Dollar?

If so, buy a bottle of Newbro's Herpicide and stop that dandruff that is slowly but surely rendering you bald.

NEWBRO'S HERPICIDE

is the only preparation on the market that really will stop it, for it is the only one that kills the microbe at work on the hair root, thus destroying the cause and consequently removing the effect.

One trial will convince you, the same as it has this "doubting Thomas":

SAN FRANCISCO, CAL., Dec 1, '99.
When I bought that bottle of Herpicide a few months ago, like the majority of such preparations, I thought it would prove a fake, but I am happy to state that it does all, and even more, than you claim for it. My hair is growing rapidly. Respectfully,
ALF. H. KELLY, 2195 Devisadero St.

For Sale at all First-Class Drug Stores.

Weir the expert candy maker is now located at Moliques. Call and get some candy.

For Sale in Rockwood.

T. P. Brinegar of Rockwood will sell his nice residence and six lots cheap as his employment calls him elsewhere. A fine garden now growing nicely adds value to the place.

SILVERTON MEAT AND PRODUCE CO.

ESTABLISHED 1876.

DEALERS IN

FRESH, SALT AND SMOKED

MEATS

OF ALL KINDS.

BUTTER, EGGS, CHEESE, LARD, VEGETABLES, ETC,

AT LOWEST PRICES.

So'e Agent For DEL NORTE CREAMERY BUTTER.

BRICK BUILDING, GREENE ST., BETWEEN 11TH AND 12T

Independent Meat Market.

C. H. H. KRAMER.

Fresh Fish. **Wholesale and Retail Butcher.** Fresh Meat.

Telephone: 21 F

VEGETABLES, CURED MEATS, AND POULTRY

Rohrig & Kramer's Old Stand.

THE FESTIVAL? OF MOUNTAIN AND PLAIN.

This festival business in Denver is thin;
Tired skinning each other, this state they would skin,
They trot out their "Serpent," (the same is a fake),
And promise a feast, but it's all for the "Snake."
You may stand on the "curb," and see him go by,
While he sizes you up and winks his off eye;
For that's about all you will see of the show,
Unless you've a "pull," or plenty of "dough."
The jobbers of Denver are on to their job,
And the merchant of Jaytown they know how to rob;
Their "Drummers" are thicker than birds in the spring,
And very alluring the songs which they sing;
They stock up your store with consumate gall,
And stock up your customers late in the "Fall."
Colorado, we know, is famous and great,
But they think down in Denver, they are the state.
Whenever they tell you that Denver is "It,"
Get a grip on your "Roll," and gently say "Nit."
For Denver, I think, would sing very small
If only her own, "blew" themselves in the fall.
Of Denver, of course, we're all very proud;
And her praises, elsewhere, we sing very loud;
But that beautiful city, which sprang up so quick,
Owes all that she is, to the man with the pick.

—*J. L. McDowell.*

EXTRACTS FROM THE *Gladstone Kibosh.*

The libel suit brought by us against the editor of Eureka Slasher, some three weeks ago, wherein he accused us of hog stealing, kid napping and being run out of Missouri for setting fire to a church, has been dismissed by request of the plaintiff. But we want to say right here that an opponent who will send back to Missouri for witnesses is a low down cuss.

It has been suggested to us by eastern mine investors, that the capital stock of the All Gold Consolidated Mining, Milling and Tunnel company, owned exclusively by us, should be reduced from $800,000,000 to a figure that will cover the present cash value of the mine. After consulting with the office boy and Si Jones, who has charge of the KIBOSH circulation, we have concluded to place the stock at 800 shares, $1.00 per share. We are going to start with a force of one man and drive the main tunnel both ways from the center, sink and raise and run a few drifts until mineral has been encountered after which time stock is bound to go sky high. Purchase now while the stock is selling at ten cents.

Advertise in the KIBOSH. It pays. John Bilk advertised for his lost dog some three weeks ago and the dog returned of its own accord Wednesday. The Angel of Mercy saloon having put in a new mirror 2x2, advertised a free lunch and free beer and inside of one hour after the KIBOSH was on the street Bill Sagria was drunk. Wm. Cuthing advertised for a type written girl and inside of a week his wife secured a divorce. Advertise in the KIBOSH and get quick action. Front page reserved for saloons.

The Aeolian Male Quartet.

Arrangements are being made for this deservedly popular organization to visit Silverton in the course of their coming western trip. The gentlemen represent the College of Music in the University of Denver. They have been steadily engaged during the past season in Denver and vicinity, and have met with hearty appreciation in their concerts. Under the efficient teaching and leadership of Dean S. H. Blakeslee, the Quartet has become a very attractive and capable combination. They are due in Silverton on or about the 14th inst. at the People's Church.

FOR

Groceries

That Are Groceries,
go to

O. BALLOU & SON.

'Nough Said.

Dealers in

ELEGANT RIGS

are not livery methods, but we believe our outfits are better than those sent out from many stables. Clean wagons, stylish harness, and good looking, well fed horses are our rule.

If you wish prompt, courteous attentention. and at moderate expense, come here.

SILVERTON TRANSFER CO.

UTE COAL

C. A. BOWMAN.

BUCKLEN'S ARNICA SALVE.

Will often heal a horrible Burn, Scald Cut or Bruise. Bucklen's Arnica Salve, the best in the world, will kill the pain and promptly heal it. Cures Old Sores Fever Sores, Ulcer, Boils, Felons, Corns, all Skin Eruptions. Best Pile cure on earth. Only 25 cts a box. Cure guaranteed. Sold by S. D. Cunningham, Druggist.

NOTICE.—C. A. Shugart has 200 acres of mining property for sale. 27-2t.

SHIEDLER & GILBERT

Contractors and Builders

OFFICE:

Greene Street, bet. 14th and 15th.

Will draw plans and give estimates

Call and see us.

W. B. Erect Form and Bon Ton Corsets

Hemphill & McCrimmon.

Old Soldier's Experience.

M. M. Austin, a civil war veteran, of Winchester, Ind., writes: "My wife was sick a long time in spite of good doctor's treatment, but was wholly cured by Dr. King's New Life Pills, which worked wonders for her health." They always do. Try them. Only 25c at Cunningham's drug store.

NOTICE OF FORFEITURE.

SILVERTON, COLORADO, April, 26, 1901.

To F. R. BUSCH and W. H. AMIOT their heirs and assigns:

You are hereby notified that the undersigned have expended during the years 1899 and 1900, One Hundred Dollars in labor and improvements for each of said years upon the Surprise No. 2 lode mining claim situate in the Animas Mining District, San Juan county, Colorado, the location certificate of which is recorded in the office of the Clerk and Recorder of said county, in Book 96 at Page 281, in order to hold said claim under the provisions of Section 2324 of the Revised Statutes of the United States and the amendment thereto concerning annual labor on mining claims, said sum of One Hundred Dollars, for each of said year, being the amount required to hold said claim for each of the two year ending December 31, 1900; and if within ninety days after the service of this notice upon you by publication you fail or refuse to contribute to the undersigned your proportion of such expenditure for the said years 1899 and 1900 as co-owners and pay for the publication of this notice, your interests in the said claim will become the property of the undersigned by the terms of said section.

BRIDGET HUGHES,
THOMAS TRAVIS,

First pub. April 27, 1901.
Last pub. August 3, 1901.

It Saved His Leg.

P. A. Danforth, of LaGrange, Ga., suffered for six months with a frightful running sore on his leg; bnt writes that Bucklen's Arnica Salve wholly cured it in five days. For Ulcers, Wounds, Piles, it's the best salve in the world. Cure guaranteed. Only 25c. Sold by Cunningham, druggist.

Ladies' Percale Wrappers worth $1.75 for $1 25.

Hemphill & McCrimmon.

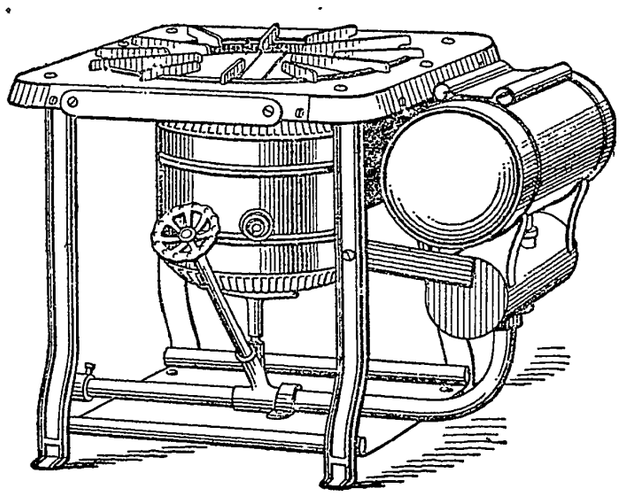
C. A. COOPER, Assayer.

GOLD OR SILVER, $ 75 COPPER 75C.
BOTH, - - - - - 1.00. LEAD, - 50C.

Complete price list on application.

This is the Smallest

WICKLESS Blue Flame OIL STOVE



Made also in four larger sizes.

Sold everywhere.

If your dealer does not have them—write to the nearest agency of

CONTINENTAL OIL CO.

W C Ferrill curator
Nat. history society

Silverton Standard

VOLUME XV — SILVERTON, COLORADO, JANUARY 30, 1904 — NUMBER 10

MINES AND MINING IN SAN JUAN

DEEP TUNNELS LARGE VEINS

Bar Silver.....$	57⅝
Lead, smelter trust.....	3 50
Copper, casting brand....	12.37½

The fact that like the objects of all ambitions, gold mining frequently gives more pleasure in the pursuit than in the possession.

The re-location of the Oro tunnel site by Messrs. Damschroeder and Bell two weeks ago was a little premature. The Gold Tunnel and Railway company have possession.

A Colorado Springs promoter has caught the idea and has ordered 2.000 of New Year's juniors to distribute among his people who are becoming interested in the San Juan.

Powder can be safely thawed by placing it in an enclosed box with a can of hot water. One can of hot water placed thus has been found to keep the powder soft for 12 hours.

About forty men are employed at the Highland Mary mine with a $7.500 distribution each month. The development now in progress, however, is the blocking out of ore bodies and preparing in a general way for the milling season.

E. H. Blunt of Needleton sold a one-fifth interest in the Bluff, Waterfall, Winner, Jasper Crown Point and Cora Bell mining claims in the Needle mountains to John F. Davis. The consideration was not put on record

The Gold Spur tunnel is being driven at a lively rate; 175 feet in King Solomon since last fall The 1,500 feet of pipe have been laid and as early as possible the coming spring the power house and drill compressors will be installed.

That the news of the resumption of work on the Hercules Consolidated company's mines on Sultan mountain is received with joy by all Silverton people goes without saying. On or about the 15th of February a large force of miners will be put to work driving the main tunnel into Sultan mountain and on the ore measure already developed. Carpenters and machinists will commence the reconstruction and enlarging of the mill and the once busy life of the nearest mine to Silverton will assume its old-time activity.

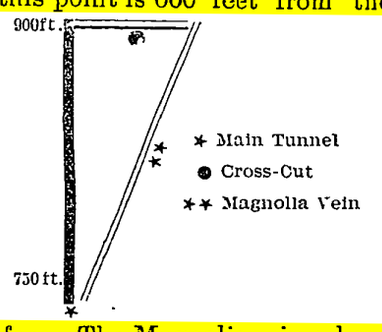
J. H. Sloan came down from Burrows Park Wednesday and reports that the ore streak on the Bismuth property is improving with every round of shots....It is rumored that operations on the Dewey mine in Hurricane basin will be resumed next month.—Lake City Phonograph.

The San Juan Smelting and Refining company has been very busy the past two weeks through its agents. Ed. Walter and F. W. Kendrick, in getting up lumber for buildings and mine boarding house supplies to their Burrows Park property. Although late in the season to prepare for active operation, the prevailing weather permitted all arrangements necessary to equip a small force of men for the next six months. This company's properties, known as the Success group, adjoins the famous Isolde mine; and several tests made on croppings by Assayer Walter has convinced the owners that chances are favorable for the opening up of another gold shipper in Burrows Park.

Two shipments from the fifth level of the North Star, King Solomon mountain, was made last week of three and eight-ton lots. The former netted the leasers, Kearns, Michaelson & Cason, $650, and the latter lot returned $690. The value predominated in silver with lead second and copper third. At the point in the fifth level where the new ore body has been opened up is insufficiently explored to make any reasonable calculation as to the extent, but enough is shown in other workings—old and new—in the North Star to rebut every argument that this old famous producer has "played out." Upon what theory or practical test did the experts for the Contention Mining company recommend this King Solomon mountain mine?

San Juan county is unique in having no other industry whatever than mining and treatment of its ores. It is a county of mountains, with only one park opening of importance, that where Silverton is situated. But it promises before many years to be the banner county of the state in the production of gold, silver, lead and copper. In gold it already stands third; in silver, fourth; in lead, third and in copper it is the first. ... There has been a marked gain in the values of its production over 1902, and such important additions to mills and shipping mines are being made, that it is confident the increase for 1904 will be still more striking. The great capitalists of the world are already heavily interested in the San Juan, and the mining and smelting magnates have control of many great properties. The veins of the districts are of enormous width, sometimes 50 to 150 feet, and many of these promise to give milling ore across the entire veins, with many rich pay streaks running through.—Mining World, Chicago.

The latest good news comes from the Natalie-Occidental. Cement creek, where the main tunnel has been going ahead by the machine drill process. The Magnolia vein that was cut a few months ago with fairly good results was crosscut from the main tunnel with the result of finding 12 feet of ore containing copper and lead besides a 2-inch streak of solid tungsten ore. The depth gained on the Magnolia vein at this point is 600 feet from the



surface. The Magnolia vein, where first encountered by the tunnel, is about 750 feet from the portal, with an additional 200 feet to where the vein is again cut by the cross tunnel:

Many new shippers will be added to the producing list during the year 1904 in San Juan county. One of the most important will be the Gold Prince mines in Mastodon gulch as there is little doubt that sufficient ore, already disclosed by old workings, will justify the erection of a 500-ton plant at Animas Forks this year. The company is well provided with funds and thoroughly prepared for the vigorous prosecution of work on mine and mill with a reasonable certainty that the output for San Juan will be noticeably increased by and through this, more than any other agency. Our predictions are based on only what indications present themselves at this time. We look forward to the Silver Ledge at Chattanooga to materially increase this years' output for reason that everything will be in readiness by early spring when the electric separators will have been installed. The New York-Brooklyn promises to share credit with others that are going to swell the metal output of San Juan to the $4,000,000 mark this year. Manion Brothers & Murphy, owners of this property, have done a large amount of dead work during 1903 and now have all the workings in excellent condition to mine the rich gold ore (for which it is famous) during the present year. The Henrietta mine with its wonderful ore reserves blocked and ready to ship to the Kendrick-Gelder smelter should be the potent factor among the new outputters to be added to the list. The Standard's New Year edition did not compute the ore purchased and piled in the bins at the local smelting plant during 1903 for the reason that, although valued at many thousands of dollars, could not be recorded as sent out of the county. This ore when reduced to copper matt next summer will not be overlooked in the grand total for this year's review next January. Again. if the Hercules Consolidated company's project materializes, viz: the operation of their Sultan mountain mines on a gigantic scale, it will be safe to say that another $100,000 will accrue therefrom. The energy put forth during the past year on the Green mountain mines has not been made in vain, for the ore being blocked out for the mill to be built this year will mean dividends to the owners and a boon to our district. As the prosecution of work on several tunnels continues in our county such as the Bos and Silverton Mining and Reduction company, the Astor, the Eureka Exploration, the Royal, the Natalie-Occidental, the Ruby Basin, the North Star and others we can conservatively predict that five or six out of the twenty or more will be shippers of ore in quantity and quality to affect in no small degree the output for the year. With this forecast, is it not encouraging? The only interference possible that could deter the increased output would be the fatal labor struggles that have been going on in our neighboring mining camps for the past two or three years. But with these as objects from which a lesson may be learned and the continuing calm and conservativeness on the part of the officers of the unions, the employers and the employees, lessens the chance for strife and discord—for a few years at least.

The following instruments have been filed for record in the county clerk's office since last report and up to the 28th inst.

Chas. W. Barney, et al., to Martin V. Barney, quit claim deed, Columbus; Netlie F. Blair to C. O. Boring, bill of sale, Columbus; Hawley Allison to the Animas Forks M. & M. Co., mining deed, Yellow Rose of Texas; owners of Columbus lode to The Animas Forks M. & M. Co., mining deed, Columbus; William Moyle to Benj. Toy, mining deed, Sunbeam; E. C. Van Diest to Eureka Ex. Co., quit claim deed, right of way; John M. Cornelius, et al., to Granville Pendleton, et al., mining deed, Little Bessie; John P. Johnson to Mrs. Rowena C. Beaton, quit claim deed, Artois, et al.; Henry Van Bocken to Jessie Van Bocken, warranty deed, Silverton property; power of attorney, ten parties to Chas. O. Boring.

DID YOU HEAR ABOUT?

Your last notice! Hitch on to the city light and take your medicine.

A little surprise party is among next week's events. Now don't tell anybody.

George Boss, the stage man, is complaining about stray stock. Principally heifers.

The revised souvenier—just a few left—one with every new subscription or 50 cents apiece.

The old electric light building and grounds were this week sold to John Dalla. Consideration, $1000.

When sending a letter to an eastern friend or to one whom you might interest in San Juan mines, don't forget to enclose a "Junior" Standard.

The blacksmith shop at the Isolde mine, Burrows Park, was torn to pieces by a snowslide Wednesday evening. The first slide of the season.

Next week or week after look for the Standard's Mid-winter picture supplement. "Diversity of San Juan's Winter Seasons—January 1903-04." If you don't get it, why, raise the devil.

Word was received this week from St. Louis that Mrs. W. D. Watson is on the improve. For a time last week she was reported dangerously ill.

Mrs. Panthea Kendrick of Denver, mother of Wm. F. Kendrick, the mine promoter and Frank C. Kendrick of this place is reported very ill at her home.

Thomas Annear, receiver for the Bank of Silverton, sold the propperty of the late James H. Robin in North Durango to Wm. Schulz. The consideration was $300.

The Ladies Christian Union will meet with Mrs. W. R. Pyke next Tuesday afternoon. Business relative to the white goods sale at the coming bazaar will be discussed.

The unscrupulous promoter may not cherish a frank "heart to heart" talk but the investor may profit by a sound suggestion to appear in next week's Standard. It contains truth, if nothing more.

This is the season of the year
When the change is such a bore;
But somehow one should not forget
To write it nineteen-FOUR.
—Chestnuts.

The partnership existing between Fred Grebles and T. F. Keeley has been dissolved and the Gold King and Gladstone boarding houses will hereafter be conducted by Grebles and G. A. Bowman.

Geo. Martin after several weeks looking over the field has concluded to open a harness shop in Silverton and this week rented a portion of the W. H. Haas plumbing building on Greene street and is ready to serve the trade. The making and repairing of harness will be made a specialty.

Refreshments will be served at the hall of the Miners' Union during the dance of the Women of Woodcraft, Feb. 4. Everybody invited. Tickets $1.00 which are now on sale at the usual stores in Silverton.

Last Saturday evening there was much doing at the Masonic hall. Walter O'Malley, W. W. Wilkinson and Paul Warner were initiated. Carrying stone and fetching mortar, being duties assigned for the present.

The democratic papers in the San Juan are making a fight for a portion of the land office work. As yet Perkins is the same old stubborn mule; instructions given him by Washington officials to—the—contrary, notwith—etc.

Some snaps in machinery may be had by calling on the Silverton Electric Light and Power Co. One 125 h. p. boiler tested to 180 lbs. Two 50 h. p. boilers. Two 125 h. p. engines, Ideal and Buffalo. Three 30 kw. and two 25 kw., 125 v. generators; 13 miles of wire.

"If a man can write a better book, preach a better sermon or make a better mousetrap than his neighbor, though he build his house in the woods, the world will make a beaten path to his door." Had Emerson substituted stationery, printing and basement his assertion would have been none the less true.

Every farmer wants to be a school teacher; every school teacher hopes to be an editor; every editor would like to be a banker; every banker would like to be a trust magnate, and every trust magnate hopes some day to own a farm and have chickens and cows and pigs and horses to look after. We end where we begin.—Index.

It is reported that an unknown man was found dead on the outskirts of a small Kansas town recently. A revolver and $100 in cash were found on his person. The coroner held an inquest taking $75 to defray expenses and bury the body. The police judge fined the corpse $25 for carrying concealed weapons and confiscated the gun. The local newspaper, which published the obituary, got—nothing.

One of the pleasantest affairs of the season yesterday took place (Thursday) afternoon at the Hurley residence. Mrs. Hurley entertained the Euchre Club and others in honor of Mrs. G. A. Singer who left this morning for Denver. While Mr. Singer is at present holding a responsible position in the Klondyke it is the hope of their many friends that the San Juan will again claim his capabilities in the near future.

A genuine surprise was given Mr. and Mrs. Pearce last Friday evening, a week ago, by a number of their friends; their daughters Misses Maud and Ethel being instrumental in making the evening's occasion a jolly affair. Those present were:

Mr. and Mrs. William Jones and family, Mr. and Mrs. J. Brown and family, Mr. and Mrs. Brumfield and family, Mrs. Thomas Rowland and child, Mrs. P. Clifford and son, Mr. and Mrs. Allen, Mr. and Mrs. Thomas Colmer, Mrs. John Jenkins, Mrs. J Glanville, Mrs. J. Perrin, Lee Leslie, James Cole, Thomas Lewis of Durango.

Cunningham's Drug Store

WATCHES, CLOCKS, JEWELRY.

We have moved three doors above our old location into the Bert Brown new building and will in connection with the drug business carry a first-class line of Jewelry.

All kinds of repairing done in a first-class manner.

Toilet Articles, Perfumes, Souvenirs, Navajo Blakets and Curios.

The Silverton Supply Co

IS A GOOD PLACE TO BUY GROCERIES REASONABLE PRICES.

Has its own Bakery, Pastery and Bread always fresh.

Has its own warehouse on track and can fill wholesale orders on short notice.

FRESH FRUIT

Fresh Vegetables

AND A

Fine Line of Groceries

To Select from.

N. A. BALLOU,

WHOLESALE AND RETAIL GROCERIES,

1157 Green Street. Phone 52.

George Watson is up and around. He looks the victim of a long siege of illness and consoles himself and everybody that it was not worse.

The large pipe crossing over the road at the mouth of Arastra gulch, which at this time of the year conveyed all the water used at the Silver Lake mill, froze up last Tuesday night, necessitating a complete close down of the mill and effecting some forty men in employment. Steam has been applied but up to the time of going to press (this Friday evening) a flow was not reached.

The New South Jubilee company, four colored entertainers, is billed for next Wednesday, Feb. 3rd. The quartette includes E. E. Bennett, first tenor; F. A. Nelson, second tenor; Walter Dean, baritone and E. A. Nelson, bass. Alonzo Moore is the magician of the company. The entertainment is largely musical, and it is well spoken of by the press throughout the country. This (sixth) number of the Siverton Lyceum Club is the star engagement of the season.

Chas. P. Schutt junior member of the firm of Chas. Schutt & Co., Silverton, was united in marriage to Miss Cheney Sanderson in Durango Thursday afternoon, the father of the bride, Rev. Sanderson, officiating. Charles Schutt is a prosperous confectioner and his winning ways and industrious habits have made a way to love and friends galore, (a cigar please.) The bride is the third youngest daughter of Rev. Sanderson and is a beautiful and accomplished young lady. For a time Mr. and Mrs. Schutt will reside in Durango.

A contract was let Tuesday by the Silverton & Northern Railway company to E. M. St. Claire for 10,000 ties. Mr. St. Claire arrived about a week ago and joined R. K. Reed in the photography business in this city. Having learned that the company was in the market for ties and being acquainted with a number of Rockwood lumbermen Mr. St. Claire engineered the deal. The consideration will be $2600. This young contractor left Wednesday for Rockwood to superintend the filling of the order in the shortest possible time. He severing his connection with the Reed studio Tuesday.

We are not going to say that the lecture on the "'Yankee and his Notions' was good." To the contrary if we voice the sentiments of the very small audience that congregated to hear "the high class" and "elevating" declamation of Rev. R. A. Chase of Pueblo, the Standard will say that the fifth number of the Silverton Lecture course given was a "frost." It was colder at the Peoples' church by 100 degrees than at any place in Silverton. Bursts and puffs of pathos for an hour and a half but not a smile as the theme of the lecture would indicate. The Standard advertised this number for the Peoples Lyceum Club as being good, at so much per line with the reserve (verbal contract) to criticise if criticism be well founded. Had the Rev. R. A. Chase referred to the people in Silverton as being a genuine and congenial bunch of Yankees who bought anything and everything that promised to be something or nothing, he would at least have been commended for holding the mirror up to nature as it were. Those who have purchased season tickets would probably be upheld by judge and jury to ask in the name of equity that their money be returned.

The Woman's Club Meeting.

The San Juan Woman's club will meet Saturday, Jan. 30, with Miss Gertrud Upton.

General Subject, The Discovery of America
Leader..... ..Miss Marie Hollingsworth
Topics.—Remote causes which led to the discovery; Trade; Effect of the Crusades on Trade; Columbus, His Voyage; The Thrones of England, Spain, France and Germany.
Responses at Roll Call,
Facts on the life of Columbus.
Paper, Ferdinand and Isabella, ...
Mrs. Clara Watson
Leader on Current Events... . ...Mrs. Casad

Current Topics for the year will be assigned as follows:

The Exposition..... Mrs. Anna Watson
Hospitality.....Mrs. Clara Watson
Art. ....Mrs. Potts
Social Reform.....Miss M. Hollingsworth
English Usage..... ....Mrs. Whitelaw
Household Economics ....Mrs. Carbis
Good Cooking ....Mrs. Goble
Science..... ....·..... . .Mrs. Springer
Education ....Mrs. Palmer
The Stage..... ..... Miss Upton
Health..... .. ..Mrs. Hodges
Smiles..... .. . . Mrs. Carr
Sunshine.. .. ..Mrs. Pike
Window Gardening. .....Mrs. Rogers
Fashion..... ....Mrs. Casad
Needlework . ...Mrs. McKelvey
The House Beautiful.....Mrs. Coddington
New Books ....Miss Ashley
Commerce..... ....Miss Case
Minerology.. .. .. Miss Fickle
Music .... Miss Petherbridge
Parliamentory Law.....Leaders Chosen

Eagles' Night.

At Wyman's hall, Tuesday night, Silverton Aerie No. 177, F. O. E. twenty persons were initiated into the order by having taken advantage of the one-third initiation fee granted Silverton Aerie for the next thirty days. "The Birds" are getting in some good timber through this special offer and effort. Silverton Eagles now number over one hundred and will increase another fifty by March first.

Tuesday night's initiation proved to the new members the true spirit of the order. Special music had been engaged for the occasion and extra preparations were made to the eaglets and the forty older birds. Turkey, salads and liquid refreshments, combined with impromptu speech and song rendered the occasion a pleasant one.

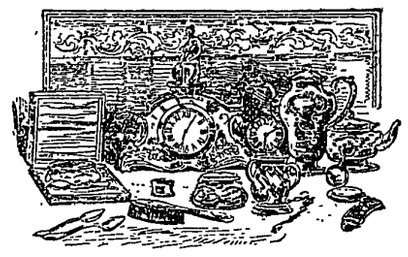
Those initiated were: John Amon, L. M. Braunsworth, J. M. Clifford, R. R. Collins, F. H. Dovey, Otto Damm, Albert Ehlert, W. H. Evershed, Chas. A. Grill, Harry Hussey, S. Jacques. J. W Koehler, C. C. Reid, W. L. Spafford, D. Sheahan, J. F. Sorge, Sam Stitzer, C. Stiles, Chas. Stanter and A. Z. Watson.

From an enthusiast on Eagleism we were apprised that the order had planned to open a club room with library and all modern conveniences, perchance a gynasium and bath rooms, and put forth every effort to place the social features at the top notch of perfection in Silverton notwithstanding the excellent care and attention that is always given when needed during sickness or distress. Silverton Eagles have taken on a new plumage.

Dance to be given by Women of Woodcraft changed to Feb. 4.

A. GREBLES,

WATCHMAKER AND JEWELER



When you want anything in the Jewelry line. you can save money by buying from me.

A LARGE LINE OF

Watches, Clocks, Rings, Watch Charms and Silverware to Select from.

How is your Watch? If it not running right bring it to me and have the faults corrected. We repair watches with a skill only obtained by years of practical experience.

Fred Goble

Wholesale and Retail Dealer in

LUMBER AND COAL,

Screen Doors, Sash, Doors, Lime, Cement and Mining Timbers.

The Perins Peak Coal.

PHONE 46-A.

The World Moves

SO DO I

And if you wish a prompt delivery of goods or baggage see that you have WM. LESTER do it. Ring up Phone Silver 102, or at N. A. Ballou's Store.

All trains arriving and departing reached in due season and baggage carefully handled.

THE SILVERTON TRANSFER. W. E. LESTER. Prop.

DOUD BROS.

EXCHANGE LIVERY

OPPOSITE GRAND HOTEL.

SADDLE HORSES. ⁘ DRIVING HORSES.

AGENTS FOR

HESPERUS COAL.

SILVERTON STANDARD.

KLINGER BROS.—PUBLISHERS.

Entered at the Silverton, Colo. postoffice for transmission through the mails as second class matter.

FFICIAL PAPER OF SAN JUAN COUNTY

ONE YEAR $2.50.
SIX MONTHS, $1.25
THREE MONTHS, 75c

SATURDAY, JANUARY 30, 1904.

The all-absorbing topic: "Is Hanna a candidate?"

Honor with some men runs a "nip and tuck" race with profit.

Rockefeller does not own the earth. He is now buying real estate in New York City.

A bloody battle has just been fought in Uruguay, the losses being one mule and a gamecock.

Spain may exhibit its old battered hulks at the World's Fair in St. Louis. Then again she may be contrary.

The matter of the state building for Colorado has been settled. The exhibits as well as general headquarters will be located somewhere in St. Louis county.

What a stampede there would be if fire should break out in the hall in Chicago where the next big republican convention is to be held. You understand that the greater a man's sins the faster he runs when the devil gets after him.

Dispatches from Telluride to Denver papers the early part of the week stated that all trails and roads were blockaded by snow between Telluride, Ouray and Silverton. Strange—with stages running from those points every day.

President John Mitchell and Secretary Wilson were re-elected Tuesday by the United Mine Workers of America. A motion for an increase in salary for the president, from $3000 to $5000 per year, was carried by a two-thirds vote.

Fusion is all right this year providing the democrats are permitted to name the candidates. Such a man as Owers has but a choice of two parties: republican which he helped last fall and socialist which he led into the republican ranks.

Whittaker Wright the noted London promoter of a number of Colorado mines committed suicide Tuesday. He was tried in London on a number of charges of swinding and found guilty. The judge pronounced the severest sentence permissable, seven years imprisonment, and on hearing this Wright drank a glass of clear liquid and died before leaving the court room.

According to the Standard Oil-Rockefeller code, stealing from the people and endowing colleges is philanthrophy. In early days it was compound larency as the thief and the receiver were jointly amenable to the law. But that was before New Jersey became a dumpins ground for incorporated crime. —Durango Democrat.

The Masonic Temple in Chicago, situated just a block east of the Iroquois theatre, was threatned with a holocaust similiar to its near neighbor. Two thousand people were in the building at the time of the explosion which caused the fire. The heroic work of the elevator men, remaining at their posts, through smoke and fire, until all occupants were brought out, is all that saved the city another awful loss of life.

Pittsburgh, Pa., and adjacent territory drained by the Alleghany, Monongahela and Ohio rivers has suffered considerably the past week from ice gorges and floods. Five lives are reported lost and damage to the extent of $1,000,000 done to property. Fifty thousand men are out of employment owing to the water rising and entering the mills. Youngstown, Ohio, is experiencing the second worst flood in its history. Philadelphia is threatened by a repetition of the flood of 1892.

Bill Devere, the veteran actor, writer, printer and Colorado pioneer, died almost penniless in a cheap New York lodging house last week. He published a book years ago, a book of poems, descriptive of early Colorado days, taking many people well known in Durango as characters. "Parson Hoage" and "Jim Marshall's New Piano" were Durango, Silverton and Lake City products. He leaves three daughters named respectively Denver, Frisco and Spokane.

"I believe that no one can harm us but ourselves; that sin is mis-directed energy; that there is no devil but fear; and that the Universe is planned for good. We know that work is a blessing, that winter is as necessary as summer, that night is as useful as day—that death is a manifestation of life, and just as good. I believe in the NOW and HERE. I believe in you, and I believe in a Power which is in ourselves that makes for righteousness."—Fra Elbertus.

Colonel D. M. Parry of Indianapolis has organized his army of labor union smashers, and is ready for business. This country is not clamoring for labor union smashers or capital smashers. It is clamoring for men who are willing to accept the golden rule for their guide. Neither labor rioters nor labor smashers will solve the vexatious problems which are confronting the American people today. The rioter is a labor breaker and the smasher is a trouble hunter and a trouble maker.—Dallas (Tex.) Herald.

Fred Goble has recently secured the agency for an anthracite coal that has no superior in the state. When you get out try a ton.

Muscular Rheumatism,

ARE YOU SORE?

Sore Joints, Sore Muscles and Sore Feet make life miserable for hundreds of people who could get instant relief by using Paracamph. This wonderful external remedy relieves such ailments instantly, because when applied, it opens the pores, allowing the soothing, healing oils and camphor to penetrate directly to the seat of the pain, removing congestion and soreness and drawing out all fever and inflammation by causing perspiration. You do not take Paracamph-you rub it on, and it cools, soothes and cures. Don't arguedon't hesitate. Every bottle is guaranteed to do what we claim. Sold in 25c, 50c and $1.00 bottles by good druggists.

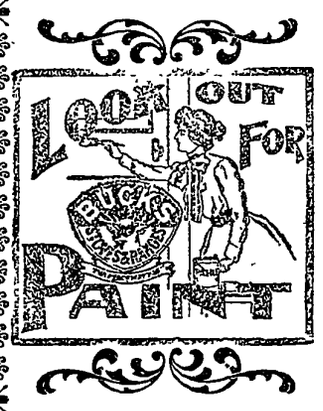
THE PARACAMPH CO. LOUISVILLE. KY. U. S. A

ARE YOU SORE?

USE Paracamph.

On Sale at Cunningham's Drug store.

The most popular girls in town

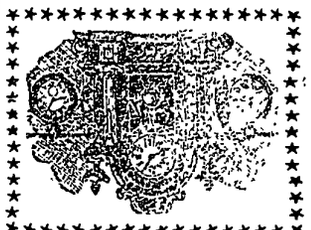


PAINT

UP THEIR WORN CHAIRS; RETOUCH THE FLOOR BORDERS, WINDOW SILLS, ETC. WITH OUR GUARANTEED PAINTS. YOU CAN GET ANY SHADE OR COLOR HERE. COME AND EXAMINE OUR COLOR CARD. PRICES LOW.

New Goods Still Coming.

Stubbs & Jakway



HENRY DEITRICH THE JEWELER

Again in his old stand next door to postoffice.

Will attend to all watch work that has been improperly repaired by incompetent workmen

COLD QUARTZ MADE INTO NEW JEWELRY.

PROCEEDINGS

OF THE

Board of County Commissioners of San Juan County,

For December, 1903 and January, 1904.

RESOLUTIONS. Dec. 2, 1903.

Taxes refunded to J. S. Robinson on Maten Lode, Survey No. 10036-A; amount $1.28; reasons, double assessment and double payment by mistake.

Resolution authorizing Treasurer to sell all tax sale certificates on Alexander lode, Sur. No. 1979 for $230.00, all taxes for 1900, 1901 and 1902 to be paid in full by purchaser; reasons; claim has been idle for years, no taxes ever paid, and most of taxes more than six years delinquent.

Jan. 4, 1904.

Resolved, That County Treasurer be authorized to sell all tax sale certificates on the Whale lode, Sur. No. 914 for $181.64, all taxes for 1900, 1901, 1902 and 1903 to be paid in full by purchaser. All to be paid within five days from date.

Resolved, That County Treasurer be authorized to sell all tax sale certificates on Central lode, Sur. No. 507; Clara lode, Sur. No. 506; Georgia lode, Sur. No. 504; Big Giant lode, Sur. No. 505 for $136.46. Purchaser to pay in full all taxes for 1900, 1901 and 1902. All to be paid within five days from date.

Jan. 5, 1901.

Resolved, That whereas, the personal property of Geo. W. Bausman (now deceased) was erroneously assessed for the years 1901 and 1902, therefore resolved: That the Treasurer be authorized to accept, as in full payment for the taxes of said years, the following. For 1901, $81.91; for 1902, $60.81 and the purchaser to pay in full all other taxes on said property.

Resolved, That the Treasurer be authorized to sell all tax sale certificates on Summit lode, Sur. No. 2769 for $40.00. Sale to be made within five days from date.

BILLS ALLOWED.

ROAD FUND.

To Whom Issued.	For What Purpose.	Bill No.	Amt. Claimed.	Amt. Allowed.
David Hindel	Road Order, west district	878	$7 50	$ 7 50
O R Reynolds	do do do	879	7 50	7 50
T A Gifford	do do do	880	21 00	21 00
Gus Brolin	do east do	881	2 50	2 50
Joe Bordeleau	do do do	882	75	75

ORDINARY REVENUE FUND.

To Whom Issued.	For What Purpose.	Warrant No.	Amt Claimed.	Amt. Allowed
W N Searcy	Services as Co. Atty	5875	$75 00	$75 00
NellieTulley Cunningham	Clerk Hire	5876	300 00	300 00
do do	Services as Co. Treasurer	5877	425 00	425 00
Jas R Pulliam	do District Attorney	5878	10 00	10 00
Henry Forsyth	do Co Com. Supt. of Poor	5879	117 00	117 00
J B Patterson	do Co. Commission	5880	70 00	70 00
Ole M Lee	do do	5881	70 00	70 00
Mrs Hodge	do Janitor	5882	50 00	50 00
E L Ingersol	do Co. Physician	5883	50 00	50 00
Thos Colmer	do Co. Assessor	5884	325 00	325 00
Hubert Work	Care of Insane	5885	158 75	158 75
Josiah Watson	Services as Co. Judge	5886	36 15	36 15
B W Lockhart	do Clerk of Board	5887	50 00	50 00
do do	do do do	5888	110 00	110 00
Silverton Standard	Printing	5889	40 75	40 75
Out West Printing Co	Stationery	5890	66 76	66 76
Silverton Standard	do	5891	4 25	4 25
C S Casad	Postage	5892	2 00	2 00
Josiah Watson	do	5893	2 50	2 50
Frank L Watson	do	5894	2 00	2 00
NellieTulley Cunningham	do	5895	9 25	9 25
B W Lockhart	do	5896	5 25	5 25
Thos Colmer	do	5897	10 00	10 00
Fritz Hoffman	Services	5898	1 00	1 00
Colo. Telephone Co	Telephone rent	5899	24 00	24 00
Jos Bordeleau	Merchandise (jail)	5900	3 35	3 35
Town of Silverton	Water Rent	5901	6 00	6 00
W N Haas	services	6902	7 50	7 50
Vienna Restaurant	Meals for Election Judges	5903	6 00	6 00
Fritz Hoffman	Ballot box and lock	5904	34 75	34 75
E C Condit	Fees Justice Court	5905	15 50	15 50
W D Watson	do do do	5906	31 70	31 70

POOR FUND

To Whom Issued.	For what purpose.	Bill No.	Amt. Claimed.	Amt. Allowed.
N A Ballou	Mdse for Paupers	301	24 35	24 35
Josephine Boyd	Boarding do	302	139 25	139 25
Doud Bros	Coal for do	302	5 75	5 75

UNFORSEEN CONTINGENT FUND.

To Whom Issued.	For What Purpose.	War. No.	Amt. Claimed.	Amt. Allowed.
T M Tripp	Services as Surveyor	853	$161 80	$161 80
Josiah Watson, Co. Judge	Fees lunacy case	854	355 40	355 40
Doud Bros	Coal Co. building	855	65 42	65 42
Fred Goble	do Jail	856	84 47	48 47
Town of Silverton	Electric Lights	857	22 20	22 20
Silverton E L & P Co	do	858	14 40	13 70
C S Casad	Services as Sheriff	859	69 00	69 00
do	Boarding priseners	860	120 75	120 75
Frank L Watson	Services Clerk of the District Court	861	21 80	21 80
John E wood	Juror Certificate	862	12 65	12 65
Henry Sherman	do do	863	5 15	5 15
Frank Schmelzer	do do	864	2 65	2 65
D Umble	do do	865	3 70	3 70
Arthur Castonguay	Witness do	866	7 65	7 65
C A Bowman	do do	867	6 05	6 05
Ellen Carbis	Services as Supt of Schools	868	31 05	31 05
J B Patterson	Services as Mineral Exhibit	869	125 00	125 00

Jan. 6, 1904

Resolved, That the Treasurer be authorized to sell all tax sale certificates upon the Silver Star lode, Survey No. 6495, for $20.08. Purchaser to pay at the same time all taxes for 1900, 1901 1902 and 1903, and all to be paid within ten days from date.

Jan. 7, 1904.

Out West Printing Co. awarded contract to furnish County officials with record books, blanks, pens, pencils, rubber bands and ink.

Silverton Standard awarded contract to furnish envelopes, letterheads, billheads, County affidavit blanks, memorandum and tax memorandum slips.

Silverton Standard selected as official newspaper for 1904.

Jan. 12, 1904.

Bid of B. A. Taft to furnish medical supplies for paupers for 1904, accepted.

B. W. LOCKHART, County Clerk.

Semi-Annual Statement

Of the Treasurer of San Juan County, State of Colorado

To the Honorable Board of County Commissioners,
San Juan County, Colorado.

GENTLEMEN:—

I hereby submit for your examination and approval the semi-annual statement of the receipts and expenditures of San Juan County, for the six months ending Decembrr 31st 1903:

ORDINARY REVENUE FUND.

To warrants outstanding July 1, 1903	$ 556 62	By warrants cancelled since July 1, 1903	$ 7640 79
To warrants issued since July 1, 1903	8955 34	By warrants outstanding Jan. 1, 1904	1871 17
	$ 9511 96		$ 9511 96

ROAD FUND.

To warrants outstanding July 1, 1903	$ 1 50	By warrants cancelled since July 1, 1903	$ 2982 10
To warrants issued since July 1, 1903	2980 60		
	$ 2982 10		$ 2982 10

POOR FUND

To warrants issued since July 1, 1903	$ 605 75	By warrants cancelled since July 1, 1903	$ 605 75

UNFORSEEN CONTINGENT FUND.

To warrants issued since July 1, 1903	$ 1436 21	By warrants cancelled since July 1, 1903	$1436 21

COUNTY DEBT

To bond issue bearing 6 per cent	$97000 00	Cash on hand	$ 21112 71
To bond issue bearing 8 per cent	49000 00		
To ordinary revenue warrants	1871 17	By Balance	126729 02
	$147871 17		$147871 17

Total County Debt $126729 02

THE VARIOUS FUNDS ARE IN THE FOLLOWING CONDITION.

	CR.		DR.
Ordinary revenue fund	$ 2152 25	Cash on hand	$21142 15
Sinking fund of the County bonds	5001 28		
Road fund	103 01		
General School fund	2994 00		
Interest on county bonds	3902 21		
Unforseen contingent	5378 83		
Poor fund	501 29		
Special School fund	1046 15		
Treasurers fees on papers issued	83 10		
	$21142 15		$21142 15

Statement of money on hand July 1st, 1903, amount collected from July 1st, 1903, to Jan. 1st, 1904, for what money was expended and amount on hand Jan. 1st 1904.

Ordinary revenue warrants paid	$ 7640 79	Cash on hand July 1, 1903	$31870 90
County Bonds paid	10500 00	Taxes collected	27692 08
Paid state treasurer	3439 43	Treasurer's fees on papers	83 10
Paid Road warrants	2982 10		
Paid General School warrants	3258 75		
Paid Interest on County bond	5091 02		
Paid Unforseen contingent warrants	1436 21		
Paid Poor warrants	605 75		
Paid Special school warrants	2871 33		
Paid Town Treasurer	677 78		
Paid Commissions to Kountz Bros.	77		
Cash on hand	21142 15		
	$59646 03		$59646 03

Redemption money due W C Mitchell	in addition to the above		$ 86 15
Redemption money due G H Malchus	do	do do	206 84
Redemption money due W. C. Mitchell	do	do do	16 41
Redemption money due James H. Robin (deceased)	do	do do	52 77
Redemption money due W. R Trippe	do	do do	31 66
Redemption money due Jas. Gibbons	do	do do	5 17
Total			$399 00

The above statement is true to the best of my knowledge.

[SEAL]

NELLIE TULLEY CUNNINGHAM,
County Treasurer San Juan County, Colo.

Semi-Annual Statement

OF THE

Board of County Commissioners of San Juan County, ending January 8, 1904.

We submit herewith our Report and Statement, showing the expenditures of the County from July 10, 1903, and we also submit the report of the County Treasurer for the second half of the year 1903, showing the receipts and disbursements in her office; the present indebtedness of the County and the rate of interest the same bears.

Dated January 8, 1904.

HENRY FORSYTH,
OLE M. LEE,
J. B. PATTERSON.
County Commissioners San Juan County, Colo.

Summary of Ordinary Revenue, Poor, Unforseen Contingent and Road Fund.

County Assessor		$ 650 00
County Attorney		150 00
Clerk of the Board of Commissioners		170 00
County Commissioners		550 00
County Court		142 45
County Coroner		
District Court		682 15
Election Expense		716 71
Fuel and Light		91 37
Janitor		150 00
Printing		1035 60
Public Building and Insurance		676 90
County Physician		150 00
Superident of Schools		25 60
Stationery		215 80
Sheriff's Fund		713 90
County Treasures		850 00
District Attorney		165 00
Office Furniture and Fixtures		244 35
Insane		625 85
Treasurer's Fee Fund		300 00
Refund Tax		4 38
Justice of the Peace		215 00
		$ 8589 61
Poor Fund		622 35
Unforseen Contingent Fund		2414 70
Road Fund, East district		912 40
Road Fund West district		904 28
Total for last half of year		$13393 34
Total for first half of year		9702 97
Total for the year 1903		$23096 31

PURELY PERSONAL.

—Robert E. Hutchins was called to Gunnison last week, his mother being very ill.

—Frank Palmer conductor on the Gladstone railroad spent Sunday in Durango.

—O. S. Campbell, of the Durango smelter came up to Silverton Tuesday night on a business trip.

—E. C. Condit writes from Philadelphia that he has hopes of being in the San Juan by early spring.

—Tony Crane, contractor on the Highland Mary tunnel, made a business trip to Silverton the fore part of the week.

—Mrs. M. B. Merrill, treasurer of the Gold Tunnel and Railway company has returned from her Toledo, Ohio, trip.

—E. Harrington of the Iron-Hat Copper-Gold Mining company departed for his home in Beloit, Kansas, this week.

Joe Morgan, who has been in Salt Lake City for four months returned to Silverton this week. Joe says a man can't live on salt air.

—George Sneer, bookkeeper for the Silverton branch of Stubbs & Jakway, spent Wednesday in Durango consulting with L. C. Jakway.

—H. R. McElhaney is a newcomer from the South. With a keen-edged razor he is right at home in the tonsorial parlors of Freeman & Lamb.

—Mrs. E. L. Ingersoll left for Pueblo this week to join her husband. The doctor writes that he is enjoying a good practice and likes his new home.

—Fred Grebles and James Bowman returned last Friday night from their trip to Moutrose. They departed Saturday morning for their homes at Gladstone.

—Mr. and Mrs. J. L. Mitchell, of the Highland Mary mine departed for their home in South Britain, Conn., where they will visit their parents for a month.

—Albert Brendle and son Otto arrived Monday evening from Howardsville. They left the following day for Colorado Springs where they will spend the winter.

—James Kitt, superintendent on the Sunnyside mine, returned Monday night from his trip to Denver. He visited with his family who are stopping at the home of his son Harry. His daughter Beatrice has been ill for some time but she is rapidly recovering.

—D. W. Williams of Silverton was a guest of Roy Fisher this week as they are interested together in mining property. Mr. Williams is a man of varied experience in mining in various parts of the world and can tell some very interesting stories about Alaska especially.—Creede Candle.

—Mr. and Mrs. Clarence Finch went out to spend the winter.

—A. V. Shaw returned from Wymenuche Creek, near Pagosa Springs, Wednesday, accompanied by his brother R. R.

—D. J McCanne, civil and electrical engineer for J. J. Henry of Denver, is in Silverton for the purpose of disposing of the engines, boilers, dynamos, etc., of the old light plant.

—Mrs. Nels Nelson was up from Durango for a few days this week visiting her husband. Notwithstanding a ten years' residence in the Smelter City this was her first trip up the Animas river.

—Mrs. E. J. Fuller left for Montrose Wednesday morning where she will spend the winter. Before returning to Silverton Mrs. Fuller will visit in California for about a month, returning early in June.

—Representative and Mrs. C. A. Cooper returned from their Salt Lake trip Tuesday. In appreciation of their son's good behavior (!) during their absence, Ray was presented with a high-class graphaphone upon their return.

—Louis Wyman writes from San Diego, Cal., that the pleasure of their trip to him and family far exceeded their anticipation. They will stop at San Diego, where many other Silverton people are at this time, for the next two months.

—Mrs. A. Barnes, formerly of Silverton, who has been visiting her sister Mrs. Ochs for six weeks, left Saturday for Hotchkiss where she will spend another six weeks with relatives, and then return to Ouray and open dressmaking parlors.—Ouray Plaindealer.

Advertised Letter List.

Following letters remain uncalled for at the postoffice in Silverton, Colo., for the week ending Jan. 28, 1904.

Broini, Gust	Myres, Phil
Bats, Herbert	Michele, Benari
Collins, J. N.	Micklevich, Mike
Cani, Geo.	Michele, Bortolo
Eva, D. R.	Nelson, Ernest
Field, Robert	Lutcliffe, F.
Hecklen, Kate	O'Reilly, Wm.
Hook, W. B.	Richardson, Matthew
Kemp, Rd.	Ripley, Chas.
Linder, Bron.	

Parties calling for any of the above letters will please say "advertised" and give date of list. MATILDA MCCARTNEY, Postmistress.

Doud Brothers met with a small loss Sunday. Two cutters that were let out during the day were returned a little the worse for wear. One was driven over a rock breaking the single tree. The other had a brace broken while coming down from the Anglo-Saxon tunnel. The parties left the horse untied in the road and the train coming from Gladstone frightened the animal. He made the trip to town alone, far ahead of the train and pulled up in front of the Doud barn. Merrill Doud drove along the Cement creek road in search of the sleigh occupants and robes. He learned that the travelers made the trip to town on the train and he found the missing robes scattered along the road.

LOST—Gold seal ring. Leave at Standard office and receive $5.00 reward.

LOST.—Ladies pocket book or hand bag—containing money, papers and keys. Leave at Standard office and receive reward.

Fifty Years the Standard

DR. PRICE'S CREAM

BAKING POWDER

Improves the flavor and adds to the healthfulness of the food.

PRICE BAKING POWDER CO. CHICAGO

There's no place like home—except the Chop House.

A Pleasure Trip.

If you wish to take a trip to a warmer climate and a lower altitude, the Colorado & Southern Ry. will give you a low rate for the round trip to any of the principal resort points in the south, southeast, and along the Mexican Gulf. There are, too, some delightful combination rail and water trips. Write for details. T. E. FISHER, Gen'l, Pass. Agent, Denver, Colo.

TIN SHOP,

OLIVER HAAS,

All kind of Tin, Copper, and Sheet Iron work to order.

Roberts' Old Stand.

Talk about hot cakes, why Will Marsh makes better "flap jacks" than the Waldorf-Astoria—Fact.

The T bone steaks at the Chop House are delicious, delectable—and what you can't say of other places—devourable.

Mr. William S. Crane, of California, Md., suffered for years from rheumatism and lumbago. He was finally advised to try Chamberlain's Pain Balm, which he did and it effected a complete cure. For sale by all druggists.

"Red hot and still a Boiling" What? Chile Con Carne all night at The Will Marsh Chop House.

Here's where I get even on the game. I'm going down to the Chop House for a "square."

HEMPHILL & McGRIMMON

Fine Dry Goods,
Cloaks, Notions.
Florsheim Shoes,
Stetson and Boss Hats,
Monarch Shirts,
Hansen Gloves,
Crousse & Brandegre
Fine Tailered
Clothing.

Wyman Block,

Cor. Greene and 15th Street.

ANYTHING YOU WANT?
TELEPHONE 344 BLACK.

Ladies' and Childrens' Shoes.

Groceries and Gents Furnishings

Our Photograph Department is still the leading gallery in Silverton.

BRUMFIELD

Rocky Mountain Pie.

"I thoroughly enjoyed everything in the Sportsmen's show last week," said a clerk in the New York postoffice, "because it was new to me. I was born in a New England town, and knew little about such things. But my wife came almost from the base of Pike's Peak, and asked me to take her, so I did. As we were coming out I saw a sign outside the restaurant, 'Rocky Mountain pie.' In my opinion, you cannot tell a New Englander much he doesn't know about pie, so I went in and asked for some. My wife said she did not know what was coming, either. Well, sir, it was a revelation. There was a thick, rich bottom crust, with quarters of apples sticking up endwise all over it, and the little valleys in between them filled chock-a-block with delicious cream. It looked like snow between mountain ridges. My wife and I ate a whole pie between us."

L. G. PROSSER,

Furniture Dealer

AND UNDERTAKER

The Best Line of Sewing Machines in the World.

THE
STANDARD ROTARY
WHITE ROTARY
NEW HOME
HOUSEHOLD
IDEAL

Sold Here on Time at Denver prices.

AT

JOHN WALTER'S

BEER DEPOT

You Can Get

The Famous Golden Beer and Tonic; all grades of Pabst's Beer, such as Blue Ribbon, Red, White and Blue, Dark Bavarian, Light Bohemian and Tonics, Wines and Liquors and the best grades of

LUNCHES

IN THE MARKET

PHONE - - 345 BLACK

PETE ORELLA

Sole Agent for

ANHEUSER-BUSCH
LEMP'S AND
ZANG'S

Beers---Bottled and Keg

Also Agent for

The Original Manitou Ginger Ale and Mineral Waters.

Phone 7-C P. O. Box 217
SILVERTON, COLO.

WITH THE SAGES.

Knowledge, like religion, must be experienced in order to be known.—Whipple.

He is great who is what he is from nature, and who never reminds us of others.—Emerson.

A man's virtue should not be measured by his particular efforts, but by his ordinary actions.—Pascal.

To aid us in the darkness of our route, God has given us a shining light—conscience.—Lamartine.

Individuals are virtuous when they sacrifice their personal interest in the interest of all.—Mme. de Stael.

Perfect worth and goodness is in doing in private the actions that you are capable of performing before the world.—La Rochefoucauld.

Refinement creates beauty everywhere. It is the grossness of the spectator that discovers anything like grossness in the object.—Hazlitt.

Simplicity of manner is the last attainment. Men are very long afraid of being natural, from the dread of being taken for ordinary.—Jeffrey.

The practice of virtue costs many endeavors and privations, but one will find its prize in the serenity of his soul and in universal esteem.—Latena.

It is better by a noble boldness to run the risk of being subject to half of the evils which we anticipate than to remain in cowardly listlessness for fear of what may happen.

A good deed is never lost; he who sows courtesy reaps friendship, and he who plants kindness gathers love; pleasure bestowed upon a grateful mind was never sterile, but generally gratitude begets reward.

POINTED PARAGRAPHS.

A hobo's idea of a nightmare is to dream of working.

A woman is seldom able to see the point to her husband's jokes.

When a man is too accommodating he is apt to become a nuisance.

If a man is not vain he is apt to suffer from the vanity of others.

Time works fewer wonders than the dime museum manager exhibits.

Many of the so-called problems of life are the flimsiest kind of illusions.

Deaf mute wives would be worth their weight in gold if silence is golden.

Some of the heaven-made matches seem to have been tipped in the other place.

When a girl is chummy with her mother she can manage to get along pretty well without a chaperon.

After arguing with a man for half an hour a woman invariably says: "Now, why can't you be sensible?"

Women have a sympathetic liking for cats because the latter always seem ill at ease when there is a man around.

During her courtship a girl wonders what takes the place of marriage in heaven, but after being married a year she doesnt care much what it is.—Chicago News.

BULLETIN BUBBLES.

How it goes—thread.

Second in command—the stepmother.

Did you ever see a hogshead full of calves' brains?

Every actor should have part interest in the play.

Somehow the hand of fate always has a finger in the pie.

Some preachers do not practice so much as they rehearse.

Don't advise the keeper of the lighthouse to "keep it dark."

Counterfeit change for a bad dollar is a "queer" coincidence.

It's a poor church organist who doesn't know when to stop.

The fashionable evening gown goes a long ways; that is, behind.

When a man's a bore, it doesn't augur well for his popularity.

Even a quiet wedding is not celebrated without due ceremony.

The long arm of the law embraces a number of feminine attorneys.

Don't take offense at the swing in a person's walk; it's only the gait.

It's only when they put a veil on that some women dot their eyes.

A hot spring on a certain place might be a boil on a neck of land.

Church singers are like some kinds of writing paper; they come in choirs.

The elevator boy doesn't always feel worked up when he gets called down.

Tenors and sopranos are not the only ones who are graduated from the high school.—Philadelphia Bulletin.

FIGS AND THISTLES.

They who court fame never win it.

Greedy masters make greedy men.

Sacrifice is the measure of service.

God never demands the impossible.

No home is built with hands alone.

Faith does not exclude forethought.

Easy virtue is the nurse of hard vice.

True culture is simply soul growth.

It is not necessary to be irreverent in order to be reasonable.

A man's reflections on others constitute a fair reflection of himself.

The more a man grows in God's sight the smaller he becomes in his own.

It is impossible to think of His words and our worries at the same time.

The man who sighs for the days of the martyrs generally does it in an easy chair.

It might endanger the existence of the cold-storage church if the Spirit of fire entered there.

Some people think that God is waiting for them to die.

M. B. HOLT
Mining Engineer
U. S. Deputy Mineral Surveyor

FINNEY JONES
..CIVIL ENGINEER..
Cor. Reese and 13th
SILVERTON, COLO.

JAMES DYSON,
CIVIL AND MINING ENGINEER
U. S. Deputy Mineral Surveyor
Office on Reese Street, between 14th and 15th near the county offices. No. 1437. P. O. Box 118.

L. L. HAINES
Agent for
The New York Life Insurance Co. and the U. S. Casualty Co.
ACCIDENT AND HEALTH INSURANCE

J. S. BAILY
DENTIST
Residence Phone
Silver 4
Silverton Colorado

C. A. COOPER
ASSAYER

Gold or Silver	$ .75
Both	1.00
Copper	.75
Lead	.50

Complete price list on application.

A 26-page pictorial souvenir—11x16 inches (price 50c)—with every subscription to the Silverton Standard. It contains views of every town, mill and scenic points in the county of San Juan.

The Schulz Brewery
BREWER OF
HIGH-GRADE LAGER
WM. SCHULZ, PROPRIETOR.
Our new brews under the present management have reached a high grade of perfection. Its pureness is guaranteed. Ask for it, as it is sold by all first-class dealers.

MY LOST YOUTH.

By LONGFELLOW.

Often I think of the beautiful town
That is seated by the sea;
Often in thought go up and down
The pleasant streets of that dear old town.
And my youth comes back to me.
And a verse of a Lapland song
Is haunting my memory still:
"A boy's will is the wind's will,
And the thoughts of youth are long, long thoughts."

I can see the shadowy lines of its trees,
And catch, in sudden gleams,
The sheen of the far-surrounding seas,
And islands that were the Hesperides
Of all my boyish dreams.
And the burden of that old song,
It murmurs and whispers still:
"A boy's will is the wind's will,
And the thoughts of youth are long, long thoughts."

I remember the black wharves and the slips,
And the sea-tides tossing free;
And Spanish sailors with bearded lips,
And the beauty and mystery of the ships,
And the magic of the sea.
And the voice of that wayward song
Is singing and saying still:
"A boy's will is the wind's will,
And the thoughts of youth are long, long thoughts."

I remember the bulwarks by the shore,
And the fort upon the hill;
The sunrise gun, with its hollow roar,
The drum-beat repeated o'er and o'er,
And the bugle wild and shrill.
And the music of that old song
Throbs in my memory still:
"A boy's will is the wind's will,
And the thoughts of youth are long, long thoughts."

I remember the sea-fight far away,
How it thundered o'er the tide!
And the dead captains, as they lay
In their graves, o'erlooking the tranquil bay,
Where they in battle died.
And the sound of that mournful song
Goes through me with a thrill:
"A boy's will is the wind's will,
And the thoughts of youth are long, long thoughts."

I can see the breezy dome of groves,
The shadows of Deering's Woods;
And the friendships old and the early loves
Come back with a sabbath sound, as of doves
In quiet neighborhoods.
And the verse of that sweet old song,
It flutters and murmurs still:
"A boy's will is the wind's will,
And the thoughts of youth are long, long thoughts."

I remember the gleams and glooms that dart
Across the school-boy's brain;
The song and the silence in the heart,
That in part are prophecies, and in part
Are the longings wild and vain.
And the voice of that fitful song
Sings on, and is never still:
"A boy's will is the wind's will,
And the thoughts of youth are long, long thoughts."

There are things of which I may not speak;
There are dreams that cannot die:
There are thoughts that make the strong heart weak,
And bring pallor into the cheek,
And a mist before the eye.
And the words of that fatal song
Come over me like a chill:
"A boy's will is the wind's will,
And the thoughts of youth are long, long thoughts."

Strange to me now are the forms I meet
When I visit the dear old town;
But the native air is pure and sweet,
And the trees that o'ershadow each well-known street,
As they balance up and down,
Are singing the beautiful song,
Are sighing and whispering still:
"A boy's will is the wind's will,
And the thoughts of youth are long, long thoughts."

And Deering's Woods are fresh and fair,
And with joy that is almost pain
My heart goes back to wander there,
And among the dreams of the days that were,
I find my lost youth again.
And the strange and beautiful song,
The groves are repeating it still:
"A boy's will is the wind's will,
And the thoughts of youth are long, long thoughts."

ESTABLISHED 1876

Silverton Meat & Produce Co.

DEALERS IN ALL KINDS OF

Fresh and Salt Meats, Ham, Bacon, Kettle Rendered Lard. Del Norte Creamery Butter, San Luis Valley Eggs and Vegetables of All Kinds

Supplying Mines in Any Quantity

AT BED-ROCK PRICES

Brick Building — 1125 Green Street

Independent Meat Market

C. H. H. KRAMER.

Wholesale and Retail Butcher.

FRESH FISH. FRESH MEAT.

Vegetables, Cured Meats and Poultry.

Rohrig & Kramer's Old Stand.

THE KENDRICK-GELDER SMELTING CO.

F. C. KENDRICK, General Manager — E. W. WALTERS, Supt. and Metallurgist

Purchasers of Gold, Silver and Copper Ores. Special rates on tonnage of low grade ores.

Sampling and Settlements Made Promptly

AND AT ALL TIMES

Joseph Bordeleau,

DEALER IN

HEAVY AND SHELF

HARDWARE

Stoves, Crockery, Tinware and Mining Supplies.

Agent for Hercules and Giant Powder — Fuse, Caps, Etc.

Local Weather Report.

The following is a correct temperature record taken from a Farenheit thermometer on the Standard corner, for the week ending Thursday evening, January 28:

TEMPERATURE RECORD.

DAY		Above Zero	Below Zero
FRIDAY—	7 a. m.....	3	
	12 m..	21	
	6 p. m.....	13	
SATURDAY—	7 a. m.....	10	
	12 m., ...	43	
	6 p. m.....	10	
SUNDAY—	7 a. m.....		1
	12 m., ...	20	
	6 p. m.....	10	
MONDAY—	7 a. m.....		1
	12 m., ...	40	
	6 p. m.....		3
TUESDAY—	7 a. m.....		22
	12 m., ...	31	
	6 p. m.....	10	
WEDNESD'Y—	7 a. m.....		11
	12 m., ...	30	
	6 p. m.....	5	
THURSDAY—	7 a. m.....		10
	12 m., ...	40	
	6 p. m.....	12	

WEATHER AND STORM CONDITIONS.

Friday, Jan. 22.—Snow.
Saturday, Jan. 23.—Snow.
Sunday, Jan. 24.—Clear.
Monday, Jan. 25 —Clear.
Tuesday, Jan. 26.—Hazy, snow.
Wednesday, Jan. 27—Clear.
Thursday, Jan. 28.—Clear.

Church days and movable feasts.—Septuagesima Sunday, Jan. 31.

Moon changes for January (mountain time).—Full moon, 2d. 10:47 p. m.; last quarter, 9th, 2:10 p. m.; new moon, 17th, 8:46 a. m.; first quarter,, 25th, 1:41 p. m.

WEATHER TO BE EXPECTED:

Rev. Ira L. Hicks forecasts stormy weather about the 4th of February.

The State weather bureau predicts light snow Friday, Saturday and Sunday.

Flowers to Bloom at San Antiono.

San Antonia, quaint and beautiful, is one of the most delightful places in winter—Coloradoans' favorite resort. The Colorado & Southern Ry, offers a round trip rate of $41.10 from Denver. If you do not care to go to San Antonio, let us map out a trip for you to some other southern resort; possibly you would prefer a trip across the Gulf of Mexico.

T. E. FISCHER.
Gen'l Pass Agent,
Denver, Colo.

Classon's maps—all kinds—now on sale at Standard office.

Clayson's Map of the San Juan Triangle, Pocket edition, $2, Wall map $25.00 on sale at Standard office.

LOST.—A bunch of five keys. Return to this office,

Bargains in wall paper and paints can be secured by calling on Fred Brouckenauer.

Wanted.—Go cart, will rent or buy. Address L. B. 215.

5-room furnished house for rent. 2 wheels for sale. Apply at this office.

When wishing a first-class haircut, shave or bath, call at Lamb & Freeman's barber shop, just above the Benson block.

When billious try a dose of Chamberlain's Stomach and Liver Tablets and realize for once how quickly a first-class up-to-date medicine will correct the dis order. For sale by all druggists.

Remember that Fred Brouckenauer will close out his stock of wall paper and paints regardless of cost.

You don't have to wait. The best of workmen at Lamb & Freeman's when it comes to a shave or haircut. Baths in connection.

Wonderful Nerve

Is displayed by many a man enduring pains of accidental cuts, wounds, bruises, burns, scalds, sore feet or stiff joints. But there is no need for it. Bucklen's Arnica Salve will kill the pain and cure the trouble. It is the best salve on earth for piles, too. 25c at S. D. Cunningham's, druggist.

The Silverton Supply Co., have just unloaded a car of flour and have a car of sugar, lot of candles, car of canned goods on the road. Car of Greeley potatoes. Wait for them if you are fond of good cooking and good eating potatoes.

THE SILVERTON SUPPLY CO.

Saved From Terrible Death.

The family of Mrs. M. L. Bobbitt of Bargerton, Tenn., saw her dying and were powerless to save her. The most skillful physicians and every remedy used failed, while consumption was slowly but surely taking her life. In this terrible hour Dr. King's New Discovery for Consumption turned despair into joy. The first bottle brought immediate relief and its continued use completely cured her. It's the most certain cure in the world for all throat and lung troubles. Guaranteed bottles 50c and $1. Trial bottles free at S. D. Cunningham's drug store.

Typewriters
Bought, sold and exchanged.
Any make furnished promptly.
Tel. 157. A. L. Maxwell.

Congratulations.

Mr. John H. Cullom, editor of the Garland, Texas, News, has written a letter of congratulations to the manufacturers of Chamberlain's Cough Remedy, as follows: "Sixteen years ago when our first child was a baby he was subject to croupy spells and we would be very uneasy about him. We began using Chamberlain's Cough Remedy in 1887, and finding it such a reliable remedy for colds and croup, we have never been without it in the house since that time. We have five children and have given it to all of them with good results. One good feature of this remedy is that it is not disagreeable to take, and our babies really like it. Another is that it is not dangerous, and there is no risk from giving an overdose. I congratulate you on the success of your remedy." For sale by all druggists.

WM. FEIGEL,
Millwright & General Contractor
For the Construction of Concentrating Mills and Mine Work.
SILVERTON, COLO.

J. J. CARROLL,
Assayer and Chemist,
Special Contracts made with mining Companies.
Office: Franklin's Old Stand, Creene Street.

CIGARS
Pure Tobacco and Clean Manufacture is the reason
ANDRE'S CIGARS
ARE THE BEST
An Industry in Silverton.

CHAS. SCHEER,
PRACTICAL PLUMBER
and Steam Fitter.
Headquarters at
Joseph Bordeleau's

Ernest Grill & Co.
Lumber and Feed,
wholesale and retail agents for
HESPERUS,
BLACK DIAMOND
ANTHRACITE
COAL

Try the New Tailor
WM. SHEARER,
Successor to Peter Nelson
For a Winter Suit of Chothes. Clothes cleaned and pressed. Prompt attention given to all work.
MASONIC BUILDING 209 THIRTEENSH ST.

THE BERT BROWN MARKET
AND
LIVE STOCK COMPANY.
Wholesale and Retail dealers in
MEATS AND PRODUCE.
Beef, Pork, Mutton, Veal
Dry and Green Vegetables
Butter, Eggs,
Sugar Cured Hams and Bacon.
Pickles and Kraut.
Cheese, Salt and Fresh Fish, Oysters, Game, Poultry
TRY OUR OWN MAKE Breakfast Bacon, Kettle Rendered Lard, Corned Beef, Pickled Pork, Dry Salt, Sausage of all kinds
WE GUARANTEE SATISFACTION.
Supplying Mines a Specialty. Give us a Tria
Cor. Green and 11th St. SILVERTON, COLO.

FROM TOWNS NEAR BY.

The "Plaindealer" at Ouray is to send some female representative to the St. Louis Exposition, by the scheme it has inaugurated, on the "Maid of Honor" plan.

The Micky Breen mill in Poughkeepsie gulch was started up last week with Frank M. Jackson superintendent for the Tempest-Apex Mining company. Twenty-six men are employed and the outlook is good for cotinuous and profitable shipment via Ouray's station.

C. S. Bailey, now editor and manager of the San Juan County (N. M.) Index, made his debut in last Friday's issue of the paper, Joe Prewitt, retiring. Among other things Mr. Bailey promises his readers an "all home print" paper in the near future. The Index will undoubtedly grow in such hands, as "Joe" said he is all right.

There remain in the county at present only about 120 soldiers. According to information given out at military headquarters, a yet further reduction will be made as conditions warrant. The military outpost at Placerville, under command of Lieut. Rainger, will be maintained for an indefinite period, as it is the intention of the military to continue to intercept any of the deported men that attempt to come back and prevent their return to Telluride. All the soldiers have been withdrawn from Ophir, and there are no guards at either the Liberty Bell or the Smuggler-Union mills.—San Miguel Examiner.

Twenty Years Ago Today.

Silverton had a firs-tclass gymnasium.

Rasmus Hanson started on his annual Chicago trip.

All traffic ceased on account of snow and snow slides.

The Jennie Parker ore house was carried away by slide.

The thermometer registered twenty-two degrees below zero.

Ed. Gibson braved the storm and snow slides between Eureka and Animas Forks.

We have snowshoers here that cannot be beaten in the San Juan. Merrill Doud, for instance.—Animas Forks Pioneer.

Already had politics begun to wax warm for the spring election, with N. E. Slaymaker slated as a probable candidate for mayor.

A battle royal was on between the Animas Forks Pioneer and the then La Plata Miner at Silverton. Of course Raymond of Animas Forks put up the best talk, there being eight feet of snow on the level between Silverton and the town of Animas Forks.

Thos. Tripp and E. W. Hunt in the Animas Forks district and Finney Jones in the Red mountain district were "doing" everybody's surveying. It cost the claimants 50 cents a line for publication of patent notices.

EXTRACTS FROM THE *Gladstone Kibosh*

The Kibosh has always tried to suppress scandal, but when Deacon Devine makes a practice of trotting around all night with other men's wives and is seen rushing the can at 2 o'clock in the morning while we, as editor of the leading paper of this section, have to stay at home and read the bible, its time for the good people to call a halt and install the socialistic principle, i. e., "divide up."

Ex-Mayor Miller, Tuesday evening, went into the barber shop to warm his long lean body. They were scrubbing out and the soles of his shoes became wet. It was 35 degrees below zero. The ex-mayor stepped out in front of the shop and froze fast to the sidewalk. George the barber has been arrested for painting the captive red, white and blue and using him for a barber-pole.

Eight years ago we furnished a full household set of furniture, cooking utensils, etc., and waited patiently 365 days for some maiden to propose, then we packed and stored our belongings. Again we have brought the truck to the surface and rented a shack where each and every night we can be found with our ear to the key-hole listening for the sound of a female footstep.

NOTICE OF FINAL SETTLEMENT.

In the Matter of the Estate of DAVID M. HERR, Deceased.

Notice is hereby given, that on Monday the 1st day of February A. D. 1904 being one of regular days of the December Term of the County Court of San Juan County in the State of Colorado, we Jesse S. Herr and Henry Herr, Administrators of said estate will appear before the Judge of said Court, present our final settlement as Administrators pray the approval of the same, and will then apply to be discharged as such Administrators. At which time and place any person in interest may appear and present objections to the same if any there be.

Dated at Silverton, Colo, this 7th day of Jan., A. D. 1904. JESSE S. HERR, HENRY HERR, Administrators of the Estate of David M. Herr, Deceased.

First pub. Jan. 9, 1904.
Last pub. Jan. 30, 1904.

WANTED—TRUSTWORTHY LADY or gentleman to manage business in this county and adjoining territory for house of solid financial standing. $20 00 straight cash salary and expenses paid each Monday direct from headquarters. Expense money advanced; position permanent. Address Manager, 605 Monon Building, Chicago.—Jan. 30.

The difference between the city light service and Chop House Service—The city lights "go a-glimmering when they get a little more to do" and the Chop House goes "to getting there"—hands, feet and "think pots"—savy?

I must close out my stock of wall paper and paints inside of thirty days. Cost cuts no figure.
Fred Brauckenaur.

A Very Close Call.

"I stuck to my engine, although every joint ached and every nerve was racked with pain," writes C. W. Bellamy, a locomotive fireman of Burlington, Iowa. "I was weak and pale, without any appetite and all run down. As I was about to give up, I got a bottle of Electric Bitters, and after taking it I felt as well as I ever did in my life." Weak, sickly, run down people always gain new life, strength and vigor from their use. Try them. Satisfaction guaranteed by S. D. Cunningham. Price 50 cents.

WANTED.—Situation at a mine boarding house as cook. Best of reference. Address or call on Standard.

Do you need a ton of hard coal? Fred Goble is now agent for a superior quality of anthracite.

Found a Cure for Indigestion.

I use Chamberlain's Stomach and Liver Tablets for indigestion and find that they suit my case better than any dyspepsia remedy I have ever tried and I have used many different remedies. I am nearly 51 years of age and have suffered a great deal from indigestion. I can eat almost anything I want to now. —Geo. W. Emory, Rock Mills, Ala. For sale by all druggists.

Follow the "crowd;" the "crowd" never gets fooled and the "crowd" goes to Will Marsh's.

The only red hot up-to-date meals in the "burg" at Will Marsh's.

WANTED.—A cook for a small number of persons. Apply to Chas. Karney.

A Prisoner in Her Own House.

Mrs. W. H. Lavho, of 1001 Agnes avenue, Kansas City, Mo., has for several years been troubled with severe hoarseness and at times a hard cough, which she says, "Would keep me in doors for days. I was prescribed for by physicians with no noticeable results. A friend gave me a part of a bottle of Chamberlain's Cough Remedy with instructions to closely follow the directions, and I wish to state that after the first day I could notice a decided change for the better; and at this time after using it for two weeks, have no hesitation in saying I realize that I am entirely cured." This remedy is for sale by all druggists

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NOTICE OF DISSLOLUTION.

Notice is hereby given that the co-partnership heretofore existing between John Lind and John Nelson, under the firm name of Lind & Nelson, and doing business in Silverton, San Juan county, Colorado, is this day dissolved by mutual agreement. The business will be continued by Nelson & Sutherland, who will collect all bills owing said firm of Lind & Nelson and liquidate all indebtedness of said firm.

Dated at Silverton, Colorado, January 5th, 1904. JOHN LIND, NELSON & SUTHERLAND

First pub No. 7-3t.

SALE OF MINING PROPERTY.

The undersigned will sell at publicauction, without reserve, at the hour of 10 o'clock, a. m., on the 11th day of February, 1904, at the office of The Long Shot Mining Company in the Opera House Block at Cranford, Union county, New Jersey, the following described property, towit. An undivided seven-eights (7-8) interest in and to the Brewster Lode Mining Claim, patented, situated on the South slope of Red Mountain, in the Red Mountain Mining District, in the County of San Juan, in the State of Colorado, as the same is bounded and described in the amended location certificate thereof recorded in Book 123, at page 91, of the records of the office of the County Clerk and Recorder of said County of San Juan, Colorado.

JOHN J. MILLER,
53 Barclay St.,
New York City, N. Y.

First publication January 23, 1904.
Last publication February 6, 1904.

NOTICE OF FORFEITURE.

To the Heirs and asssigns of L. A. Phillips

You are hereby notified that I have expended during the year 1903, $100.00 each on the Bumble Bee, Gracia, Recapture, Carl, and Gold Lake lode mining claims situated in Animas Mining district, San Juan county, state of Colorado, of which the location certicates are of record, viz: Bumple Bee, in Book 99, page 190; Gracia, in Book 99, page 188; Recapture, in Book 99, page 489; Carl, in Book 111, page 71, and Gold Lake, in Book 99, page 330 in the office of the Recorder of San Juan county, Colorado, in order to hold said claims under the provisions of section 2324 of the revised statutes of the United States and amendment thereto approved January 22, 1880, concerning annual labor upon mining claims, it being the amount required to hold said lode claims for the period ending December 31st, 1903.

If within ninety days after the last publication of this notice you fail or refuse to contribute your proportion of said expenditure as co-owner, your interest in the said claims will become the property of the subscribers, your co-owners, who have made the required expenditure by terms of said section and amendment thereto.

Dated at Silverton, San Juan county, this 18th day of January, A. D. 1904.

First pub Jan. 23, 1904. LOUIS FRITZ
Last pub. April 23, 1904. AL. RENNIS.

NOTICE OF FORFEITURE.

To the Heirs and assigns of J. J. Graham:

You are hereby notified that I have expended during each of the following years, viz: 1897, 1898, 1899, 1900, 1901, 1902 and 1903, $100.00 each on the Little Hattie, Minnie, Minta and Dilworth lode mining claims situated in Ice Lake Mining district, San Juan county, State of Colorado, of which the location certificates are of record in Book 60, pages 10 and 212 and Book 61, pages 235 and 281 respectively in the office of the Recorder of San Juan County, Colorado, in order to hold said claims under the provisions of section 2324 of the revised statutes of the United States and amendment thereto approved January 23, 1880, concerning annual labor upon mining claims, it being the amount required to hold said lode claims for the period ending December 31, 1903

If within ninety days after the last publication of this notice you fail or refuse to contribute your proportion of said expenditure as co-owner, your interest in the said claims will become the property of the subscriber, your co-owner, who has made the required expenditure by terms of said section and amendment thereto.

Dated at Silverton, San Juan county, this first day of January, A. D. 1904.

First pub. Jan. 2, 1904. J. M. DODD.
Last pub. April 2, 1904.

ADMINISTRATOR'S NOTICE.

Estate of BERT H. MARTIN, deceased.

The undersigned, having been appointed Administrator of the estate of Bert H. Martin, late of the County of San Juan, in the State of Colorado, deceased, hereby gives notice that he will appear before the County Court of said San Juan county, at the Court House in Silverton in said county, at the December term, 1903, on the first Monday in February next, at which time all persons having claims against said estate are notified and requested to attend for the purpose of having the same adjusted. All persons indebted to said estate are requested to make immediate payment to the undersigned.

Dated at Silverton, Colo., this 6th day of January A. D., 1904. WILLIAM L. TERRY, Administrator.

First pub. Jan, 9, 1904.
Last pub. Jan. 30, 1904.

NOTICE OF FORFEITURE.

To the heirs and assigns of O. S. Waite:

You are hereby notified that I have expended during the year 1903 $100 each on the Golconda and Minnesota Boy mining claims situated in Red Mountain Mining District, U. S. Basin, San Juan county, Colorado, of which the location certificates are of record in Book 86, page 116 and Book 86 and page 118, respectively in the office of the Recorder of San Juan county, Colorado, in order to hold said claims under the provisions of section 2321 of the Revised Statutes of the United States and amendment thereto approved Jan. 22, 1880, concerning annual labor upon mining claims, it being the amount required to hold said lode claims for the period ending December 31, 1903.

If within ninety days after the last publication of this notice if you fail or refuse to contribute your proportion of said expenditure as co-owner, your interest in said claims will become the property of the subscriber, your co-owner, who has made the required expenditure by terms of said section and amendment thereto.

Dated at Silverton, Colorado, this first day of January, A. D. 1904

First pub. Jan. 16, 1904. MRS JOHN OWNENS
Last pub. April 16 1904.

NOTICE OF FORFEITURE.

To the heirs and assigns of John Sessions:

You are hereby notified that I have expended duirng the year 1903, $100 on the Yellow Bird lode mining claim situated in Animas Mining District, San Juan county, Colorado, of which the location certificate is of record in Book 116, page 318, in the office of the Recorder of San Juan county, Colorado, in order to hold said claim under the provisions of section 2321 of the Revised Statues of the United States and amendment thereto approved January 22, 1880, concerning annual labor upon mining claims, it being the amount required to hold said lode claim for the period ending December 31, 1903.

If within ninety days after the last publication of this notice if you fail or refuse to contribute your proportion of said expenditure as co-owner, your interest in said claim will become the property of the subscriber, your co-owner who has made the required expenditure by terms of said section and amendment thereto

Dated at Silverton, Colorado, this 21st day of January, A. D. 1901.

First pub. Jan. 23, 1904. IRA TORREY.
Last pub. April 23, 1904.

W C Farrill curator
Nat. history soc

SILVERTON STANDARD

VOLUME XVIII — SILVERTON, COLORADO, SATURDAY, OCTOBER 20, 1906 — No. 48

MINES AND MINING

SUNNYSIDE REPORTED TO BE SOLD

The Standard has information from Denver that a deal has been consummated by which Howell Hinds of the Old Hundred mines becomes owner of the Sunnyside mine, the great property of the Terrys.

The price is stated to be $1,000,000, although it is hardly possible that the Sunnyside could be bought for any such figure.

Robert W. Davis, resident manager of the Old Hundred, although just returning from Denver, pleaded ignorance of any such transaction, yet The Standard's source of information is considered trustworthy.

Black Rover Group.

Developments on the Black Rover group on Wood mountain, directly east of the town of Animas Forks, have been quite extensive during the past summer months and brought to light a large vein of ore varying in width from fifteen to thirty feet, carrying high values in lead, silver and gold, with a very light percentage of copper and zinc.

The course of the vein is northeast and southwest and it can be easily traced from a point near the base of the mountain, close to the Animas river, to a point where it crosses the ridge west of the summit and still down on the opposite side for several thousand feet. At a point on the western slope of the mountain 800 feet below the summit of the ridge, where the vein crosses and in plain view of the town, a main working tunnel was started on the vein, it is now in over eighty feet.

This tunnel will gain a vertical depth of over 500 feet below the point where the vein crosses the ridge. At the face of the tunnel a cross-cut was driven both ways, exposing over twenty-five feet of solid vein material without encountering either walls. At a distance of 125 feet farther up the mountain side the vein is exposed for sixteen feet in width, with either walls showing. Running with and through the vein there is a shoot of solid lead carbonate and galena ore over six and one-half feet in width by actual measurement. Mill tests from this shoot of ore gave average returns of $31 in gold, silver and lead. The balance of the vein in this cut averages from $8 to $12 per ton and it is a low estimate to say that the whole vein will average from $12 to $20 per ton. From this point to the top of the ridge and down on the opposite side several open cuts are made along the apex of the vein, which show practically the same conditions, with the exception that the vein on the eastern slope of the ridge, seems to contain more iron and copper pyrites and better values in gold and silver, average in the precious metals being about $20 per ton, irrespective of its lead and copper values. The general country formation is of the character commonly known throughout the district as Burns Latete, being an intermediate between rhyolite and andesite. It seems to be cut near this vein by a large dyke of intrusive andesite, which may form one of the walls and is regarded by experienced mining men as a most favorable condition. Its trend is slightly east of north and several cross veins of different dimensions and character are known to intersect at irregular distances. The ore is easy of concentration and the property is most admirably situated for easy development and economic working by a series of tunnels along the apex as it descends the mountain, the lower of which could be started at any desired location near the tracks of the Silverton & Northern railroad, and a short tramway would convey the ore from the upper workings to the lower terminal at the rail road track. There are several mill sites below, any of which is admirably situated for the mine.

The property is owned by E. T. and N. H. Hand of Animas Forks, who have recently given six months' the option to eastern capitalists for $35,000, a portion of which has already been paid, the balance to be paid at or before the expiration of the option. It is the intention of the purchasers to begin active developments early next spring and push it with vigor and all possible speed until another great mine is added to the Animas Forks list of big producers.

A Wonderful Gold Belt.

There is much activity along the line of the great central gold belt of San Juan county, which developments have proven to extend, from the mines surrounding Gladstone, in a northeasterly direction until it crosses and continues beyond the dividing line between San Juan and Hinsdale counties. It is several miles in width, and strange as it may appear the larger portion of its surface, in which many large quartz veins are clearly visible, the touch of the prospector's pick has never been known. Within its confines are situated many of the noted mines of the county.

Passing through this great gold belt and very close to its center is the mammoth vein upon which the Gold King mines at Gladstone and the famous Sunnyside and Gold Prince mines to the northeast, on the opposite side of the ridge, are situated. The combined wealth of these three great mines is almost beyond the comprehension of man. In the Gold Prince, the most noted experts estimate, by computations based on actual measurements and average values, over $60,000,000 worth of ore in sight. The Sunnyside seems to be inexhaustible and gains in size and richness with every foot in depth and extension, and when the great Gold King tunnel, now nearing its destination, taps the immense ore bodies, several hundred feet below the present workings, the best days of the past will pale before its future greatness. This great vein does not stop at the end lines of the Gold Prince group, but continuing on to the northeast it passes through the Gold Queen, Duke of Bull Run, the southeastern end of the Sunlight properties and enters the Big Seven group, where it joins the Sunlight, and traverses the entire length of the group for a distance of nearly a mile.

The Big Seven group embraces thirteen claims, as follows: The Clara, Green Meadow, Ida, Big Seven, Kuroki, Mikado, Oyama, Last Chance, Antlers, Hidden Treasure, Hillside, Nogi and Togo. The first four are located along the apex or out-cropping of the Sunnyside vein and the remainder extend in different directions, covering an equal number of cross veins running to and from the great fissure. The ore bodies in both the Sunnyside and Gold Prince vary from 40 to 100 feet in thickness.

The vein, as it passes through the Big Seven, varies from 40 to 100 feet. This was shown by the development work done along the vein during the summer by Messrs. Kunkle and Sturgeon, the fortunate owners, for the sole purpose of determining the size and character of the vein as compared with the great properties above.

The uniformity in the size of the vein is established. It is clearly visible and can be traced as easily in its course as the Animas river can be followed through the valley. If the vein does not stop at the end lines of the Gold Prince, it is unreasonable to presume that the values end there. If the veins continue on, so do the values, and all that is needed to add another Sunnyside or Gold Prince to San Juan's producers is the introduction and the courage to carry to completion a proper and economical system of development.

The proposed 800-foot tunnel, within half a mile from the railroad, will cut the vein 625 feet deep. There is a large spring close by that will furnish an ample supply of water for milling purposes. The ore yields readily to concentration and will easily reduce from five to seven into one and amalgamation will gather the free gold. There is a great future before this valuable property.

DEMOCRATIC CAMPAIGN IS OPENED

Rousing Meeting Hears Adams, Seeds, Rowan.

Alva Adams, Judge W. P. Seeds, Miss Honora Maloney and Dr. W. W Rowan started the first local wave of Democratic enthusiasm a-rolling Thursday night, which will gain in force until it culminates in the usual sweeping Democratic victory next election day.

The party came up from Durango on the noon train, where they had spoken to a splendid audience the night before. At the depot a delegation of representative Democrats, with Otto Mears well to the front, greeted the candidates and escorted them to the Grand. In the afternoon Democratic headquarters was thronged with the best people of the community, ladies predominating, who were cordially received by Governor Adams, Miss Honora Maloney and the other state candidates. Almost all the ladies interested in educational interests, particularly the teachers, paid their respects to the fair young candidate for superintendent of public instruction.

In the evening the music of band, the detonation of giant powder and the glow of red fire gave Silverton streets a festal air. By 8 o'clock the opera house was packed to the doors, and the crowd increased rather than lessened until the last word of the speakers had been uttered.

Mayor Melton presided and after a few preliminary remarks introduced Dr. W. W. Rowan of Ouray, candidate for congressman from the Second district. The doctor announced that this was his first introduction to a Silverton audience, though he had lived in the San Juan for almost a generation. His many friends here were agreeably surprised at his growing success as an orator and predict that he will well hold his own in the halls of congress.

Miss Honora B. Maloney, candidate for superintendent of public instruction, was introduced and promised to guard well the responsibilities attached to this most important office should she be elected.

Governor Adams was next presented, and in an address of three-quarters of an hour laid bare the base plot by which the people of Colorado were robbed of their suffrages and every department of state made the plaything of corporation thievery. A letter was read from Clarence S. Darrow, general attorney tor the Western Federation of Miners and one of the most brilliant thinkers and expounders of Socialism, in which Mr. Darrow pointed out the futility of voting the Socialist ticket at this election and strongly advising members of that order to vote for Adams and the Democratic ticket as the only means of doing justice and accomplishing reform. Governor Adams promised a government wherein all would receive equal and exact justice before the law. He had been forced from his office, and no human power could have prevented the infamy, since all the power of the United States government could have been invoked to oust him. Nevertheless, if again elected, no matter how narrow the margin, he would hold his seat, because every move of the enemy can now be anticipated from the beginning and guarded against.

Governor Adams was hardly up to his usual standard, as he is suffering from a severe cold, nevertheless his address was listened to with great interest and every word went to the hearts of the auditors.

But the treat was to come. Many thought the orators done when Governor Adams sat down and were moving to the doors. The opening words of Judge Seeds, a compliment to Silverton's municipal ownership system, enchained them, and as he advanced to heart of his subject he hammered with pile-driving force truth—plain unvarnished truth—home to the hearts and minds of the hearers. The horrors of the bull-pen and deportation were painted in all their hideousness; the theft of the governorship; the atrocious decisions of the supreme court; the ruthlessness of the military—all were pictured with dynamic force.

There may be more eloquent orators than Judge Seeds, but no more forcible one ever faced a Colorado audience. That Judge Seeds changed scores of Socialist and Republican votes to the Democratic column is beyond question.

The party left Friday morning for Ouray, much pleased with the result of the missionary work performed here.

Socialist Oratory.

Guy E. Miller, who as secretary of the Telluride Miners' Union was deported from that district by the Peabody administration a few years ago, has been orating in the interests of the Republican ticket hereabouts the past week.

Presumably, Mr. Miller was doing missionary work for the dreamful and restful Socialist cause, but the result resolves itself into Republican campaign contribution, since that party is the indirect recipient of whatever stray Democratic votes may be beguiled into the Socialist camp.

The learned deportee spoke at Miners' Union hall Sunday night, and to do him justice did not rant or burn any red fire. The audience was pretty well divided among Democrats, Republicans and Prohibitionists, with the Socialist party principally represented by leaders. The Socialist contingent manifested great enthusiasm when the speaker promised under Socialistic conditions to gradually reduce the eight-hour working day to the vanishing point, when life would become a continuous Spanish siesta. The applause was terrific at this telling point. Alluding to the charge that the Haywood campaign was being financed by the irreproachable Bill Evans and Saint Simon Guggenheim, Mr. Miller denounced the allegator as a liar, which leaves the question of veracity as undecided as before.

By the kindness of W. Z. Kinney, Republican candidate for senator, the Socialists were provided with the dining room at the Gladstone hotel Monday night and Mr. Miller again expatiated on the idyllic Socialistic state to a fair sized crowd. Tuesday night he moved over to Animas Forks and was again provided with speaking quarters by the Republican candidate for senator.

Jim the Penman.

Last Sunday a tramp printer skated into town, ostensibly from Durango, and was given a day's work on The Standard. During the day he secured a few blank checks from an order which was being printed in the office for the Wilkinson Hospital Co., and making them to the order of J. R. Williams and signing the company's name to them, succeeded in shoving one for $10 on the Hub and another for a like amount on F. W. Koehler. As soon as the checks reached the Silverton National bank Monday, Cashier Emerson readily discovered the forgery, but the handwriting expert had faded away.

The name signed to the checks was J. R. Williams, but whether that is the name of the individual in question is not known, no one about the office being sufficiently interested to inquire his appellation. He was aged about 46, dark complexion, height 5 feet 9, rather sparely built, dark gray hair and mustache, ordinarily dressed, wore a cap, taciturn in manner, and looked the part of a sneak rather than a forger. He is supposed to have headed toward Ouray or Telluride, and newspaper offices are warned to look out for him and send word here if he shows up.

Our representative will soon visit your district with a view of buying good mines and prospects. Give acreage, price, terms, tonnage and value of ore shipped, also engineer's report if possible. P. O. Box 330, Denver, Colo. 46tf

POLITICAL POINTERS

With Finch pulling one leg and Malchus the other, what will Boss Kinney look like, financially, on election day?

It is reported around town that Billy Palmquist has gone into the brokerage business and how has a corner on Rice.

The Socialists should not insist upon spoiling a good barber in trying to mould a statesman. Good barbers are scarce, but light-weight statesmen are many.

The Republicans have invited a merited defeat by the nomination of Arthur Rice for sheriff. That office requires a cool-headed and even-tempered man like the present incumbent.

Dr. Pascoe: Are you in favor of Simon Guggenheim for United States senator? Will you vote for him if you are elected and he is the choice of the Republican legislative caucus?

The La Plata County Democratic ticket was named Monday, as follows: clerk, Charles Conroy; treasurer, Frank Goodman; assessor, J. P. Coston; superintendent of schools, Mrs. Pulford; sheriff, Hans Aspaas.

Miner says Senator Kennedy is a fool or a knave. Who issued Miner its license to judge any man? Miner is now vigorously supporting the same party that put forward the man who voted as Senator Kennedy voted.

Republican headquarters have been opened in Boss Kinney's depot, with Ned Carmichael as office boy and Clarence Finch as messenger boy, through whom all negotiations between the boss and the Socialist party must be carried on.

We understand that Joe Barnes and George Barnes have formed a political co-partnership. The new firm will be known as Barnes & Barnes and will do all kinds of political turning and twisting. Joe will do the Socialist "class conscious" act, and George will look after the Guggenheim elephant end of the barrel.

No well-posted elector has seriously questioned the election of the entire local Democratic ticket. It should and will be elected in its entirety. The Republicans hope to cut down the Democratic majorities by boosting the Socialist ticket, but their object is too thinly veiled and the voters will not be fooled.

F. J. Bawden, nominated for representative by the Democrats in San Juan county, has had wide experience in legislative affairs and will give a good account of himself at the coming session. Knowing Mr. Bawden and knowing the political sentiment in that county one is absolutely safe in saying that his election is a cinch.—Lake City Phonograph.

The big Democratic sign extending across Greene street in front of Democratic headquarters in the Benson block lets the fact be known that Democracy still carries the high sign in San Juan county. The interior is well equipped, has reading matter, etc., and a good Democrat can be generally found on guard, principally Chairman Nat Ballou. Drop in, whatever your politics.

Those who have had occasion to inspect the records in the office of the county assessor are the best advertisers of Mr. Colmer's honesty and fairness in fixing valuations for taxation purposes. He has been fair and equitable to all, showing favors to none, but forcing corporations to place reasonable valuations on their property, and he needs no recommendation. He should and will be re-elected.

William Palmquist was a peace officer when Peabody threatened an invasion of the county by his imperial army. His cool judgment, unbiased position and positive stand checked all murmurings of disturbance. The county may need just such a man for sheriff if the Socialists should succeed in electing the Republican ticket. No mistake can be made in voting for Palmquist for sheriff.

The records in the office of the county treasurer of San Juan county were never in better condition in the history of the county. The abstract of tax sale records, prepared by Treasurer Annear, has brought in and saved for the county thousands of dollars heretofore deemed uncollectable. The records are open for inspection and will substantiate the statement and the people will reward Mr. Annear's efforts in behalf of the county by his re-election by a substantial vote.

The Socialist boom has died a-bornin'. Their claims have dwindled from 1,200 to 128 voters.

The Socialist generalissimo in San Juan county will be satisfied if you vote either the Socialist or Republican ticket.

Sorehead Democrats make the best Republican material obtainable. They are not hard to locate on the local Republican ticket.

The voters in this senatorial district can be depended upon to save Charlie Waters the embarrassment necessarily attendant upon trying to fill a senatorial chair with a vacuum.

Wallie Haas has been an obliging and efficient county clerk, showing every courtesy to one and all alike and his re-election will demonstrate the public appreciation of his acts.

Andrew Sandberg, candidate for state auditor on the Democratic ticket, and Robert Z. Adams, city attorney of Georgetown, arrived Friday night. They will speak at Gladstone Sunday night on the issues of the campaign.

Senator John Kennedy passed through last Saturday on a tour of his district, going to Archuleta and other mooted points, returning with the Adams party Thursday. "It looks good to me," said the conservative John, who would be modest if he saw 10,000 majority in sight.

Samuel B. Belford, second edition of the "Redheaded Rooster of the Rockies," Democratic candidate for congressman-at-large will speak here Monday, October 29. Brains run in the Belford family, and Young Sam is a worthy son of his father.

Eugene V. Debs is due to speak here Friday, October 26, on Socialism. The fact that Debs is not in reality a Socialist, but like others finds it profitable to pose as such, does not detract from his oratorical powers. He is quite a persuasive speaker and draws well, whatever views he advances.

Chairman Ballou this week appointed Mrs. Howard T. Lee Democratic state central committeewoman for San Juan county, in compliance with the rule adopted by the last Democratic state convention granting women representation all along the line of political organization. Miss Ellis Meredith, the brilliant literary woman, is vice chairman at state headquarters, and she is insistent that women exercise this privilege and have active committeewomen in every precinct in Colorado.

For Gents Only.

Mr and Mrs. C. H. H. Kramer, who have a reputation for hospitality to live up to, sprung a novelty the past week. They left the maids and matrons off the calling list and Monday night invited a band of choice male spirits to their pleasant new home.

Mr and Mrs. Kramer, assisted by their daughters, Gretchen and Violet, and Miss Mary Cole, looked after the comfort of the guests. There was six handed euchre, music, singing, and, to crown all, a repast which in proportions might better be termed a banquet. The revelers held forth until after the midnight hour, and went home to tell their spouses that "stag" parties were the only proper function and to take pattern by the Kramer way of doing it.

There were present Al Springer, specially imported from Durango; Louis Wyman, W. N. Haas, Frank L. Ross, E. W. Hodges, R. H. Cooper, C. A. Cooper, Dr. J. S. Fox, Dr. C. N. Potts, Dr F. C. Wiser, William Lonergan, James E. Cole, Guy V. Emerson, S. H. Crittenden, N. A. Ballou, Thomas Evans, N. Smith, R. Ptolemy, W. N. Searcy, W. D. Watson, James O. Aveline, A. A. Brown, Thomas Annear, Howard T. Lee, A. J. Aurand, J. H. Slattery, J. T. Joyce, E. W. Walters, James McHolland.

Wanted

Good woman or girl, steady and competent, for general housework. Good wages. Mrs. W. H. Crooke. 46—tf

WANTED:—Room and board in in private family by young man of good habits. Call at this office. 48-tf.

The biggest stock of wall paper in town at F. Brockenaur's

The Silverton Undertaking Company. Undertakers and embalmers. Open day and night. Opposite postoffice. Telephone King 145. Our ambulance at Doud Bros. barn at the disposal of anyone. T. H. Jones, Mgr.

ELECTION NOTICE.

STATE OF COLORADO, } ss.
COUNTY OF SAN JUAN. }

Pursuant to the provisions of Section Twenty-One (21) of Chapter Thirty-Four (34) of the General Statutes of the state of Colorado of 1884, entitled "Elections," notice is hereby given that a General Election will be held in the several wards and voting precincts in said County of San Juan in the State aforesaid, on the Tuesday succeeding the first Monday in the month of November, A. D. 1906, to-wit: On the Sixth (6) day of November, A. D. 1906.

That on said day the following officers are to be elected, to-wit:

Two Judges of the Supreme Court of the State of Colorado.
One Representative in the 60th Congress of the United States for the state at large.
One Representative in the 60th Congress of the United States for the Second Congressional District.
One Governor of the State of Colorado.
One Lieutenant Governor of the State of Colorado.
One Secretary of State.
One State Treasurer.
One Auditor of State.
One Attorney General.
One Superintendent of Public Instruction.
Two Regents of the University of Colorado.
One State Senator, Eighteenth Senatorial District.
One Representative of the Sixteenth General Assembly.
One District Judge Sixth Judicial District.
One County Clerk and Recorder.
One County Sheriff.
One County Treasurer.
One County Assessor.
One County Superintendent of Schools.
One County Surveyor.
One County Coroner.
One County Commissioner, First Commissioners' District.
Two Justices of the Peace, each Justice Precinct.
Two Constables, each Justice Precinct.

Notice is also hereby given that at the General Election to be held on the Sixth day of November, A. D 1906, there will be submitted to the qualified electors of the State of Colorado, the question of amending the Constitution of the State; to amend Section Eight (8) of Article VII of said Constitution, as follows, to-wit:

ARTICLE VII.

Entitled, "Suffrage and Elections," Section Eight (8) providing for the use of Voting Machines at Elections. Each Ballot must have printed on it:

"For the amendment to Section 8 of Article VII, authorizing the use of Voting Machines at Elections"

"Against the amendment to Section 8 of Article VII, authorizing the use of Voting Machines at Elections."

In witness whereof, I have hereunto set my hand and official seal at Silverton this 17th day of October, A. D. 1906.

[SEAL.] W. S. HAAS, County Clerk.

NOTICE OF SHERIFF'S SALE.

Notice is hereby given that under and by virtue of a certain writ of special execution, issued to me out of the County Court of San Juan County, Colorado, under a judgment in said Court rendered on October 10th, 1906, in a cause therein pending wherein Henry Pollman is plaintiff and J. C. O'Neill, H. L. Hollister and G. M. McKinney are defendants, I am commanded to make the amount of said judgment, to-wit, the sum of $2162 damages and the further sum of $7.55 costs, together with interest thereon, from the day of rendition of said judgment out of the property hereinafter described, said property having been previously levied upon and attached under writ of attachment issued in said action and said attachment proceedings having been sustained and confirmed in said action; therefore I have levied said writ upon all right, title and interest of said defendants in and to said property, and notice is hereby given, that under said writ, I, the undersigned Sheriff of said County, will, on the 14th day of November, 1906, at ten o'clock in the forenoon, at the mine buildings on the May Flower group of mines in Animas Mining District, San Juan County, Colorado, expose for sale at public auction and sell to the highest and best bidder for cash, all of the following described property, or so much thereof as may be necessary to make the amount of said judgment, costs, interest thereon and the costs and expenses of said sale, to-wit:—

1825 lbs. Hercules powder; 2,200 ft. fuse; 3 boxes caps, 3 40-lb. boxes candles; 240 ft. water pipe; 46 lengths 6 inch to 1¼ in. air pipe; 44 lengths 12-lb. rail; 2 wheelbarrows, 1 six hole rugge, (W C 815); 2 heating stoves, (Cole's Hot Blast No. 18); 1 gasoline engine, 6 horse Cushman; 120 sacks of coal; 20 sacks blacksmith coal; 1 2-stick powder thawer; 100 pieces of steel, 6 0 lbs; 1 hood for forge; 1 blower, No. 400; 1 anvil, No. 7; 3 pieces steel, extra long; 134 fish plates; 50 lbs. spikes; nuts and bolts; 1 pinch bar; 6 picks; 3 pick handles, 3 hammer handles, single; 3 hammer handles, double; 1 ax; 1 saw, large; 6 shovels, 4 single hammers; 2 double hammers; 2 cutters; 1 sorting hammer; 1 hardy; 1 blacksmith hammers; 2 sand pumps; 2 tongs; 1 flattening hammer; 1 level; 1 square; 1 monkey wrench; 1 stillson pipe wrench; 150 ore sacks; 1 water keg; 26 lbs. nails; 1 saw; 2 dinner buckets; 1 sausage machine; 2 water buckets; 3 egg pans; 2 wash pans; 2 frying pans; 1 coffee pot; 1 tea pot; 3 dish pans; 3 stew pans; 1 stock boiler; 3 stew pots; 1 meat saw; 1 cleaver; 2 steels; 1 bread knife; 2 butcher knives; 11 soup bowls; 21 plates; 12 coffee cups; 12 saucers; 5 plates; 4 deep dishes; 12 knives; 12 forks; 6 spoons; 6 tea spoons; 4 large spoons; 1 coffee mill; 5 bread pans; 1 sugar bowl; 1 milk pitcher and 22 mining timbers.

Made and given this 17th day of October, 1906. WILLIAM PALMQUIST, Sheriff of San Juan County.

First 10-20-06. Last 11-10-06.

NOTICE OF FORFEITURE.

To Chas. McLennon, his heirs and assigns:

You are hereby notified that the undersigned has expended One Hundred Dollars in labor and improvements upon the Magnolia lode mining claim, situated in Ice Lake Mining District, San Juan County, Colorado, for the year 1905, the location certificate of said mining claim being of record in the office of the County Clerk and Recorder of San Juan County, in book 128, page 121, and in order to hold said claim under the provisions of section 2324 of the revised statutes of the United States and the amendment thereto approved January 22, 1880, concerning annual labor upon mining claims, being the amount required to hold said lode claim for the period ending on the 31st day of December, A. D. 1905.

And you are notified that if within ninety days after the publication of this notice you fail or refuse to contribute your respective proportion of said expenditure as co-owner your interest in said claim will become the property of the undersigned, your co-owner, who has made the required expenditures by the terms of said section.

GEO. PATRIQUIN.

First pub. July 7, 1906: last Oct. 13, 1906.

Notice.

Notice is hereby given, by order of the District Court of San Juan county, Colorado, to all persons to whom payment has not been made of the last dividend of the Bank of Silverton, to furnish their correct postoffice addresses to the undersigned Receiver within twenty days from the date of this notice.

All persons who shall fail to appear and claim said dividend, or who shall fail to send their correct postoffice addresses to the undersigned within twenty days from the date of this notice, shall suffer forfeiture of said dividend, the cost of this notice to be deducted pro rata.

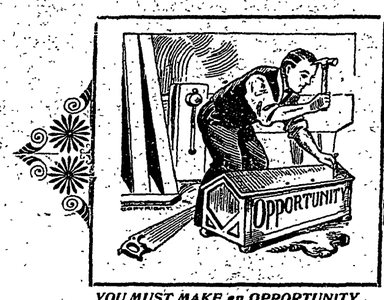
Made and given this 24th day of September, 1906. THOS. ANNEAR, Receiver of the Bank of Silverton.

A large supply of spring lambs are received daily by Patterson & Henry.

A house for sale, furnished or unfurnished. Good water service. 47-1m MRS. MARY BODEN.

Woman wants work by the day. Apply at W. D. Watson's office. 48-1t.

An American woman, first-class cook, also pastry cook, would like cooking or dining room work at a camp. Must have good wages. State salary when answering. E. T. B., Williams house, Durango, Colo. 48-tf.



YOU MUST MAKE an OPPORTUNITY

If one is not made for you, to see what we are selling in the lumber line, if you're at all interested in house construction or alteration or the putting up of barns, business buildings, outhouses, fences or the like. It will pleasure you and profit you to see our well selected stock of lumber, lath and shingles.

ERNEST GRILL & CO.

PAY YOUR BILLS BY CHECK

Writing a check is the simplest way to pay your bills. You always have the right change. It is the safest way, too, to handle your funds for current expenses. Your checking account will be welcome, be it large or small, at

The Silverton National Bank

We handle out-of-town accounts. Remittances for credit may be made by registered mail, postal money orders or checks. Please bear in mind that the cheapest, safest and best way to send money is by bank money orders, which we sell, payable in any part of this or any foreign country.

KELLY'S PLACE

FORMERLY

THE BRANCH SALOON

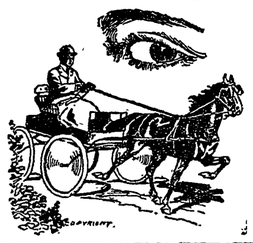
IS NOW

Under the Management of JAMES O'KELLY.

FINE LINE OF *Wines, Liquors and Cigars*

Doud Brothers

LIVERY.



U OUGHT TO C

The style of our rigs, the freshness of our vehicles and the character of our horseflesh whenever you want a turnout for business or pleasure.

No hackneyed "hasbeens" here, but animals with life that it's a pleasure to draw reins over, likewise a pleasure to settle for the use of, at our prices.

DALE FOUNDRY Planing Mill and Machine Shop. : : : :

Complete throughout. Equipped for all kinds of casting and repairing. All Brass, Copper, Bronze, Bell Metal and Aluminum Castings.

CHAS. DALE, Prop.

Corner Tenth and Mineral Sts., Silverton, Colo.

GROUT & ST. CLAIRE

PORTRAIT & SCENIC

PHOTOGRAPHERS

FRAMES, Mats, Passepartouts, Poster board, Amateur finishings, Enlargements in bromide, crayon, pastel and water color. We will not cut prices. The quality of work we turn out cannot be made at any less than the prices we ask.

1129 Greene St., Upstairs

SILVERTON STANDARD.

LEE & JOYCE, Publishers

HOWARD T. LEE.....Editor
JOHN T. JOYCE.....Business Manager

Entered at the Silverton, Colo., postoffice for transmission through the mails as second class matter.

OFFICIAL PAPER CITY AND COUNTY

ONE YEAR $2.50.
SIX MONTHS, $1.25
THREE MONTHS, 75C

SATURDAY, OCTOBER 20, 1906.

Democratic State Ticket.

For Governor,
ALVA ADAMS.
Lieutenant Governor,
ELIAS M. AMMONS.
Secretary of State,
HORACE W. HAVENS.
State Treasurer,
EDWARD G. DRACH.
Attorney-General,
WILLIAM B. MORGAN.
State Auditor,
ANDREW SANDBERG.
Superintendent of Public Instruction,
MISS HONORA MALONEY.
Justices of the Supreme Court,
GEORGE J. HARTENSTEIN.
WILLIAM P. SEEDS.
Regents of the State University,
BENJAMIN COBEY.
HARRY BRYANT.

Congressional.

Congressman at Large,
SAMUEL W. BELFORD.
Congressman—Sec. Congressional Dist.
DR. W. W. ROWAN.

Judicial.

For Judge of Sixth Judicial District,
JAMES L. RUSSELL.

Senatorial.

For Senator Eighteenth District,
JOHN KENNEDY.

COUNTY TICKET.

For Representative.....F. J. BAWDEN
Sheriff.....WM. PALMQUIST
Treasurer.....THOMAS ANNEAR
Clerk and Recorder.....W. N. BAAS
Assessor.....THOMAS COLMER
Superintendent of Schools.....
.....MRS. FRANK HARWOOD
Coroner.....VARREN PROSSER
Justices of the Peace—
First District—W. D. WATSON,
T. J. SHEA.
Second District—M. O'HOOLIHAN,
CHESTER PINNEY
Constables—
First District—ROY TEWKSBURY,
C. A. VALITON.
Second District—ALBERT SAMS,
JOHN YOUNK.

ANOTHER STEAL.

The right kind of a Democrat stays hitched. With him it is a matter of principle—not securing an office or getting even.

Governor Charles S. Thomas is that kind. He was ousted from the state convention with the Speer crowd, but he is not going to sulk in his tent or turn Republican because of it. Not he. He is liable to be on the stump ere the campaign wanes.

The ex-governor had a letter worth perusal in his dearest adversary's Rocky Mountain News last week. In that it recounted another Republican delinquency, there might be nothing novel in it, yet a little matter of a $400,000 theft is worthy of an airing, even if it does not stack up against a stolen state.

Briefly, the flat tax imposed on corporations, amounting to four cents per $1,000 of capital stock, has never been collected. In lieu thereof, the corporations have contributed more than liberally to the Republican campaign funds and have got off scot free. The law thus taxing corporations began with the Peabody administration, and not one penny has been turned into the state's coffers.

It is estimated that if the immense sum of $400,000, which thus has been misappropriated, were turned into the state treasury, the state levy could be reduced from four mills to two. Taxes all over the state would be lowered that much.

This money is recoverable, but only through a Democratic administration. No Republican attorney general has ever brought action to recover, nor will he. The nominee for attorney general on the Republican ticket, W. H. Dickson, certainly will not He is the son-in law of John C. Osgood, one of the largest debtors, and while speaker of the last house, corporation lobbyists openly directed his rulings.

Think of Dickson prosecuting the corporations for back taxes.

If the Adams ticket is elected the money will be paid into the state treasury and this infamous steal will be stopped. There will be no question of William B. Morgan, of Trinidad, Democratic candidate for attorney general, doing his duty, and he is doubly certain to with the peerless executiev, Alva Adams, in the chair.

A vote for the Socialist ticket is a vote to restore Peabodyism.

DR. PRICE'S Cream Baking Powder

Pure, Wholesome, Reliable

Made from cream of tartar derived solely from grapes, the most delicious and healthful of all fruit acids.

Its use is a guarantee of perfect food and a protection against the ills that follow the use of alum, alum-phosphate and other low grade powders.

The mixtures called baking powders that sell for ten or twenty-five cents a pound, or a cent an ounce, are all alike, made from alum and costing less than three cents a pound.

STATE RAILROAD COMMISSION WILL PUNCTURE SMELTER TRUST

Some years ago an independent smelter was started at Gunnison. It was well located for business, as any mining man will testify. It had brains and energy back of it, and experience, too. It had ample capital—not, indeed, so much as its great rival, but all it needed. There was every reason to predict a bright business future for it. But the independent smelter has gone out of business.

Why?

The success or failure of the enterprise depended on the freight rates.

The managers of the independent concern knew this. They knew that if they could get a square deal on the railroads they could do business, and if not, that they would have to close down. So they got what they thought was an ironclad agreement with the railroads, guaranteeing them as good terms as the smelter trust had, or nearly so.

But the men of the smelter trust were not idle.

They went to the railroads and informed them that they would have to choose between doing business for the independent smelter and for the trust; that no railroad was ever big enough to do both.

The railroads protested. Men do not change their natures when they go into a railroad office, and most of us like to see fair play, provided it costs us nothing. Also the roads declared that they were helpless, that they had made a contract with the independents and would have to carry it out.

They were foolish enough to think that this would end the discussion.

The representatives of the trust demanded to see the contract. Whether the roads objected or not this paper does not know. Certainly they ended by showing the contract to the trust managers. These expert gentlemen found a loophole in it.

The price of all kinds and varieties of transportation was fixed in that document—save and except the charge for carrying the bullion to market. That was the loophole.

The trust gave its orders to the roads, and the roads had to obey.

They raised the rates on the bullion of the independent smelter till they out-balanced the cost of hauling the ore from Gunnison to Pueblo where the trust had its smelter.

Do you see now why the independent smelter went out of business?

It is the old, old story. Whenever you find a monopoly you will find some such tale as this. There is not, there never was, and there never will be, a monopoly that won its control of an important branch of industry in fair competition. There is always some underhand advantage, some unfair discrimination; and nine times out of ten that discrimination is made on the railed highways. That is what has made the smelter trust and the beef trust and the Standard Oil trust, and it has done quite as much as the tariff in building up the steel trust. And—there is not in the State of Colorado a legal remedy for this outrageous wrong.

Why did the railroads obey the orders of the smelter trust—this trust whose chief master in Colorado insists that he must be a United States senator?

Why did they lend their aid to crush an industry whose growth could do them nothing but good?

Why did they break faith with the men to whom they were bound by every tie of honor?

Because they could not help themselves.

The same lawless condition which puts the individual shipper at the mercy of the railroad puts the railroad at the mercy of the big and unscrupulous shipper.

The smelter trust has a volume of business which, even at reduced rates—and on the strength of a public statement made by R. H. Malone at Silverton, the railroads pay that precious trust $200,000 per month in rebates—will go far toward making expenses for the road that gets it.

It has used this power to the limit, just as the Standard Oil used its power. The smelter trust guarantees each of the roads with which it has an "agreement" a certain income from trust freight. That can be figured on, months in advance—provided the road keeps "right" with the trust. If one road will not grant the favors the trust requires, another one will—and the injured road, like the injured shipper, has no court in which to adjust his grievance.

The railroads give rebates because they are bullied into doing it, not because they like it.

With a commission which could punish this gross violation of business decency, rebates would stop, and the smelter trust, as a trust, would go out of that branch of its business.

What would a state railway commission do? The same work for traffic within the state that the interstate commission will do for commerce between the states; only more thorough, because its duties would be fewer. The same work that is being done by the commissions of Connecticut and Texas. The Connecticut commission has very nearly squeezed the water out of the railway lines in that state. Any transportation company wishing to do business in Connecticut must show actual property for every dollar of its stocks or bonds. Rebates have ceased to exist there; passenger fares on the Hartford & New Haven railroad have been voluntarily reduced to two cents per mile; grade crossings are becoming matters of ancient history in the larger towns; and the railway station is not a hideous contrivance where one may take a train or send freight, but an ornament to as well as the business center of the community in which it is placed.

The Texas commission has nearly, if not quite abolished rebates on state traffic, and unfair discrimination in service as well.

And further, the average freight rates in Texas are from forty to seventy per cent of what they are in Colorado.

And the difference is greater oftener than less.

The first work of a railway commission in Colorado would be to wipe out the rebate system and the discrimination between cities.

It would soon make it impossible for the smelter trust to get a net advantage over its rivals of more than $2,000,000 per year.

DEMOCRACY ONLY PARTY PLEDGED TO THIS REFORM

This reform alone would start a hundred new industries in this state.

The capital is ready. The resources are here. But so long as the railed highways are patroled by the robber barons of the Fuel and Iron company, the trusts and others, so long will industry halt outside our gates.

With a commission it would no longer be possible to bleed the western slope by extortion ate rates.

With fair play insured independent smelters would start up at once, and what this would mean to the mines only those who have watched the way in which the trust intercepts the advantage of every discovery can understand.

A VOTE FOR A REPUBLICAN OR SOCIALIST SENATOR OR REPRESENTATIVE IS A VOTE FOR THE SMELTER TRUST.

GLOWING INDORSEMENT OF JUDGE RUSSELL.

The following eulogy on District Judge Russell was pronounced by Dave Day August 16, 1900. The caps are the colonel's. A fortnight later the Democrat was denouncing him for non-compliance in a dirty political deal, and has continued a disgraceful personal campaign since then.

The people indorsed Judge Russell in 1900, and will do it again next month:

There ARE A FEW in Durango, A VERY FEW, A MASS OF DEGENERATES, WHO ARE IN THE MARKET, who seem to labor under the belief that they will become potent factors in the defeat of Judge Russell.

The Judge stands UPON THE RECORD OF SIX YEARS UPON THE BENCH. HE CAN BE ELECTED EASILY AND WITHOUT A NOMINATION; the people want him; they will honor him; HIS DECISIONS ARE ALWAYS FAIR, ALWAXS EQUITABLE AND ALWAYS JUST; he may be reversed and at times by jurists whom misguided suffrage mistook for such.

JUDGE RUSSELL IS OF THE PLAIN, THE COMMON PEOPLE; HE ADHERES TO WHAT HE BELIEVES TO BE RIGHT and what in his analysis of the law says is right. We admit that there are corporations that are not pleased with Judge Russell's decisions—they are of the class that seek favoritism rather than justice—they are out for the best of it, and have not the evidence or facts to support them in their claims. Justice is not what they seek; their graft is advantage over the poor man. THEY CANNOT BIAS, WORK OR PROSTITUTE JUDGE RUSSELL, as those who toil and produce are not yet ready to yield to the abject conditions that oppression seeks to gain.

This high-minded, just judge is a candidate for re-election. He has jailed a few of the degenerates mentioned above, and forced payment of peculated public accounts by delinquent officials since the above was published. Hence the present opposition.

There are many additional reasons why you should VOTE FOR JUDGE RUSSELL IN 1906. The character of his enemies, for instance.

BUCHTEL AS AN APOSTATE.

The following from the Longmont Times, edited by E. F. Beckwith, former secretary of state, places Parson Buchtel in a new and unenviable light:

Buchtel was a good choice for campaign purposes. As an advertiser he is a past grand master. He would make an execrable governor. Either he would be bossed by Evans or he would be too great a bully to get on well with any of his departments. As a lecturer, a preacher, or an advertiser, he is great. Raised and partly educated as a Catholic for the Catholic priesthood, he has preserved about him many of Catholicism's worst faults, and as an apostate lost the great virtues of that religion.

For the Stomach Heart and Kidneys

Dr. Shoop's Restorative is a Cause Cure—not a Symptom Cure.

It is a common mistake to take artificial digesters for stomach troubles—or heart stimulants for weak heart—or so-called kidney remedies for diseased kidneys. These organs do not act separately or of their own accord—they have no control over themselves—and not once in 500 times is the sickness the fault of the organ. It is the fault of the nerves which control the organ—and only through these nerves can stomach, kidney or heart disorders be cured. Dr. Shoop, of Racine, Wisconsin, learned early in his medical experience that these inside nerves were the power nerves—that through them only was is possible to cure indigestion, heartburn, belching, insomnia, backache, heart weakness, and Bright's disease and all other affections of the kidneys. For all of these ailments are not separate and distinct diseases but are not to be treated as such. They are merely symptoms of inside nerve weakness, and when the nerves are restored the symptoms and the sickness disappear. The remedy which Dr. Shoop prescribed for these ailing nerves is known as Dr. Shoop's Restorative. It relieves the pain and distress of kidney, stomach and heart troubles quicker even than those medicines designed simply to give temporary relief. Dr. Shoop's Restorative can now be had of druggists everywhere. For sale and recommended by

By the Inside Nerves

B. A. TAFT.

Women Who Wear Well.

It is astonishing how great a change a few years of married life often make in the appearance and disposition of many women. The freshness, the charm, the brilliance vanish like the bloom from a peach which is rudely handled. The matron is only a dim shadow, a faint echo of the charming maiden. There are two reasons for this change, ignorance and neglect. Few young women appreciate the shock to the system through the change which comes with marriage and motherhood. Many neglect to deal with the unpleasant pelvic drains and weaknesses which too often come with marriage and motherhood, not understanding that this secret drain is robbing the cheek of its freshness and the form of its fairness.

As surely as the general health suffers when there is derangement of the health of the delicate womanly organs, so surely when these organs are established in health the face and form at once witness to the fact in renewed comeliness. Nearly a million women have found health and happiness in the use of Dr. Pierce's Favorite Prescription. It makes weak women strong and sick women well. Ingredients on label—contains no alcohol or harmful habit-forming drugs. Made wholly of those native, American, medicinal roots most highly recommended by leading medical authorities of all the several schools of practice for the cure of woman's peculiar ailments.

For nursing mothers, or for those broken-down in health by too frequent bearing of children, also for the expectant mothers, to prepare the system for the coming of baby and making its advent easy and almost painless, there is no medicine quite so good as "Favorite Prescription." It can do no harm in any condition of the system. It is a most potent invigorating tonic and strengthening nervine nicely adapted to woman's delicate system by a physician of large experience in the treatment of woman's peculiar ailments.

Dr. Pierce may be consulted by letter *free* of charge. Address Dr. R. V. Pierce, Invalids' Hotel and Surgical Institute, Buffalo, N. Y.

CHURCH NOTICES.

Congregational.

First Congregational church, corner of Eleventh and Reese streets, Charles Adam Mohr, pastor. Regular services at 10:30 a. m. and 7:30 p. m. Sunday school at 11:50 a. m. Weekly prayer meeting Thursday 7:30 p. m.

Catholic.

Rev. Father O'Malley, pastor. Mass at 8 and 10 a. m. Vespers and benediction, 7:30 p. m. Sunday school, 2 p. m.

Christian Science.

Mrs. Hickey, reader. Reading Sunday 11 a. m.; midweek meeting Wednesday, 7:30 p. m. Reading rooms open Wednesdays and Saturdays, 2 to 5.

Our Principles Are : :

FIRST: A complete stock of the best material manufactured.

SECOND: To guarantee satisfaction.

THIRD: To have all work done by practical mechanics.

FOURTH: To charge reasonable prices.

FIFTH: To solicit inspection from the public.

SIXTH: Always to be found ready to accommodate all patrons at our own little shop on West 13th st.

Call Silver 19

Or visit our Show Rooms.

THE SAN JUAN TINNING & PLUMBING COMPANY

UNDER NEW MANAGEMENT

O. K. COFFEE HOUSE ..AND RESTAURANT..

Courteous treatment and quick service. The best the market affords properly cooked and served. Try one of our 25c Dinners. The best in town for the money

DOWNEY & RUNNING

The Royal

Is Silverton's standard restaurant. We have the best cooks. We buy the best meats. We have the best service. This

Restaurant

Supplies a long-felt want. Try our 35c Mid-Day Luncheon.

Short Orders All Hours.

McMahon & Mann.

Notice of Tax Sale

TREASURER'S OFFICE,
County of San Juan, } SS
State of Colorado.

Public Notice, is hereby given that I, the undersigned, Treasurer of said County, will, according to law, offer at Public Sale, at the office of the Treasurer, of the County of San Juan, State of Colorado, in Silverton, Colorado, on

Wednesday, 21st Day of November, A. D. 1906

and succeeding days, commencing at the hour of 10 o'clock a. m. of said day, so much of the following described real estate, situate in the said County, on which taxes for the year 1905, and such prior years as are hereinafter designated, have not been paid, as shall be necessary to pay the taxes thereon, respectively, as herein below set down, interest and penalties, to-wit:

Real Estate

NAME OF OWNER.	Town.	Lot.	Block.	Valuation.	Tax.	Year.
Alexander, Margaret	Silverton	pt. 15	44	60	$ 2.18	1905
Alexander, Margaret	Silverton	all 16	44	80	2.91	1905
Alexander, Margaret	Silverton	17	44	430	16.64	1905
Gray, Jno G	Silverton	20	2	5	.18	1905
Hemphill, Clara	Silverton	½ 5	46	25	.91	1905
Hemphill, Clara	Silverton	6	46	50	1.82	1905
Hemphill, Clara	Silverton	7	46	450	16.37	1905
Morris, Mrs S U	Silverton	11	6	60	2.18	1905
Morris, Mrs S U	Silverton	12	6	325	11.82	1905
Maurell, Louisa	Silverton	10	19	1600	58.20	1905
Roberts, Emma	Silverton	7	19	50	1.82	1905
Roberts, Emma	Silverton	8	19	960	34.92	1905
Roberts, Emma	Silverton	9	19	70	2.54	1905
Roberts, Emma	Silverton	18	29	200	7.26	1905
Welsh, James	Eureka	27	7	45	1.64	1905
Welsh, James	Eureka	28	7	50	1.82	1905
Work, Mary E	Eureka	23	25	5	.18	1905
Work, Mary E	Eureka	24	25	5	.18	1905
Work, Mary E	Eureka	3	32	2	.07	1905
Work, Mary E	Eureka	4	32	2	.07	1905
Work, Mary E	Eureka	5	32	2	.07	1905
Work, Mary E	Eureka	17	47	2	.07	1905
Work, Mary E	Eureka	18	47	2	.07	1905

Name of Owner Unknown by Assessor TOWN.	Lot.	Block.	Valuation.	Tax.	Year.
Eureka	1	5	$ 5.00	$ .18	1905
Eureka	2	5	5.00	.18	1905
Eureka	7	5	5.00	.18	1905
Eureka	8	5	5.00	.18	1905
Eureka	9	5	5.00	.18	1905
Eureka	10	5	5.00	.18	1905
Eureka	11	5	5.00	.18	1905
Eureka	12	5	5.00	.18	1905
Eureka	14	5	5.00	.18	1905
Eureka	17	5	5.00	.18	1905
Eureka	18	5	5.00	.18	1905
Eureka	20	5	5.00	.18	1905
Eureka	21	5	5.00	.18	1905
Eureka	27	5	5.00	.18	1905
Eureka	28	5	5.00	.18	1905
Eureka	30	5	5.00	.18	1905
Eureka	1	16	5.00	.18	1905
Eureka	2	16	5.00	.18	1905
Eureka	5	16	5.00	.18	1905
Eureka	6	16	5.00	.18	1905
Eureka	7	16	5.00	.18	1905
Eureka	8	16	5.00	.18	1905
Eureka	9	16	5.00	.18	1905
Eureka	10	16	5.00	.18	1905
Eureka	11	16	5.00	.18	1905
Eureka	12	16	5.00	.18	1905
Eureka	5	17	5.00	.18	1905
Eureka	6	17	5.00	.18	1905
Eureka	9	17	5.00	.18	1905
Eureka	10	17	5.00	.18	1905
Eureka	13	17	5.00	.18	1905
Eureka	14	17	5.00	.18	1905
Eureka	15	17	5.00	.18	1905
Eureka	16	17	5.00	.18	1905
Eureka	17	17	5.00	.18	1905
Eureka	18	17	5.00	.18	1905
Eureka	19	17	5.00	.18	1905
Eureka	20	17	5.00	.18	1905
Eureka	24	17	5.00	.18	1905
Eureka	25	17	5.00	.18	1905
Eureka	26	17	5.00	.18	1905
Eureka	28	17	5.00	.18	1905
Eureka	1	24	5.00	.18	1905
Eureka	2	24	5.00	.18	1905
Eureka	3	24	5.00	.18	1905
Eureka	4	24	5.00	.18	1905
Eureka	7	24	5.00	.18	1905
Eureka	8	24	5.00	.18	1905
Eureka	9	24	5.00	.18	1905
Eureka	10	24	5.00	.18	1905
Eureka	11	24	5.00	.18	1905
Eureka	12	24	5.00	.18	1905
Eureka	13	24	5.00	.18	1905
Eureka	14	24	5.00	.18	1905
Eureka	17	24	5.00	.18	1905
Eureka	18	24	5.00	.18	1905
Eureka	19	24	5.00	.18	1905
Eureka	20	24	5.00	.18	1905
Eureka	23	24	5.00	.18	1905
Eureka	24	24	5.00	.18	1905
Eureka	26	24	5.00	.18	1905
Eureka	28	24	5.00	.18	1905
Eureka	29	24	5.00	.18	1905
Eureka	30	24	5.00	.18	1905
Eureka	32	24	5.00	.18	1905
Eureka	1	25	5.00	.18	1905
Eureka	2	25	5.00	.18	1905
Eureka	3	25	5.00	.18	1905
Eureka	4	25	5.00	.18	1905
Eureka	5	25	5.00	.18	1905
Eureka	6	25	5.00	.18	1905
Eureka	7	25	5.00	.18	1905
Eureka	8	25	5.00	.18	1905
Eureka	9	25	5.00	.18	1905
Eureka	10	25	5.00	.18	1905
Eureka	11	25	5.00	.18	1905
Eureka	12	25	5.00	.18	1905
Eureka	13	25	5.00	.18	1905
Eureka	14	25	5.00	.18	1905
Eureka	15	26	5.00	.18	1905
Eureka	16	25	5.00	.18	1905
Eureka	17	25	5.00	.18	1905
Eureka	18	25	5.00	.18	1905
Eureka	19	25	5.00	.18	1905
Eureka	20	25	5.00	.18	1905
Eureka	21	25	5.00	.18	1905
Eureka	22	25	5.00	.18	1905
Eureka	25	25	5.00	.18	1905
Eureka	26	25	5.00	.18	1905
Eureka	31	25	5.00	.18	1905
Eureka	32	25	5.00	.18	1905
Eureka	1	32	2.00	.07	1905
Eureka	2	32	2.00	.07	1905
Eureka	6	32	2.00	.07	1905
Eureka	7	32	2.00	.07	1905
Eureka	8	32	2.00	.07	1905
Eureka	9	32	2.00	.07	1905
Eureka	10	32	2.00	.07	1905
Eureka	11	32	2.00	.07	1905
Eureka	12	32	2.00	.07	1905
Eureka	13	32	2.00	.07	1905
Eureka	14	32	2.00	.07	1905
Eureka	15	32	2.00	.07	1905
Eureka	16	32	2.00	.07	1905
Eureka	17	32	2.00	.07	1905
Eureka	18	32	2.00	.07	1905
Eureka	19	32	2.00	.07	1905
Eureka	20	32	2.00	.07	1905
Eureka	21	32	2.00	.07	1905
Eureka	22	32	2.00	.07	1905
Eureka	23	32	2.00	.07	1905
Eureka	24	32	2.00	.07	1905
Eureka	25	32	2.00	.07	1905
Eureka	26	32	2.00	.07	1905
Eureka	27	32	2.00	.07	1905
Eureka	28	32	2.00	.07	1905
Eureka	29	32	2.00	.07	1905
Eureka	30	32	2.00	.07	1905
Eureka	31	32	2.00	.07	1905
Eureka	32	32	2.00	.07	1905
Eureka	5	40	2.00	.07	1905
Eureka	6	40	2.00	.07	1905
Eureka	7	40	2.00	.07	1905
Eureka	8	40	2.00	.07	1905
Eureka	9	40	2.00	.07	1905
Eureka	10	40	2.00	.07	1905
Eureka	11	40	2.00	.07	1905
Eureka	12	40	2.00	.07	1905
Eureka	13	40	2.00	.07	1905
Eureka	14	40	2.00	.07	1905
Eureka	15	40	2.00	.07	1905
Eureka	16	40	2.00	.07	1905
Eureka	19	40	2.00	.07	1905
Eureka	20	40	2.00	.07	1905
Eureka	21	40	2.00	.07	1905
Eureka	22	40	2.00	.07	1905
Eureka	28	40	2.00	.07	1905
Eureka	2	41	2.00	.07	1905
Eureka	4	41	2.00	.07	1905
Eureka	5	41	2.00	.07	1905
Eureka	6	41	2.00	.07	1905
Eureka	7	41	2.00	.07	1905
Eureka	8	41	2.00	.07	1905
Eureka	9	41	2.00	.07	1905
Eureka	10	41	2.00	.07	1905
Eureka	11	41	2.00	.07	1905
Eureka	12	41	2.00	.07	1905
Eureka	13	41	2.00	.07	1905
Eureka	14	41	2.00	.07	1905
Eureka	19	41	2.00	.07	1905
Eureka	20	41	2.00	.07	1905
Eureka	21	41	2.00	.07	1905
Eureka	22	41	2.00	.07	1905
Eureka	23	41	2.00	.07	1905
Eureka	24	41	2.00	.07	1905
Eureka	25	41	2.00	.07	1905
Eureka	26	41	2.00	.07	1905
Eureka	27	41	2.00	.07	1905
Eureka	31	41	2.00	.07	1905
Eureka	32	41	2.00	.07	1905
Eureka	1	41	2.00	.07	1905
Eureka	2	49	2.00	.07	1905
Eureka	5	49	2.00	.07	1905
Eureka	6	49	2.00	.07	1905
Eureka	7	49	2.00	.07	1905
Eureka	8	49	2.00	.07	1905
Eureka	9	49	2.00	.07	1905
Eureka	10	49	2.00	.07	1905
Eureka	11	49	2.00	.07	1905
Eureka	12	49	2.00	.07	1905
Eureka	13	49	2.00	.07	1905
Eureka	14	49	2.00	.07	1905
Eureka	17	49	2.00	.07	1905
Eureka	18	49	2.00	.07	1905
Eureka	22	49	2.00	.07	1905
Eureka	23	49	2.00	.07	1905
Eureka	24	49	2.00	.07	1905
Eureka	31	49	2.00	.07	1905
Eureka	32	49	2.00	.07	1905
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Eureka	5	50	2.00	.07	1905
Eureka	6	50	2.00	.07	1905
Eureka	7	50	2.00	.07	1905
Eureka	8	50	2.00	.07	1905
Eureka	9	50	2.00	.07	1905
Eureka	10	50	2.00	.07	1905
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Eureka	28	50	2.00	.07	1905
Eureka	29	50	2.00	.07	1905
Eureka	30	50	2.00	.07	1905
Eureka	31	50	2.00	.07	1905
Eureka	32	50	2.00	.07	1905
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Eureka	3	59	2.00	.07	1905
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Eureka	5	59	2.00	.07	1905
Eureka	6	59	2.00	.07	1905
Eureka	7	59	2.00	.07	1905
Eureka	8	59	2.00	.07	1905
Eureka	9	59	2.00	.07	1905
Eureka	10	59	2.00	.07	1905
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Eureka	14	59	2.00	.07	1905
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Eureka	18	59	2.00	.07	1905
Eureka	19	59	2.00	.07	1905
Eureka	20	59	2.00	.07	1905
Eureka	21	59	2.00	.07	1905
Eureka	22	59	2.00	.07	1905
Eureka	23	59	2.00	.07	1905
Eureka	24	59	2.00	.07	1905
Eureka	25	59	2.00	.07	1905
Eureka	26	59	2.00	.07	1905
Eureka	27	59	2.00	.07	1905
Eureka	31	59	2.00	.07	1905
Eureka	32	59	2.00	.07	1905

Mines

Name of Owner Unknown by Assessor.	Survey No.	Mining District.	Acres.	Valuation.	Tax.	Year.
Erie	8547	Animas	10.33	$ 300	$10.90	1905
Eureka	2403	Red Mt	10.3	300	12.50	1904
Eureka	2403	Red Mt	10.3	300	10.90	1905
I X L	11319	Animas	10.2	300	10.90	1905
Iron Clad	8488	Animas	10.3	300	10.90	1905
Ice Lake Mill Site	11694	Ice Lake	5.	1600	58.20	1905
No Name	11319	Animas	10.2	300	10.90	1905
Queen	497	Animas	4.6	150	5.45	1905
Silver	512	Eureka	10.2	300	10.90	1905
Washington	104	Eureka	5.	150	6.25	1904
Washington	104	Eureka	5.	150	5.45	1905

Mines

NAME OF OWNER.	Name of Mining Claim.	Mining District.	Acres.	Survey No.	Valuation.	Amount of Tax.	Year.
Aroostook M & M Co	½ Aroostook	Eureka		15966	$ 150	$ 5.45	1905
Aroostook M & M Co	½ Aroostook Ext	Eureka	19.678	15966	150	5.45	1905
Allison, C	Clarence	Eureka	10.3	2390	300	10.90	1905
Beach, Sophie M	Quaker	Eureka	7.114	16831	240	8.73	1905
Beach, Sophie M	Naboh	Eureka	8.758	16830	270	9.82	1905
W J Boyle et al	½ Independence	Red Mt	7.032	16047	120	4.36	1905
Coons, Emery	½ Midnight	Eureka	4.	5616	120	4.36	1905
Duval, Sidney	Picket	Uncom.	7.188	16280	240	8.73	1905
Dupree Mining Co	World's Fair	Eureka	10.33	16171	300	10.90	1905
Eveline Mining Co	Eveline	Eureka	10.3	12231	300	10.90	1905
Eveline Mining Co	Monarch	Eureka	5.	12181	600	21.80	1905
Edgerton, W I	¼ Gilmore	Eureka	2.5	745	75	2.72	1905
Four Metals Mining Co	Slide Rock	Animas		15310	300	10.90	1905
Four Metals Mining Co	James Young	Animas	21.708	15310	300	10.90	1905
Four Metals Mining Co	Tip Top	Animas		15310	300	10.90	1905
Four Metals Mining Co	Baldy	Animas		15310	300	10.90	1905
Four Metals Mining Co	J B Smith	Animas	10.3	1373	300	10.90	1905
Four Metals Mining Co	Pie De Lacey	Animas		15350	300	10.90	1905
Four Metals Mining Co	Francis	Animas		15350	300	10.90	1905
Four Metals Mining Co	T V Powderly	Animas		15350	300	10.90	1905
Four Metals Mining Co	Moosic	Animas	55.055	15350	300	10.90	1905
Four Metals Mining Co	Free Press	Animas		15350	300	10.90	1905
Four Metals Mining Co	D L & W	Animas		15350	300	10.90	1905
Four Metals Mining Co	Punxsutawana	Animas		15350	300	10.90	1905
Glatzel, Robt	Hematite	——	10.33	14624	300	10.90	1905
Gold Spur Mining Co	Evening Star	Animas	4.817	16761	150	5.45	1905
Gold Spur Mining Co	Morning Star	Animas	10.331	16761	300	10.90	1905
Gold Spur Mining Co	Union	Animas	7.973	16761	240	8.73	1905
Gold Spur Mining Co	Yankee Girl	Animas	10.331	16761	300	10.90	1905
Gold Spur Mining Co	Yankee Boy	Animas	10.165	16761	300	10.90	1905
Gold Spur Mining Co	Golden Gate	Animas	10.331	16761	300	10.90	1905
Gold Spur Mining Co	Black Chief	Animas	10.331	16761	300	10.90	1905
Gold Spur Mining Co	Smuggler	Animas	10.331	16761	300	10.90	1905
Gold Spur Mining Co	Gold Hill	Animas	10.331	16761	300	10.90	1905
Gold Spur Mining Co	Oceola	Animas	10.331	16761	300	10.90	1905
Gold Spur Mining Co	White Chief	Animas	10.331	16761	300	10.90	1905
Gold Spur Mining Co	Snow Slide	Animas	10.331	16761	300	10.90	1905
Gold Spur Mining Co	William Hughes	Animas	10.331	16761	300	10.90	1905
Gold Spur Mining Co	Monmouth	Animas	10.331	16761	300	10.90	1905
Gold Spur Mining Co	Sunnyshine	Animas	10.331	16761	300	10.90	1905
Gold Spur Mining Co	Eugen	Animas	10.331	16761	300	10.90	1905
Gold Spur Mining Co	Gold Spur Mill Site	Animas	4.794	16761	100	3.63	1905
Graboskey, Theo	½ King George	Animas	5.2	1080	75	2.72	1905
Graboskey, Theo	Part Howardsville Placer	Animas	10.123	942	200	7.26	1905
Graboskey, Theo	Improvemts at Howardsville	Animas	.....	.....	100	3.63	1905
Hodges, Mrs. M B	9-100 Grand View	Ice Lake	10.3	11693	273	9.93	1905
Hodges, Mrs. M B	9-100 Last Hope	Ice Lake	4.7	11695	136	4.94	1905
Hodges, Mrs. M B	9-100 Columbus	Ice Lake	10.3	11693	273	9.93	1905
Hodges, Mrs. M B	9-100 Webster	Ice Lake	10.3	11695	273	9.93	1905
Harrison, Alexander	Excelsior	Eureka	10.3	857	300	10.90	1905
Kaika, Louis	3-10 Monitor	Eureka	3.3	5321	150	5.45	1905
Kavanaugh, Ella	Geraldine	Animas	10.331	13606	300	10.90	1905
Kimball, S B	Toronto	Eureka	7.9	5415	240	8.73	1905
Kimball, S B	Fannetto	Eureka	3.3	5425	120	4.36	1905
Keeley, Thos	½ President	Animas	5.2	2229	150	5.45	1905
Keeley, Thos	Iowa Belle	Animas	9.5	1818	300	10.90	1905
Morris, Mrs. S. U.	¾ Oro	Eureka	9.249	16996	225	8.18	1905
McCloud, Richard	Flag of Truce	Animas	6.5	5086	210	7.64	1905
McCloud, Richard	Thundershower	Animas	8.9	1808	270	9.82	1905
McCloud, Richard	4-6 Family	Eureka	6.4	4801	140	5.09	1905
McCloud, Ella	1-6 Family	Eureka	6.4	4801	35	1.21	1905
Moore, Fred P	½ Boston Dip	Eureka	15.16	1478	150	5.45	1905
Miller, Jno J	Breuster	Red Mt.	8.967	15697	270	9.82	1905
McIntyre, F S	½ Maud S	Uncom.	10.3	852	200	7.26	1905
Mammouth Tunnel Mining Co	Ajax Mill Site	Eureka	5.	16792	300	10.90	1905
Manmouth Tunnel Mining Co	Miner's Dream	Eureka	10.250	16792	300	10.90	1905
Yesmith, J W	Pine Bark	Eureka	7.268	17262	240	8.73	1905
Pearson, Julian T	El Dorado	——	10.331	16686	300	10.90	1905
Pittsburg-San Juan Mines Co	Monette	Uncom.		16943	300	10.90	1905
Pittsburg-San Juan Mines Co	Morris	Uncom.	18.570	16943	300	10.90	1905
Roberts, Emma	½ Crystal	Animas	10.3	15541	100	3.63	1905
Roberts, Emma	½ Croghan	Animas	10.3	15541	100	3.63	1905
Roberts, Emma	¾ Queen of Boulder	Animas	10.3	12972	225	8.18	1905
Roberts, Emma	J H R	Animas	9.	12255	270	9.82	1905
Revely, E	¼ Boston	Eureka	7.3	54	60	2.18	1905
Revely, E	¼ F J Devitt	Eureka	7.9	52	60	2.18	1905
Revely, E	¼ Greenfield	Eureka	4.3	49	35	1.27	1905
Revely, E	¼ Prairie	Eureka	10.3	40	75	2.72	1905
Rohrig, R H	Idaho	Animas	6.030	2514	210	7.64	1905
Robinson, J S	½ Una A	Animas	8.8	10036	135	4.91	1905
Robinson, J S	½ Una B	Animas	4.7	10036	50	1.82	1905
Robinson, J S	½ Vesper	Animas	8.8	10036	135	4.91	1905
Robinson, J S	½ Matin	Animas	8.8	10036	135	4.91	1905
Robinson, J S	½ Emma	Animas	8.8	10036	135	4.91	1905
Robertson Gold Mining Co	Robertson	Animas	9.5	12224	300	10.90	1905
Robertson Gold Mining Co	Scott	Animas	9.5	12224	300	10.90	1905
Shockley, J H	Reservoir	Animas		15134	300	10.90	1905
Shockley, J H	Slide Rocklers	Animas	24.93	15134	300	10.90	1905
Shockley, J H	Tram	Animas		15134	300	10.90	1905
Syndicate Gold Mining Co	Gold Bug	Animas	10.3	11691	1100	40.00	1905
Syndicate Gold Mining Co	Gold Bug Mill Site	Animas	5.	11691	100	3.63	1905
Syndicate Gold Mining Co	Gold Nugget	Animas	10.3	11691	500	18.19	1905
Syndicate Gold Mining Co	Repeal	Animas	10.3	11691	500	18.19	1905
Sheridan, Daniel, Estate of	Gloucester	Red Mt.	8.010	15975	270	9.82	1905
San Juan Gold & Silver Mining Co	Lillian B	Eureka	7.327	16930	240	8.73	1905
Thomas, Wilbur	Lucy	Ice Lake		13372	300	10.90	1905
Thomas, Wilbur	Lucy No. 2	Ice Lake		13372	300	10.90	1905
Thomas, Wilbur	May B	Ice Lake		13372	300	10.90	1905
Thomas, Wilbur	Lelia	Ice Lake		13372	300	10.90	1905
Torry, Ira A et al	2-3 Seminole	Animas	10.33	1692	300	10.90	1905
Talifora, A D	¼ Gilmore	——		745	300	10.90	1905
Wason, Henry A	½ Shenandoah	Animas	9 9-10	294	150	5.45	1905
Wason, Henry A	½ Yellow Jacket	Animas	9 9-10	311	250	9.09	1905
Woods, Jno E	2-3 Expansion	Animas	.....	14673	200	7.26	1905
Woods, Jno E	2-3 Ione	Animas	.....	14673	200	7.26	1905
Woods, Jno E	2-3 Parthenope	Animas		14673	120	4.36	1905
Zuni Mining Co	Zuni	Animas	8.7		700	25.46	1905
Zuni Mining Co	Zulu	Animas	10.3	.....	300	10.90	1905
Zuni Mining Co	Lowell	Animas	10.	.....	300	10.90	1905
Zuni Mining Co	Commonwealth	Animas	10.3	.....	300	10.90	1905
Zuni Mining Co	Yakima	Animas	10.3	.....	300	10.90	1905

Witness my hand and seal this 16th day of October, A. D. 1906.

THOMAS ANNEAR, County Treasurer.

SEAL

WOLESALE INFANTICIDE.

Berlin, Oct. 18.—On the arrival of a train from Kremmen a large parcel, wrapped in blue paper, was taken from a fourth-class compartment, and placed in the lost luggage office. Two detectives who examined it found it to contain the bodies of two newly born children, apparently twins. Almost at the same time another body was found in a lavatory in the Stralau strasse, while a fourth case is that of a body in which the head has been severed from the trunk. The police are stated to be in possession of clews which point to a large traffic in the disposal of newly born children.

MAN KILLED BY AUTO.

Waterbury, Conn., Oct. 18.—Frederick M. Frost, a prominent resident here, was instantly killed by the automobile owned by A. M. Young, president of the Connecticut Railway & Lighting company. He was struck just after he alighted from a trolley car. Mr. Young's chauffeur, Hugh McLeod, was charged with manslaughter and released on $5000 bail.

MRS. HUNTINGTON PAYS $20,000 IN DUTY

New York, Oct. 18.—One of the largest amounts paid in customs duty at this port in several years on articles fully declared and brought in by an individual, was paid by Mrs. Collis P. Huntington when she arrived Tuesday by the Kaiser William II., of the North German Lloyd line. She declared merchandise worth $32,000 bought in Europe, of which $27,000 represented two articles of jewelry. The duty amounted to about $20,000.

SERIOUS CHARGES.

Yesterday morning Pete Aspaas was arrested at Hesperus upon a warrant sworn out by J. A. Coppinger, charging cattle stealing. On the way to Durango young Pete in some way escaped from the officers and late in the afternoon Deputy Sheriff Ed Laithe started out after him. In connection with the same case and upon the same charge, upon warrant, late yesterday, Marshall Wickline arrested John Ent and placed him in the county jail.

PYTHIAN RATHBONE COMBINE.

New Orleans, La., Oct. 18.—The feature of today's Pythian convention was the decision to consolidate the Pythian Sisterhood, having a membership of 7000, and the Rathbone Sisters, which has 125,000 members. It is announced that the new name of Pythian Sisters will probably be adopted by the consolidation. The organizations will merge their rituals.

FONETIC LUV LETTER.

"Dear Hart—Another da has dragd its weery self out and I am 24 hours nerer my beluved. Altho vacashun time is only tu months off, it seems fully 5 times as long, so anxus am I to see u. Last term I studied reedin, ritin and rithmetic and a fu ov the sciences.

"Forshunately, spelin, thanks to Mr. Kaarnegy and Prezident Rusefelt, wuz omitd frum the kurikulum, and on this hed I am not remis. As to hier mathematics and the langwages, I hav grown most profishent. For instans, I hav figgered out just how long it wil tak me to walk hom from any stashun frum Boulder to Durango, shuld anything hapin to th train, and when I arive I wil be abl to tel u how much I luv u in French, Gurman, Latin, Greek and Rushian.

"I here the chapl bel summonin me and since I hev used all my cuts, must necessarily bring this to a cloz. Gud-by, dere luv. He b with u in tu months. Luvingly and egerly urs,

"GEORGE SKOOG."

"P. S.—Remember me to awl and tell ur litl sister I wil bring her awl sorts of cole suventrs."

DEMOCRATIC CAMPAIGN OPENS.

Alva Adams, Judge Seeds, Miss Maloney and Dr. Rowan Receive An Enthusiastic Reception at Democratic Rally.

A large delegation of prominent Democrats of both sexes, together with other rominent citizens of different political belief, were at the depot last evening to greet the distinguished candidates upon the Democratic state ticket. A distinctive compliment was given Miss Maloney by the lady precinct committee women of the city, being at the train in a body to greet her. The distinguished guests were escorted to the Strater.

Shortly after 7 p. m. the Opera House began to fill up and long before the time scheduled for the meeting to open all seats were taken and many could not get even standing room. The building was packed with men and women of all political beliefs.

Shortly after 8 o'clock the distinguished visitors, Hon. Blair Burwell, W. A. Reese and C. L. Russell of the local Democracy, and Mrs. Thos. H. Tulley, who accompanied Miss Maloney, took their seats upon the stage.

Mr. Reese opened the meeting by introducing Dr. W. W. Rowan of Ouray, the Democratic candidate for congress for the Second congressional district. Dr. Rowan regretted having never before addressed a Durango audience, but said that if the audience now regretted it it was because of the La Plata delegation to the ... state convention insisting upon his nomination, and they should be blamed. The doctor frequently interspersed his remarks with apt and jocular stories and from the beginning had the audience in good humor and fully en rapport. The doctor said he often wrote speeches, but seldom could read them. He quit joshing became serious and delivered many telling body blows to his political opponent. Stated that Haggott had his picture wrapped in the flag, with the worn-out eagle at the top and all surrounded by a bass drum, hung in public windows, etc., but that Haggott never opened his mouth, and he illustrated it by a comic stuttering story. Said that ex-Congressman Hogg was the drummer of the aforesaid bass drum. That Hogg saw the political handwriting on the wall and refused to run again. He illustrated this point, too, by an old but apt story on Charley Thomas. Dr. Rowan declared himself in favor of a primary law and to do away with the caucus bunco. He is in favor of a direct vote of the people for any office, from constable to President of the United States, and strongly in favor of the plank in the Democratic platform for a railroad commission by a direct vote of the people.

In concluding he stated that his record was open, that he wished to be elected, and after a short appeal for harmony, he pledged himself if elected to do anything at any time for the Brotherhood of Railway Trainmen or any other labor organization. That he was theirs to command. Dr. Rowan's remarks were frequently interspersed throughout with laughter and much handclapping.

Hon. Blair Burwell, in a neat and eloquent address, in which he rightly highly extolled her fine record as a teacher, her lovely character and her sweet disposition, had the honor of introducing our next state superintendent of schools, Miss Honore Maloney. Miss Maloney was received with much handclapping as she, becomingly dressed in a gray traveling suit and carrying a large bouquet, advanced to the front of the stage. Her remarks were confined to the school question solely, her only political offers being a request to be solid and vote a straight ticket. She remarked that Colorado expends more than fifteen times as much as Massachusetts for its schools and that distinguished Europeans visiting this country making a study of our schools, afterwards stated that Colorado led the country. She highly complimented Mrs. Helen L. Grenfell, who for six years governed our schools under the Democratic regime, and said she would pursue her policy. Miss Maloney was very modest and had nothing to say for herself. After the conclusion of the rally Miss Maloney, as a guest of Mrs. Thos. H. Tulley visited the Democrat office and many of the local Democratic nominees had the pleasure of meeting her. Charley Conroy blushed a rose pink, but stood his ground (Charley is a "bach," you know). Miss Maloney is a charming conversationalist and facinates every one by her brilliant mind and wit.

Then Mr. Reese, in a few well chosen and appropriate remarks, introduced to the waiting audience the principal speaker of the evening Hon. Alva Adams, who received a rousing reception. Mr. Adams complimented Durango, believed it would be one of the four great centers of the state, etc., and then to politics. Said that the fight was along the same lines as before; that the honor and integrity of the state were at stake. That he had nothing personally against Buchtel, but that he was a representative of Evans; that he had spoiled his position as a teacher to be a Bill Evans governor. That principles were higher than party lines. It was a question of law and order and not the buying of a legislature and a corrupt senate. Said that the opposition was carrying on a campaign of fraud. Pledging himself to the platform, but must have the legislature to assist him.

He read a telegram from Clarence Darrow, the leading Socialist in this country, to himself, in which Mr. Darrow says if he speaks at all in Colorado it will be for Adams. Said that any one could criticise a judge or the courts. He appealed in the interest of fair play and a square deal that all should support the Democratic ticket. Shot it into Simon Guggenheim good and plenty and said that if he bought his way to the senate it would create a greater scandal than that of Smoot. At the conclusion of his remarks Mr. Adams was roundly applauded.

Judge William P. Seeds, candidate against Gabbert for the supreme court, succeeded Mr. Adams. The judge's remarks were most sincere and impassioned. He explained why both morally and legally Mr. Adams withdrew two years ago, how if he had not, the federal troops would have forced him. He spoke at length about the Patterson constructive contempt case and illustrated it by a similar one in a simple manner. He said that any one has the right to say anything they can prove. He refuted the charge that he was owned and controlled by the W. F. of M. His description of the arbitrary action of Peabody and his militia in Cripple Creek was most dramatic and created profound feeling. In conclusion he pledged the fairest and most honest consideration of all and to all.

HEAD-ON COLLISION ON THE SANTA FE

Pueblo, Colo., Oct. 17.—Harry Murdock and an unknown negro were killed, while more than a score of passengers were injured as a result of a head-on collision between two Santa Fe express trains near Manzanola at 1:56 o'clock this afternoon. Both locomotives were totally demolished, as was the baggage car on the east-bound train.

Of the four enginemen, all but W T. McMurry, the engineer on No. 601, west bound, jumped and escaped injury. McMurray, a veteran in the service of the Santa Fe, stuck to his post and made every effort to avoid the collision. He was seriously injured, but is expected to recover. The Santa Fe officials state that train No. 601 was running on short time and that McMurray evidently endeavored to make a siding at Manzanola before No. 10 left that station.

Immediately after the collision the wreckage caught fire.

Only two passengers received injuries which are at all serious. C. B. Saunders suffered a fractured rib and the young son of W. R. Dawson of Nowater, I. T., was hurt internally.

MINING CONGRESS FAVORS NEW CABINET MEMBER

Denver Colo, Oct. 17.—The delegates to the American Mining Congress, after adopting by unanimous vote today the resolution of Gov. Pardee of California providing for the establishment of a department of mines and mining by the federal government, entered into a lengthy discussion of the resolution favoring the enactment of a law by congress to prevent mining frauds.

This resolution also was offered by Gov. Pardee. It was adopted. The discussion of the district drainage bill was continued tonight and the bill was unanimously endorsed J. H. Richards of Idaho, president of the congress, and Col. Thomas Ewing of Arizona, were elected directors. Another member is still to be chosen and these are empowered to name a president of the congress.

FIGHTING FOR CONTROL OF THE ILLINOIS CENTRAL

Chicago, Ill., Oct. 17.—The fight for control of the Illinois Central Railroad company waxed hot today. Stuyvesant Fish, President Road and William Nason Crowell, representing E. H. Harriman, president of the Southern Pacific, clashed openly before the 250 stockholders who had come from various parts of the country to attend the meeting. On the face of the record, Mr. Fish appears to have been the victor, but that the victory is not a final one is insinuated by Mr. Cromwell.

The clash between Messrs. Harriman and Fish was over an agreement dated July 27, 1906, and signed by Stuyvesant Fish, Charles A. Peabody and E. H. Harriman.

C. W. Mortuo Grinnell, member of the board of directors, had died during the year. Mr. Fish claims that the Harriman faction agreed on Mr. Grinnell's successor being a man whose presence on the directory would not be inimical to the independence of the Illinois Central and would be acceptable to Mr. Fish. Henry De Forest, a director of the Southern Pacific, of which Mr. Harriman is president, and one of the counsel for Mr. Harriman, was named in the petition signed by Mr. Harriman and six other directors to succeed Mr. Grinnell.

By reason of his Southern Pacific affiliations, Mr. De Forest was not acceptable to Mr. Fish. Mr. Cromwell declares that under the agreement Mr. Fish was bound to accept Mr. De Forest and to cast both his own and Mr. Harriman's proxies for him.

At today's meeting Mr. Fish, after formally being called upon by Mr. Cromwell to cast proxies in favor of De Forest, arose and declared with great emphasis: "I will never under any circumstances vote for Mr. De Forest. Mr. Fish thereupon placed James Dewitt Cutting of New York in nomination. He then cast a total of 614,703 shares for Cutting. Mr. Cromwell, as a matter of record, voted 2100 shares against Cutting and later cast them for De Forest, whom he placed in nomination. Mr. Cutting was thereupon declared formally elected to fill out the unexpired time of Mr. Grinnell, which is two years. Charles M. Beach, J. T. Harahan and Cornelius Vanderbilt, whose terms had expired, were re-elected without opposition. Mr. Fish gave his proxies to Mr. Harahan, despite the fact that the latter had signed the Harriman petition in favor of De Forest just before the meeting.

GUILTY RAILROAD REBATERS.

New York, Oct. 17.—A verdict of guilty of granting rebates on sugar shipments was returned by a jury in the United States court here today against the New York Central Railway company and Frederick L. Pomeroy, the company's general traffic manager. Sentence was deferred until Friday to permit attorneys for the defense to file motions with the court

AMERICAN BANKERS MEET.

St. Louis, Mo., Oct. 17.—The first day's session of the thirty-second annual convention of the American Bankers' association was devoted almost entirely to the hearing of routine reports.

The question of currency reform was not entered into today, being laid over for discussion tomorrow, when the federal legislative committee will lay before the convention an elastic currency plan it has prepared.

It is the unanimous opinion of the delegates that tomorrow's session will be characterized by a warm discussion when the subject is brought up, but conservative and influential members feel certain that a plan of currency reform will be agreed upon before the convention finally adjourns.

Charles N. Fowler, chairman of the committee on banking and currency in the house of representatives and Comptroller William B. Ridgely are present.

ACQUITTED OF WIFE MURDER.

Toms River, N. J., Oct. 17.—After a trial lasting about ten days, Dr. Frank L. Brouwer, indicted for the murder of his wife by poison, was acquitted today.

The courtroom was crowded when the verdict was returned. Men and women cheered and applauded in spite of the rapping for order, and the court officers had difficulty in suppressing the noise.

MRS. DAVIS TO BE BURIED AT RICHMOND, VA., FRIDAY

Richmond, Va., Oct. 17.—At a conference of state and city officials today it was arranged that the funeral of Mrs. Davis shall take place from St. Paul's church in this city Friday next. Gen. Stephen D. Lee of Mississippi as commander of the United Confederate Veterans, has been asked to act as chief marshal, and has accepted the honor. Gov. Swanson will issue a proclamation calling for a general suspension of business on the occasion of the funeral. The governors of all the states that made up the Confederacy are expected to be present. The remains will lie in state in St. Paul's church between the time of their arrival here Friday morning and the hour for the funeral.

GASOLINE EXPLOSION.

Celina, Ohio, Oct. 17.—Five persons were killed and about a hundred injured by a gasoline explosion in the Meinerding dry goods and hardware store at Fort Recovery, in this county, at noon today. The dead are: Miss Cleo Weis, aged 23 years, Henry Lammer, 23; Joseph Rosener, 45, Charles Wagner, 40, all employes of Meinerding's.

An unknown traveling salesman is missing. What caused the explosion is not known. Fire followed and a large section of the town on the west side was badly damaged.

The loss by fire and explosion will be heavy.

BRUTAL PRIZE FIGHT.

Philadelphia, Pa., Oct. 17.—Terry McGovern and Young Corbett fought a hard six round bout at the National Athletic club tonight. When the gong announced the close of the battle there was little to choose between the fighters. The fight was one of the bloodiest ever witnessed in this city. At the opening of the second round Corbett rushed and caught McGovern with a terrific right on the chin, which forced the latter to take the count of nine. When McGovern got to his feet he rushed to clinch and in so doing he batted Corbett over the left eye, opening a gash from which the blood flowed in a stream. From this round to the finish the fighters were covered with blood from head to foot.

Both men were well winded when the gong sounded at the end of the third round.

The fourth round was decidedly in McGovern's favor.

The fifth and sixth rounds were about even, but there was never a second that the men were idle. At the pace the men were going it is doubtful if either could have lasted two more rounds.

HOT WORDS OF CRITICISM BETWEEN LAWYERS IN STANDARD OIL CASE

Findlay, Ohio, Oct. 17.—After a trial of seven days, the case of the Standard Oil company of Ohio, charged with conspiracy against trade, was placed in the hands of the jury at 8:30 o'clock tonight. The day's proceedings were the most strenuous of the trial. The defense submitted fourteen points of law for incorporation in the charge of the court to the jury, all but two of which were rejected.

The tension between the counsel on either side, which has been on the increase as the case progressed reached the breaking point today and hot words of criticism were passed. The crowded courtroom became demonstrative for the first time and the court sternly rebuked all concerned

ANOTHER RECORD BROKEN.

New York Oct. 17.—Another world's record was broken at Belmont Park today, when Voochees, a 20 to 1 shot, won the first race, 6½ furlongs straightaway, in 1.17 1-5.

LINDSEY DRAWS BIG HOUSES AT SALIDA

Salida, Colo., Oct. 17.—Judge Ben B. Lindsey, the independent candidate for governor, accompanied by Jack Faw, reached Salida from Alamosa yesterday and delivered an address on the issues of the campaign to an overcrowded opera house tonight. The judge drew one of the largest crowds that has ever appeared at a political meeting, and he was compelled to talk to an overflow meeting on the outside.

LINDSEY RUSTLING.

His work Monday was as follows: Beginning at Antonito at 9 o'clock that morning, he continued his campaign without stopping for lunch until 6 o'clock in the evening, when he stopped long enough to eat his dinner and begin again. He opened the day's work at 9 o'clock with an address to 200 citizens at Antonito. He drove from there to Manassas and at 12 o'clock addressed 300 there. From there he went to Sanford, where he spoke to 250 at 2:40. At 4:50 he was in La Jara addressing a crowd of 400. From there he came to Alamosa and the opera house was packed to hear him. At the small towns at which he stopped during the day, business was suspended, the stores closed and all turned out to hear him.

GUGGENHEIM HALL DEDICATED.

Golden, Colo., Oct. 17.—Simon Guggenheim hall, an addition to the Colorado school of mines, was dedicated this afternoon. Rev. Dr. F. W. Gunsaulus of Chicago made the dedicatory address.

The new building, furnished, cost $80,000, and is a gift to the state from Simon Guggenheim. Portraits of Mr. Guggenheim and former President Regis Chauvenet were unveiled in connection with the exercises.

WATERS-PIERCE OIL COMPANY INDICTED IN OKLAHOMA

Guthrie, Okla., Oct. 17.—A special to the State Capital from Watonga says an indictment was returned today by the Blaine county grand jury against the Waters-Pierce Oil company and the Frisco railroad, alleging violation of the Oklahoma anti-trust laws.

BIG FIRE IN BIRMINGHAM.

Birmingham, Ala., Oct. 17.—Fire which broke out shortly after midnight in the six-story building of the Prowell Hardware company, has spread to other stores and it is now believed the loss will reach half a million dollars.

ON THE TRACK OF SILVIERA.

New York, Oct. 17.—The steamship Carmelina, with Manuel Silveira, the Cuban banker, whose recent disappearance from Havana was said to have brought about the failure of Ceballos & Co., his wife and two children, steamed into Curacoa a week ago last Sunday, according to Capt. Bennett and several of the passengers of the steamship Zulia of the Red D line, which reached here today from Curacoa and Venezuelan ports.

The Carmelina left the following day, ostensibly for Porto Cabello.

MONT PELEE IS AGAIN EMITTING VOLCANIC ASHES

Basse-Terre, Island of Guadeloupe Oct. 17.—A violent eruption of Mont Pelee Volcano, Island of Martinique, caused a rain of dense volcanic ashes on the southeastern portion of this island. It is reported from St. Thomas, Danish West Indies, that the atmosphere was thickly charged with fine volcanic ashes from Oct. 6 to 10, which equaled in density any observed during the worst eruptions of Mont Pelee.

BIG FIRE IN SENECA, S. C.

Columbia, S. C., Oct. 17.—The town of Seneca was visited by fire early this morning and property worth about $75,000 was destroyed.

Rumors were circulated early that the fire was started by negroes. A later investigation, however, showed there was little on which to base the rumors. It was necessary to use dynamite to check the fire.

NEW YORKER DECLARES 192,000 PUPILS UNFIT

New York, Oct. 17.—W. H. Allen, representing committees on the betterment of the physical condition of school children, stated to the board of estimate and apportionment that a large per cent. of the school children in Greater New York are physically unable to take the education which the city is trying to give them. He said that 192,000 children in the public schools are so defective that they are now blocking the rogress of other pupils in the schools. He wanted more medical inspectors of school children. Miss Julia Richmont appeared in support of the same proposition and corroborated the statement made by Mr. Allen.

CARELESSNESS CAUSES DEATH OF TWO LABORERS

Los Angeles, Cal., Oct. 17.—A special from Barnwell, Cal., says: The carelessness of one man detailed to handle the brakes on a Barnwell & Searchlight train caused the death of two Mexican laborers here shortly before noon today. Thirteen others, including an American section foreman, were seriously injured.

THE MUTUAL LIFE INSURANCE COMPANY OF NEW YORK

Notice to Policyholders.

The official statement, which may be used as a ballot for voting by mail, having been sent to each policyholder on October 11, any voter failing to receive the same in due course is requested to send his name and address to the company, New York city, in order that a duplicate may be sent him.

TAFT PARTY RETURNS.

Washington, Oct. 17.—Secretary and Mrs. Taft, Assistant Secretary of State Bacon and Mrs. Bacon, Gen. Funston and others composing Secretary Taft's party, arrived in Washington tonight from Cuba.

HOPPE BEATS SCHAEFER.

New York, Oct. 17.—Willie Hoppe beat Jack Schaefer tonight by a score of 500 to 172 in 47 innings.

SEAPORT TRADE TIED UP.

Portland, Ore., Oct. 17.—Portland's seaport trade was brought to a standstill today, when the entire water front from federation declared a strike in sympathy with the locked out grain handlers' union. The strikers will insist on the recognition of the union, and exporters declare they will insist on the "open shop."

CANDIDATES AT SILVERTON.

Silverton, Colo. Oct. 18.—The reception given the Democratic candidates here this evening was most enthusiastic. The Democrats were very much alive and in the evening burned red fire and shot off dynamite to stir things up. Committees received the candidates and made them feel at home during the day. The opera house tonight was packed and the addresses of Gov. Adams, Dr. Rowan and Miss Maloney were cheered to the echo. Many miners were in attendance. Just what effect the visit will have on the Socialist vote of this county cannot be accurately predicted at this time.

GIRL ATTACKED BY COW.

Geneva, Switzerland, Oct. 18.—A 13-year-old peasant girl named Marie Hofer has had an extraordinary escape from death on a mountain. She was attacked by a cow, and, running from the animal, fell into a deep ravine. Rushing to the spot, her father discovered that the girl's fall had been stopped by a tree 70 feet below, in the boughs of which she was securely wedged. She was practically uninjured, and as rescue was impossible that night, bread, water and a covering were lowered to her while her father and mother kept watch above. Next morning the girl was extricated by means of a rope, and was able at once to resume her work.

FLOOD OF GOLD FOR FAIR.

Seattle Raises $650,000 for Alaska-Yukon-Pacific Exposition in One Day.

Seattle, Wash., Oct. 18.—There is $650,000 in the treasury of the Alaska Yukon-Pacific exposition, and the fair is nearly three years away. If more money is needed there will be plenty available.

The $650,000 was raised by citizens of Seattle in one day, Oct. 2, and the accounting department has just completed figuring out tthe total. Oct. 2 was made a legal holiday in Seattle by order of the mayor, aand it was a great day.

Will H. Parry, chairman of the ways and means committee of the exposition, was held responsible for the raising of the money. "Everybody helps," said Mr. Parry, and the two words, adopted as a slogan, were emblazoned in crimson letters on the dead walls, on street cars, automobiles and delivery wagons, in shop windows and wherever people gathered. Mr. Parry labored hard and his well-directed staff were the principal helpers.

Mr. Parry set out to raise half a million dollars, and the total was a quarter more. The people would have bought a million dollars' worth of stock if it had been necessary.

Never before has a city as a unit come forward so spontaneously and generously for a similar enterprise. The wage-earner stood shoulder to shoulder with the capitalist in buying stock. Although subscription committees canvassed the city, a majority of the subscriptions were brought voluntarily to the exposition headquarters.

It is already apparent that the fair of 1909 is to be a big show, bigger than that given last year by Portland, or to be given next year in Jamestown. The state of Washington probably will be called upon to appropriate $1,000,000 to the enterprise, and the legislature is expected to vote this amount if the fair management thinks it necessary. The Republican and Democratic state conventions recently held made exposition appropriation clauses important planks in their platforms.

The fair site has already been chosen, a sightly tract of 355 acres, composing the grounds of the University of Washington. Situated picturesquely on the shore of Lake Washington, within 20 minutes' ride of the city, the location could not be improved upon. When the fair is over, most of the buildings will be converted into recitation halls and dormitories. Earlier fairs have found their stately palaces worthless after they had served the purpose for which they were constructed.

The exposition is to be held primarily for the purpose of attracting the people of the East and middle West to the Queen City. And when the thousands arrive they will be shown marvelous natural advantages of the Pacific Northwest and Alaska and the Yukon country, and the surprising possibilities of increased trade with the Orient. Interest in the country it was held to exploit, rather than in the fair itself, brought 126,000 people from the East and middle West to Portland last year, and the attendance from beyond the Rocky mountains at Seattle's fair is sure to be much greater.

Maj. T. S. Clarkson, an expositionist of large experience, is now touring the middle West in the interest of the fair. Every state visited by him has signified its intention of participating.

BANKERS POSTPONE CURRENCY DISCUSSION

St. Louis, Mo., Oct. 18.—The discussion of the currency question by the American Bankers' association was again postponed today, the report of the bank executive committee, which would have precipitated the discussion, being laid over until tomorrow as a special order of business. It was decided to lay the entire subject of amending the constitution relative to limitation of membership of the executive council over until next year. Reports of the bill of lading committee and clearing house committee were received and adopted.

PEASANT AND A MAD BEAR IN A TERRIBLE FI...

Vienna, Oct. 18.—The story of a ...rible fight between a peasant a... madbear comes from the little ...garian village of Sekorlievo. A ... zied bear entered the village s... growling horribly, and before it re... ed the open country many child... were terribly torn by the feroc... monster. On reaching the fields ... bear encountered a reaper. The ... struck the bear with his sickle, ... immediately the animal turned on ... assailant with extraordinaary fer... ity. The reaper, by a supreme effo... plunged his arm down the mad cre... ture's throat and tried to choke it. Just as the reaper wa being overcome ... a peasant luckily approaached with a ... gun aand shot the animal dead. The ... rescued man was carried to the hos... pital in a terrible condition, his fac... arm and chest being deeply furrowed by the animal's claws.

STANDARD OIL JURY HAS NOT REACHED VERDICT

Findlay, Ohio, Oct. 18.—The ... charged with declaring the Standard Oil company guilty or not guilty of conspiracy against trade entered upon its second night's vigil, with no indication of a verdict. Should the jury disagree, it is stated by the prosecution that either another trial of the same suit or proceedings against one of the alleged subsidiary companies will be begun without delay.

SUTTON WORLD'S CHAMPION.

New York, Oct. 18.—George Sutton of Chicago is now the acknowledged world's champion at 18.2 balk line billiards. In a match game for this title he defeated George Slosson of this city at Madison Square Garden Concert Hall tonight by a score of 500 to 375.

STREET CAR CRASHES INTO A PARADE

Marietta, Ohio, Oct. 18.—During the ceremonies in connection with the unveiling of a bronze tablet on the Marietta campus late today by Mrs. Alice Roosevelt Longworth, a street car of the Marietta and Parkersburg system crashed into a portion of the parade, seriously injuring nine persons. None were fatally hurt.

KAISER'S SONS LINGUISTS.

Budapest, Oct. 18.—The Pesti Napoli publishes an interesting story, which illustrates the importance Emperor William attaches to his sons becoming linguists. It states that a Hungarian general, who lately dined at the court in Berlin, was greatly astonished at being addressed by Prince Eitel Fritz in faultless Hungarian. The general expressed his surprise, upon which the kaiser remarked: "I attach great importance to my sons speaking the languages of all the civilized nations of Europe." The paper observes that the still slumbering project of placing Prince Fritz on the Hungarian throne in certain eventualities may also help to explain his intimate knowledge of the language.

PRESIDENT SENDS FLOWERS IN MEMORY OF LATE MRS. JEFFERSON DAVIS

New York, Oct. 18.—Simple and brief funeral services were held today for the late Mrs. Jefferson Davis at Hotel Majestic. Rev. N. A. Seagle of St. Stephen's Episcopal church officiated. The service was private, only the members of Mrs. Davis' family, representatives of the United Daughters of the Confederacy and a small number of intimate friends being present. Numerous wreaths covered the casket, one of which was sent by President and Mrs. Roosevelt.

Richmond, Va., Oct. 18.—The body of Mrs. Jefferson Davis will arrive here tomorrow morning. Interment will be in the famous Hollywood cemetery, the grave being next to that of President Davis.

Late in the evening the body was taken to the Pennsylvania ferry and started on the journey to Richmond.

LORD SCALLY DEAD.

Lincoln, Ill., Oct. 18.—William Scally, formerly Lord Scally of London, England, died in London yesterday afternoon. He was here until 1900, when he became a citizen of the United States and resided in Washington. His fortune is estimated at about 50 millions.

FUNERAL SERVICES FOR REV. SAM P. JONES

Cartersville, Ga., Oct. 18.—In the presence of a large congregation, impressive funeral services were held this afternoon over the remains of Rev. Sam P. Jones, the evangelist. The body will be taken to Atlanta tomorrow.

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NOTICE OF ADJUSTMENT DAY.

Estate of C. E. Cooper, deceased.

The undersigned, having been appointed administrator of the estate of C. E. Cooper, deceased, late of the County of San Juan, in the State of Colorado, deceased, hereby gives notice that he will appear before the County Court of said San Juan County, at the Court House in Silverton, in said County, on Monday, the 29th day of October, A. D. 1906, at the hour of 10 o'clock A. M. of said day, at which time all persons having claims against said estate are notified and requested to attend for the purpose of having the same adjusted. All persons indebted to said estate are requested to make immediate payment to the undersigned.

Dated at Silverton, Colorado, this 21st day of September A. D. 1906.

NEWTON ROE, Administrator of the estate of C. E. Cooper, deceased.

First 9-22-06. Last 10-13-06.

NOTICE OF DISSOLUTION.

Public notice is hereby given that the partnership heretofore existing between Norval H. Hand and George L. Stafford, under the firm name of "Hand & Stafford," at the village of Animas Forks in San Juan county, Colorado, has been dissolved by mutual consent and agreement of said former partners. And said Norval H. Hand will pay all outstanding accounts and indebtedness of said former firm, and all accounts and debts due and owing to said firm belong to and shall be paid to said Norval H. Hand.

Witness our signatures this 18th day of September 1906.

N. H. HAND, G. L. STAFFORD.

First 9-22-06. Last 10-13-06.

NEW ORLEANS QUAINT AND INTERESTING.

The Colorado & Southern's official special Knights of Pythias train leaves Denver at 8:30 a. m. Thursday, October 11th, for New Orleans. Tickets at one-cent-per-mile on sale the 11th, good for return November 10th ($27 from Denver). Make reservations for berths early.

T. E. FISHER, Gen. Pass. Agent, Denver, Colo

MINES AND MINING

Another strike of very rich bismuth silver ore was recently made in the Tom Moore mine, from which a test run yielded 570 ounces in silver. The strike is important in that it proves beyond a doubt the frequent occurrence of chimneys of rich ore throughout the great vein that traverses this valuable group of claims.

A large body of black copper ore has been opened up by the lessees on the Iron City mine at Red Mountain. The ore resembles very closely that which was recently encountered in the Gennessee--Vanderbilt. Regular shipments are now being made to the Ross smelter at this place. A carload received at the smelter last Saturday ran 32 per cent copper. From the large number of copper strikes made at Red Mountain during the past season it is evident that it is destined to shortly become the banner copper producing section of the state.

Everything is moving along smoothly at the properties of the Delayed Mining company in the Lime Creek district about twelve miles south of the city. The new plant of machinery is in place and will be in operation by the middle of the coming week. The boarding house and other buildings are all completed and occupied by the men. There is plenty of ore in sight for continuous shipments and from now on the mine will be a steady producer. A test shipment from one of the large ore bodies was made last week to the Ross smelter which gave returns of 43 ounces silver and 1¾ ounces gold. The ore is found in the contact and in large channels in the lime and closely resembles the carbonate and sulphide ores of the famous Leadville district.

Mines Securities Corporation.

The Mining Investor of Colorado Springs, comments as follows in reply to an inquiry concerning the Mines Securities Corporation of Ruby basin:

"In replying to our inquirer's specific question, we are glad to be able to say that we regard the Mines Securities Corporation as of high standing. It controls the Natalie-Occidental and Ruby Basin properties near Silverton, in the San Juan mining district, Colorado. The property controlled by the corporation is undoubtedly of value is in the hands of a competent and honest management and it seems almost a foregone conclusion that the stock should ultimately materially increase in value.

Rise in Zinc.

Quotations on zinc, it is said, are due to soar and to increase more rapidly, even, than have been the advances during the past few months. The reason for this is the plans just perfected by the American Smelting and Refining company to handle a greatly increased tonnage of zinc ores in Colorado and elsewhere.

Smelters in Colorado are to be equipped with magnetic separating plants, and the capacity of all zinc smelters is to be doubled. The improvements to be made in the smelters are in some instances of an unprecedented nature, being the accomplishment of plans which experts have been years in formulating and which in many cases are being given their first practical test. The cost of improvements, of course, will be enormous, but the company officers are at this time unable to give any exact estimates.

The plans of the company's experts are greatly to increase the production of zinc and to decrease as greatly the cost of production. If this is accomplished the benefit resulting to Colorado will be inestimable.

The company, which is now handling much Missouri and Colorado zinc ore which was formerly shipped to Germany for treatment has in contemplation a zinc smelting plant for Denver, and will immediately install the magnetic separators at Leadville and Durango and will enlarge the magnetic separating capacity at Pueblo.

Preventics, as the name implies, prevent all Colds and Grippe when "taken at the sneeze stage." Preventics are toothsome candy tablets. Preventics dissipate all colds quickly, and taken early, when you first feel that a cold is coming, they check and prevent them. Preventics are thoroughly safe for children, and as effectual for adults. Sold and recommended in 5 cent and 25 cent boxes by B. A. Taft.

Democracy and Plutocracy.

The Democratic party is not the enemy of property or of property rights; it is, on the contrary, the best defender of both, because it defends human rights, and human rights are the only foundation upon which property and property rights can rest securely. The Democratic party does not menace a single dollar legitimately accumulated; on the contrary, it insists upon the protection of rich and poor alike in the enjoyment of that which they have honestly earned. The Democratic party does not discourage thrift, but, on the contrary, stimulates each individual to the highest endeavor by assuring him that he will not be deprived of the fruits of his toil. If we can but repeal the laws which enable men to reap where they have not sown—laws which enable them to garner into their overflowing barns the harvest that belongs to others—no one will be able to accumulate enough to make his fortune dangerous to the country.

Plutocracy is abhorrent to a republic; it is more despotic than monarchy, more heartless than aristocracy, more selfish than bureaucracy. It preys upon the nation in time of peace and conspires against it in the hour of its calamity. Conscienceless, compassionless, and devoid of wisdom, it enervates its votaries while it impoverishes its victims. It is already sapping the strength of the nation, vulgarizing social life, and making a mockery of morals. The time is ripe for its overthrow. Let us attack it boldly, making our appeal to the awakened conscience of the nation in the name of the counting room which it has defiled, in the name of business honor which it has sullied, in the name of the people whom it has oppressed, in the name of the homes which it has despoiled, and in the name of religion upon which it has placed the stigma of hypocrisy.—William Jennings Bryan.

A Badly Burned Boy

or girl, man or woman, is quickly out of pain if Bucklen's Arnica Salve is applied promptly. G. J. Welch of Tekonsha, Mich, says: "I use it in my family for cuts, sores and all skin injuries, and find it perfect." Quickest pile cure known. Best healing salve made. 25c at S. D. Cunningham's drug store.

It is no task to work for the re-election of Senator Kennedy, as his record from start to finish is one of loyalty to the interests of the people. He is an honest, capable public servant and the people of the Eighteenth district appreciate his worth and will see that he again graces a seat in the upper house.—Lake City Phonograph.

If you like Coffee but dare not drink it, try Dr. Shoop's Health Coffee. It is true that real Coffee does disturb the Stomach, Heart and Kidneys. But Dr. Shoop's Health Coffee has not a grain of true coffee in it. Being made from parched grains, malt, etc., it forms a wholesome, food-like drink, yet having the true flavor of Old Java and Mocha Coffee. "Made in a minute." Call at our store for a free sample. Sold by F. O. Sherwood & Son.

If the Grand Old Party is standing pat on its record by nominating Gabbert, why in blazes didn't it also renominate Peabody?—Ouray Plaindealer.

Piles quickly and positively cured with Dr. Shoop's Magic Ointment. It's made for piles alone—and it does the work surely and with satisfaction. Itching, painful, protruding or blind piles disappear like magic by its use. Large Nickel Capped glass jars, 50 cents. Sold and recommended by B. A. Taft.

When it comes to first-class barbershops, it is an acknowledged fact that McElhaney Brothers have the most up to-date and best tonsorial establishment in Silverton Their equipment is of the very best, and only top-notch workmen are employed. No slip-shod work done in this shop. Our baths are the finest in the city. Don't forget the place, Benson block, Greene street, opposite Grand hotel.

Well informed parties at Aztec predict that Engineer J. W. Reagan will soon arrive in San Juan county and that his coming means actual construction south on the Arizona & Colorado railroad. The road is said to be completed in Old Mexico, or at least in such a shape as will allow the placing of a large construction force in both New Mexico and Arizona. This road means everything to the future of San Juan county.—Aztec Index.

When the tip of a dog's nose is cold and moist, that dog is not sick. A feverish dry nose means sickness with a dog. And so with the human lips. Dry, cracked and colorless lips means feverishness, and are as well ill appearing. To have beautiful, pink, velvet-like lips, apply at bedtime a coating of Dr. Shoop's Green Salve. It will soften and heal any skin ailment. Get a free trial box at our store, and be convinced. Large nickel capped glass jars, 25 cents. B. A. Taft.

KNIGHTS OF PYTHIAS OFFICIAL TRAIN TO NEW ORLEANS

Leaves Denver at 8:30 a. m. Thursday, October 11th, via Colorado & Southern railroad. Cent-per-mile rate in each direction. ($27 for round trip from Denver). Write for particulars and berth reservation.

T. E. FISHER, Gen. Pass. Agent, Denver, Colo.

Danger From the Plague.

There's grave danger from the plague of coughs and colds that are so prevalent unless you take Dr. King's New Discovery for consumption, coughs and colds. Mrs. Geo. Walls of Forest City, Maine, writes: "It's a Godsend to people living in climates where coughs and colds prevail, I find it quickly ends them. It prevents rheumatism, cures lagrippe, gives wonderful relief in asthma and hay fever, and makes weak lungs strong enough to ward off consumption, coughs and colds. 50c and $1. Guaranteed by S. D. Cunningham. Trial bottle free.

Republican papers claim that the Democratic platform contains no reference to an eight-hour law. This is a stock lie. The Democratic platform pledges its candidates to an eight-hour law with penalty attached for non-enforcement to take the place of the present Republican measure, drafted in the interest of the corporations, and worse than useless because its provisions cannot be enforced. The only way the workingman can secure an eight-hour law is to vote the Democratic ticket.

Notice.

All parties knowing themselves indebted to me will please settle their accounts with Mr. August Fast, who is authorized to receipt for same. C. L. PETHERBRIDGE. 46—3mo.

When you want a K. C. steak cooked over charcoal, remember he only charcoal broiler in town is at the Vienna.

Where to Eat.

The Vienna Cafe is the only strictly first-class restaurant in Silverton, where the menu is all that could be desired and the service is prompt and perfect.

A new broiling apparatus has just been installed, and from now on steaks, chops, etc, juicy and tender from right over the coals, will be served at all hours.

All kinds of game in season, served in epicurean style.

Our 50c Sunday bill is par excellent. It is duplicated nowhere in the city. Try it next Sunday.

New Harness Shop.

For new harness and repairing call on J. Hullt, 12th street, Silverton.

NOTICE OF FORFEITURE.

To Camillo Caravino, his heirs and assigns:

You are hereby notified that the undersigned has expended One Hundred Dollars in labor and improvements upon the Don Pedro lode mining claim, situated in Ice Lake Mining District, San Juan County, Colorado, for the years 1904, 1901 and 1905, the location certificate of said mining claim being of record in the office of the County Clerk and Recorder of San Juan County, in book 67, page 312, and in order to hold said claim under the provisions of section 2324 of the revised statutes of the United States and the amendment thereto approved January 22, 1880, concerning annual labor upon mining claims, being the amount required to hold said lode claim for the periods ending on the 31st day of December, A. D. 1903, 1904 and 1905.

And you are hereby notified that if within ninety days after the publication of this notice you fail or refuse to contribute your respective proportion of said expenditure as co-owner your interest in said claim will become the property of the undersigned, your co-owner, who has made the required expenditures by the terms of said section.

ANTONIO TAM.

First 9-8 06. Last 11-3-06.

NOTICE OF DISSOLUTION.

To whom it may concern:

Notice is hereby given that the partnership heretofore existing between Henry Schlueter and Fred Kunz, under the firm name of Schlueter & Kunz, proprietors of the Office saloon, has been dissolved, and that all debts due and payable to said firm must be paid to Henry Schlueter and that said Henry Schlueter will pay all debts of said firm.

Dated Sept. 19, 1906.

HENRY SCHLUETER, FRED KUNZ.

First 9-22-06. Last 10-13-06.

NOTICE OF DISSOLUTION.

To all whom it may concern:

Notice is hereby given that the partnership heretofore existing between C. A. Morris and W. T. Doss under the firm name of Morris & Co., has been dissolved and that all debts due to said firm must be paid to said C. A. Morris and that said C. A. Morris will pay all the debts of said firm.

C. A. MORRIS. W. T. DOSS.

The firm of Forsyth & Heath having succeeded to the business of Robin & Heath will collect all bills and assume any indebtedness incurred by the firm of Robin & Heath.

A. G. ROBIN, C. C. HEATH.

Representative wanted in every town of San Juan county to sell high grade beach lots and farming lands. New and unique proposition. Address with references, La Playa Beach Co. Inc., 345 Douglas Bldg., Los Angeles, Calif.

Cooper's Bargain Corner

Watch this every week. New opportunities will be appearing constantly.

WHAT I OFFER.

A nice, clean business for invoice price about $500. Good living rooms in connection. Just the place for small family.

Four room house, Greene street, two lots, snap at $1,200.

A 20-room hotel that is a moneymaker. Price $7,500, and you can make your own terms.

If you can pay $100 down and $20 per month I will sell you nice 3 room house, completely furnished.

Nice residence lots in almost any part of the town.

One pair good corner lots on Reese street for $150.

6-room furnished or unfurnished house on Snowden avenue; on sewer line; water and lights; two lots; $2,750 furnished, $2,500 unfurnished. This is worth investigating.

6-room furnished house on Snowden avenue; two east front corner lots. At a price that will surprise you.

4-room house on Mineral street; can be secured for $1,200; $500 cash and balance on easy terms.

8-room furnished or unfurnished house on Snowden avenue; on sewer; water and lights. Ask me the price.

Finest furnished 4-room house in town; sewer connections, porcelain bath and wash bowl, water and lights; $1,900; worth more.

I will offer others next week. Watch for them.

R. H. COOPER, Real Estate and Insurance.

PATRONIZE HOME INDUSTRY

What is the use of sending East for Goods when you can secure them for the same price at home.

All Jewelry made to order
Fine Diamond Setting and Mounting
Quartz Work a specialty
We have every facility for good work

HENRY DIETRICH, The Leading Manufact'g Jeweler

Don't Run Short of Coal

And then blame the dealer. We have an immense quantity at our yards, but the prudent man provides for contingencies. WE HAVE THE BEST COAL IN THE MARKET, and guarantee every load. Try a ton of Perin's Peak coal.

Lumber is Our Specialty.
All Kinds of Building Material

The most complete stock of PAINTS and OILS in the city. We handle only sterling material at the lowest prices.

FRED GOBLE OFFICE NEAR DEPOT. PHONE SILVER 91.

The Bert Brown Market

AND LIVE STOCK COMPANY.

Wholesale and Retail Dealers in

MEATS AND PRODUCE

Beef, Pork, Mutton, Veal, Dry and Green Vegetables, Butter, Eggs, Cheese, Oysters, Salt and Fresh Fish. Game, Poultry, Pickles, Kraut, Sugar-Cured Hams and Bacon.

TRY OUR Breakfast Bacon, Kettle-Rendered Lard, Corned Beef, Pickled OWN MAKE Pork, Dry Salt, Sausages of all kinds.

We Guarantee Satisfaction

Supplying Mines a Specialty. Corner Green and 11th Stree

GROCERIES

A complete line of Fresh Fruits and Vegetables to select from. : : : : :

O. L. LESLIE,

1051 Greene St. Phone 52.

PETE ORELLA

SOLE AGENT FOR

ANHEUSER-BUSCH, LEMP'S and ZANG'S BOTTLED and KEG BEERS

Also Agent for the Original Manitou Ginger Ale and Mineral Waters.

PHONE 7-0. P. O. BOX 217. SILVERTON, COLO.

GOOD THINGS TO EAT

GROCERIES, BAKERY, CONFECTIONERY

You cannot have good food without good material. Our Groceries satisfies and will insure the excellence of your meals. We carry staple and fancy groceries, the best bread, cakes and pies in the city.

J. M. CLIFFORD, GREENE ST., Silverton, Colo.

Independent Meat Market

O. H. H. KRAMER

Wholesale and Retail Butcher

FRESH MEAT
FRESH FISH

Vegetables, Cured Meats and Poultry

ROHRIG & KRAMER'S OLD STAND

Furniture and Undertaking

L. G. PROSSER

Everything in House and Office Furnishings.

Our line of Springs, Mattresses, Comforts and Blankets will convince you that this is the place to buy your bedding. Installment if you wish.

MINERS' UNION BUILDING Cor. Reese and Eleventh Sts.

PATTERSON BROTHERS LIVERY

Successors to Silverton Transfer Co.

Baggage To and From All Trains. Goods Delivered

The Big Brick Barn is now better equipped than ever for horses and vehicles of every description.

Experienced and careful drivers. Special attention given to driving and riding parties. : : : :

Also Dealers in

COAL, HAY AND GRAIN

TRY A POUND BOX

of Hennings' Chocolates and Bon Bons. If you don't find them the very finest and most delicious candy you ever tasted we are very false prophets. There is no guess work in the making of our confectionery, and the quality is always uniform It is because we understand the art of candy making, and what ingredients to use, that our products are pure, wholesome and a delight to eat.

G. HENNINGS

Successor to M. L. Schutt.

Books, Stationery and Cigars.

Some WOMEN'S Faces Are Full of WRINKLES

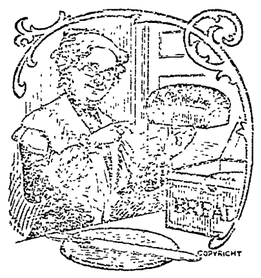
MASSEROLE is a skin food; it builds up the flesh, gives a velvety softness; it fills up the wrinkles.

CUNNINGHAM

GUARANTEES MASSEROLE. Trial Size 25c.

CUNNINGHAM'S The right Store for the right Drugs.

SILVERTON SUPPLY CO.



FOR GOOD HEALTH

The voice of experience tells you that good food is required both for your brain and stomach's sake. Bread being the most consumed of all foods, care should be exercised to provide only the best that is made right in kneading and baking and of proper flour. Silverton Supply Co.'s bread is acknowledged by all to be of the first and highest attainable quality.

Groceries Wholesale or Retail

TELEPHONES—Store, Silver 100. Warehouse, Black 1043.

...SHELF AND HEAVY...

HARDWARE

Stoves, Tinware, Crockery, Miners' Supplies, Belting, Packing, Steam and Garden Hose, Pipe and Steam Fittings, Powder, Caps, Fuse. Agent for Hercules and Giant Powder. : :

JOSEPH BORDELEAU

WHOLESALE AND RETAIL DEALER.

TOWN TOPICS

Miss Bessie Normoyle is clerking at the Henning establishment.

The Ladies' Union will meet next Wednesday afternoon at 2:30 with Mrs. A. A. Lamont.

St. John's Guild will meet Wednesday afternoon, October 24, with Mrs. W. W. Grimes. All members are urged to be present.

The Durango Democrat reports that Cummings & Hawkins, said to be from this place, have bought the Horseshoe bar there.

The Catholic fair will be held November 3, 5 and 6 and the ladies are working hard to make it the great event of the season.

The cake sale given at the home of Mrs. W. H. Crooke, Tuesday for the benefit of St. John's Guild realized over $60 for the church.

The Eagles will give a smoker November 16 and among other divertisment will have several bouts by well known pugilists, local and imported.

Charles Scheer completed the 1,200 feet of sewer extension during the week and has 800 feet of the water pipe line extension about completed.

The Ladies' Whist club spent a very pleasant afternoon last Monday with Mrs. W. D. Watson. The guests departed highly pleased with the delightful manner in which they were entertained by one of Silverton's favorite hostesses.

Chas. Wallace is down from the Animas Power Co.'s plant and will return this evening. He states that the laying of pipe was begun Saturday and is progressing well, so that it will be but a short time until the plant is again running.—Durango Herald.

Charles H. Barnes, conductor on the Gladstone road, is taking a layoff because of two smashed fingers. The accident happened Monday at the Gladstone depot and was caused by a heavy piece of iron catching the members, inflicting painful but not dangerous injuries.

In writing from Silverton, a friend of The Enterprise says Q. O. Castner and S. N. Hitchcock are working at the Silver Lake mill there. L. A. Carmichael is at the Silver Lake mine and Al. Richards is assaying for the Ross Mining company.—Montrose Enterprise.

The remains of P. Walenberg, who died at the Ochsner hospital last Saturday, were buried in Greenmount cemetery this afternoon, the funeral being held from the Hood undertaking rooms at 2 o'clock. Mrs. Walenberg arrived from Silverton Saturday evening and took charge of the funeral arrangements.—Durango Herald.

The San Juan Woman's club meets this afternoon at 2:30 with Mrs. Howard T. Lee, corner of Reese and Tenth streets. Mrs Pyke was to have entertained the club, but changed dates with Mrs. Lee, as she contemplates leaving for the winter shortly. The programme will treat of American poets, and Mrs E. M. St. Claire will read a biographical paper on "John Greenleaf Whittier."

While duck shooting at the reservoir of the Animas Power company near Rockwood last Sunday, Ray Cooper brought down with his trusty shot gun a beautiful Japanese curlew. It is one of the very few birds of its kind ever seen in this section and is highly prized by the fortunate huntsman as a rare specimen, who will have it mounted by an experienced taxidermist to ornament his home.

Fred Barry, an old-time prospector and trapper in the San Juan district, caught two large golden eagles in a trap over on Bear creek last Sunday They measured six feet and six inches from tip to tip. Fred experienced considerable difficulty in dispatching the fierce birds after they had been trapped, as they put up a magnificent battle for their lives. He is quite proud of his trophies and has sent them to a Denver taxidermist for mounting.

While on their way to attend a Socialist meeting at Gladstone last Monday night, the rig occupied by the principal speakers, Guy Miller, Casper Malchus, Miss Anna Castonguay, Phil. Schuppan and wife, tipped over at a narrow place in the road this side of the Henrietta terminal and dumped them into Cement creek. Aside from a drenching none of the occupants were seriously injured, although Mr. Malchus, who was driving, was considerably bruised. Mr. Miller continued to Gladstone and addressed the meeting as arranged, the remainder returning to the city.

D. F. Fitzgerald, the original hot tamale man of the Rocky Mountain region, has opened up an elegant suite of chili parlors near the corner of Thirteenth and Reese streets, formerly occupied by the J. L. Nickel coffee and tea store Mr. Fitzgerald and his wife recently arrived from Goldfield to establish a branch of their business in Silverton They conduct chili parlors in most of the large cities and mining camps of the Rockies, including Denver, Rawlins, Wyo; Goldfield, Nev., and Salt Lake City. He is an expert in his line and the lovers of chili and hot tamales may indulge to their heart's content in their favorite dish by calling at Fitzgerald's parlors.

PERSONAL

Thomas H. Kane returned from Denver Saturday.

Wallie Haas got back from a jaunt to Denver Saturday.

Henry Miller, the Eureka pioneer, was in town last Monday.

Mr. and Mrs. Robert W. Davis arrived from Denver Thursday.

Mrs. T. J. McKelvy was a visitor from Animas Forks last Monday.

Mrs. A. H. Mundee is expected home from Denver in a few days.

Mr. and Mrs. J. B. Evans will shortly move into the Aveline residence.

W. L. Truitt, of Gladstone, was in town during the early part of the week.

Mr. and Mrs. Otto Mears returned Saturday from a short visit to Denver.

Mrs. D. Preston Bell has been ill the past week with a light attack of pneumonia.

Mrs. A. K. Ferguson, of Durango, was a visitor in this city during the week.

W. E. Riddle, the clothing man, was among the visitors to this place during the week.

Claude H. Ford, of Gladstone, spent Sunday in the city. He was quartered at the Grand.

Mrs. Ellery W. Hunt has been confined to her home for the past fortnight with a severe attack of inflammatory rheumatism.

S. Caminsky is enjoying a visit from his family, which arrived from Durango Friday and is stopping with Mrs. D. P. Bell.

John Matties, who has been employed on the Sunnyside mine at Eureka, left Friday for Durango, where he will engage in the saloon business.

J. O. Campbell, of Durango, one of the lessees of the Shenandoah mine, came in on Sunday evening's train for the purpose of inspecting the workings at the mine.

Mr. and Mrs. R. W. Hollis left last Friday for a months sojourn in Boston, where they will visit the parents of Mrs. Hollis and enjoy the sights of the Hub.

Mr. and Mrs. A. R. Springer, of Durango are visiting their daughter Mrs. Bert Brown of this city. They will remain until the early part of next month.

W. N. McTaggart, engineer on the Gladstone railroad, resigned this week and has gone to Greenleaf, Kas., where he will take a position as fireman on the Missouri Pacific.

Mrs. R. R. Collins, wife of the manager of the telephone office, arrived from Denver Monday, being met at Durango by Mr. Collins. The family will occupy the Higgins home, at Ninth and Greene streets, during the absence of Mrs. Higgins and son Tommy in New York during the winter.

Miss. Honora B. Maloney, candidate for state superintendent of public instruction, was the guest of Mrs. Howard T. Lee during her stay here. Miss Maloney is a charming young woman and a teacher by profession. She met many of the ladies and left a pleasant memory in the minds of all.

Frank I. Fenn, one of the national officers of the trainmen organizations and formerly a state game warden, was traveling with the Adams party, doing excellent work with the labor organizations. Mr. Fenn says organized labor, particularly railroad organizations, will go down the line for the Democratic ticket.

Charles H. Carson, of Glen Falls, N. Y., who has spent the past week with Judge and Mrs. R J. McNutt, left Monday morning for his home. Mr. Carson is a brother of Mrs. McNutt and left highly pleased with Silverton, her people, scenery and prospects. He says the judge gave him a few good lessons in mountain climbing but the tenderness of his feet made him decline to scale the dizzy heights around Mineral Point.

Hon. Cyrus W. Davis, of Waterville, Me, president of the Gold Prince and Gold King Mining companies, arrived Sunday night and left for Denver Wednesday morning, accompanied by Manager Willis Z. Kinney. Mr. Davis has just passed through a strenuous campaign as Democratic candidate for governor of Maine, and succeeded in reducing the plurality nearly 20,000 from two years ago. The Democrats of that state expect to chip off the 8,000 plurality left and elect their favorite son, Cyrus W. Davis, along with W. J. Bryan, two years hence.

Frank B. Brown has returned from Denver.

William Sullivan returned to Denver Sunday.

Mrs. C. A. Mohr is visiting here from Hermosa.

John W. Wingate was in town from Durango this week.

H. A. Lamb, of Eureka, registered at the Grand Monday.

G. W. Alexander visited in Durango several days this week.

John W. Kearns, of Animas Forks, was in the city Sunday.

Mrs. T. Jay Hurley will leave next Monday for an eastern visit.

George C. Logan was up from Durango the early part of the week.

Hank Sherman returned Tuesday from Denver after an absence of several weeks.

W. T. Allen, of Aztec, N. M., arrived in the city Monday and is quartered at the Grand.

Mrs. Simon Caminsky and children arrived in town today for a few days visit with her husbands.

George H. Stough, of Denver, representing the Travelers' Insurance company, arrived in the city Monday evening. He is stopping at the Grand.

Mr. and Mrs. N. A. Ballou celebrated their sixth wedding anniversary Thursday night and entertained a few friends on the occasion.

William Rader, Jr., returned from Denver Monday and reports that his father, Dr. Rader. is recovering from the operation for appendicitis performed last week.

C. J. Garvin, the new manager of the Green Mountain mine, paid the Standard office a pleasant visit last Tuesday forenoon. Mr. Garvin is an old Leadvillian, a thorough and competent mining man and well-fitted by experience and training for the important position he occupies.

Mrs. A. E. Brendler, who was called to Kansas City seven weeks ago by the serious illness of her mother, returned last Friday evening Her mother has fully recovered and the past three weeks were spent by Mrs. Brendler visiting friends and relatives in St. Joe and the other larger cities of the intermediate states.

F. M. Tucker, formerly connected with the Famous store at Durango, has accepted the position of manager of the Silverton branch of the American Carpet company, and is now in full charge of the company's store on Thirteenth street between Greene and Reese. He will be joined by Mrs. Tucker November 1.

E. W. Walter, manager of the Green Mountain properties until early this year but since then engaged in smelting at Waldo, Ore., returned Monday evening to accept the position of manager of the Ross smelter. Mr. Walter is one of the best mine and mill men in the state and it is an addition to the district to have him re-connect himself with San Juan's industries.

Entertain at Gladstone.

Mrs. Fred Grebles and Mrs. E. L. Stewart entertained a large number of their Silverton friends at their Gladstone home Friday night, October 12, W. Z. Kinney donating a train for the occasion.

It was a jolly party of young people that left the Gladstone depot promptly at 8 o'clock. They were met in Gladstone by a host of young friends, who escorted them to the spacious dining room of the Gold King hotel. The dining room was tastefully decorated, the color scheme being red and white.

Dancing was indulged in until midnight, when a delicious lunch was served by the hostesses and the young people returned home, voting the party a perfect success, and Gladstone the most hospitable little camp in the west.

ROCHESTER HOTEL

DURANGO, COLORADO

Mrs. Thomas Finn, Prop.

Favorite Family Hotel. Newly refitted. Charges moderate for transient or regular trade. : : : :

GIVE ME A TRIAL

PATRONIZE HOME INDUSTRY

I handle strictly new goods—no second hand goods handled. Don't be deceived by buying a second watch dressed up as new. What is gained by buying second hand goods when new can be obtained as cheaply.

All Jewelry made to order. Fine Diamond Setting and Mounting Quartz Work a specialty. We have every facility for good work.

HENRY DIETRICH, The Leading Manufacturing Jeweler. : : :

The CROOKE-FULLER HARDWARE CO.

Figure With Us

We can supply your wants in

BUILDERS' TOOLS AND HARDWARE

at Prices that are Fair.

Our New Spring Stock of House Paints and Varnishes Is now in. See our COLOR CARDS.

We Carry EVERYTHING in MINE and MILL SUPPLIES

Electrical Goods and House Wiring.

THE ODOR OF GOOD ROAST BEEF,

however appetizing, can be only a suggestion of the delicious taste and flavor that goes with every piece we furnish. Prime is the one word that aptly describes all our meats and poultry. The best procurable, that the best of good judgment can select. Give us a trial order and know what good meat really is.

Consolidated Silverton Meat and Produce Company

TIME

TIME

YOU CAN BET

The man with the right time had his watch put in order by our expert workman. When a job is turned out of this place you can bank on it. We pay for the best and give you the best.

CUNNINGHAM & CROCKER

THE WATCH DEALERS OF THE SAN JUAN.

ALWAYS YOUR MONEY'S WORTH

ARE YOU AWARE

In the course of one year the balance of your watch makes 157,680,000 revolutions. THINK OF IT. : : :

In time the oil gums, produces friction and wears the delicate bearings, destroying their high finish and perfect fit, thus ruining an accurate time piece. An ordinary machine is oiled daily. Your watch should be cleaned and oiled once a year. Let us examine it; an honest opinion from us will cost you nothing.

John B. Evans

THE ONLY WATCHMAKER IN SAN JUAN COUNTY.

D. Sheahan's Dry Goods Store. Greene Street

COLONIST RATES

—TO—

California and the Northwest

Very low rates will be in effect to all Pacific Coast points from Denver, Colorado Springs, Pueblo and all main line points August 27 to October 31.

To San Francisco	$35 00
To Los Angeles	25 00
To Portland	25.00
To Spokane	22.50
To Butte	20.00

A daily line of Pullman Tourist Cars is operated between Denver and San Francisco, Denver and Los Angeles, Denver and Portland. Liberal stopovers on Colonist Tickets will be granted. For full information regarding train service, Pullman reservations, etc. call on The Rio Grande Agent.

Fall Cloaks

Fall Waists

FALL DRESS GOODS

Our line is now complete. Elegant Waists from **$1.00** up. Big line of Cloaks for Women, Misses and Children. Fall Dress Goods—all the late weaves—in an immense variety. Remember we are agents for Munsing Underwear.

The McCrimmon Merc. Co.

WYMAN BLOCK.

W C Ferrill curator
Nat. history society

Silverton Standard

VOLUME XII — SILVERTON, COLORADO, OCTOBER 19, 1901. — NUMBER 49

MINES OF CEMENT CREEK.

Wonderful Progress made during the past Seven Years and a Great future Planned by People of Enterprise.

WHEN THE mining history of San Juan county shall have been written, among its most interesting pages will be those devoted to the Cement creek section. It is ordinarily a far cry from a rugged gulch deep in the mountains, where a few hardy men toil in its recesses and on its hillsides for the treasures locked in the granite vaults, to a thriving highway lined on either side by exposed riches, splendid plants of machinery for the reduction of ores and gigantic mining enterprises and equipped with transportation facilities that only good wagon roads, railroads and the tram can furnish. Yet the first condition was that of Cement creek only a dozen years ago and the second that of the same section as it is to-day.

This wonderful change, made as one decade of years was slipping into another, has taken place so quietly that few who have witnessed it can realize what an important part the Cement creek section is playing in the ceaseless drama that adds to the wealth of the world and to the industrial greatness of the thriving west. Nor is the change due to the efforts of any one man, for many have contributed in various ways to the upbuilding of a locality favored to all who care to woo fortune's smiles in good faith and with honest zeal. Yet to Willis Z. Kinney must be granted, because it is just, the honor of having accomplished those things that have made Cement creek the wonder of all who interest themselves in mining in Colorado. Through his efforts the great Gold King has become one of the famous producers on the San Juan. Coming to this locality in 1883 with a knowledge of minerals and formations gained by patient prospecting in other fields, Mr. Kinney early saw the advantages of the then great silver camp with its numerous large veins of low grade gold ores. In time he secured a lease and bond on the Gold King, then an unknown prospect, and since that time the histories of the man and mine have been woven together in an unbroken chain of successes.

THE GOLD KING MINE

Was located in 1887 as a single claim, being situated above timberline on the eastern slope of Bonita mountain, about ten miles from Silverton. It was then recognized as a valuable piece of property in view of its proximity to the Sampson, at that time the only considerable free gold producer in this section of the San Juan. About 1890 Mr. Kinney secured a bond and lease on the King and in 1896 he succeeded in organizing the Gold King Mining and Milling company, composed of New England and New Brunswick people. In the summer of 1890 the Sampson mine was added to the company's possessions and the same year the Silverton, Gladstone and Northerly, a railroad built by practically the same company, was completed from Silverton to Gladstone, a distance of nine miles. In 1892 a ten-stamp mill was built at the foot of the mountain on Cement creek for the purpose of handling the ores of the mine—a gold-galena proposition with an iron base, the greater amount being worth on an average about $15 per ton, but often vastly increased in value by pockets of exceptionally rich free gold ore. The capacity of this mill has been increased from time to time until now 80 stamps are kept steadily pounding on a 200-tonnage every 24 hours. It was early realized that the packing of ores was an expensive part of the work and in 1898 a Bleichert tram 5,500 feet in length, running from mine to mill, was erected and put in operation. Another line runs from the American tunnel to the mill. The great property now comprises a group of 36 full claims and gives employment to 160 men. In addition to the work being done on the Gold King proper, a cross-cut to be 6,000 feet in length, now in 1,300 feet, and known as the American tunnel, is being run to cut the Gold King vein at a depth of 1,500 feet. This tunnel has its entrance about half-way between the mine and mill. The Gold King tunnel, with its entrance just above the mill, is in nearly 2,000 feet. Still another tunnel, the Anglo-Saxon, also in 1,300 feet, is being run to cut the Monarch vein. Some ore is being shipped from this tunnel. With mine and mill lighted by electricity, all mining wherever available done by the use of power drills and all departments equipped with the latest and best machinery, the Gold King is indeed one of the great properties of the San Juan.

Last year the old company was re-organized under the name of the Gold King Consolidated Mines company, absorbing the American Mining & Tunnel company, the Gold King Mining & Milling company, the Anglo-Saxon Mining & Milling company and the Rocky Mountain Coal company, with the City and Champion coal mines at Durango. The officers of the company as now constituted are: Mark Gallert, president; Cyrus W. Davis, treasurer; Davis & Soule, general managers and Willis Z. Kinney, general superintendent. The main office of the company is in this city.

From three to seven carloads of concentrates are shipped daily from the Gold King, whose future production, on account of the immense ore reserves already opened up and known to exist, is beyond calculation.

NATALIE M. AND M. CO.

One of the Largest Enterprises in the County.

The illustration of the camp of this company, on south fork Cement creek, just 5,000 feet from Gladstone, appears on another page.

This corporation is developing one of the great mining enterprises of the state and in point of ownership of claims ranks third in the county, the Silver Lake company being first and Minnie Gulch company's holdings second. Starting a few years ago with six claims on Lost mountain, known as The Natalie, Dorothy, Summer, Newton, Stella and Carmella, they have acquired by purchase and location the Silver Ledge, Silver Extension and the Klondyke claims, Camp Bird, Blue Bird, Magnolia, Louise, Silver Ledge mill site, Mountain Boy, Gold Bar No. 1, No. 2 and No. 3, Gold Nugget No. 2, Klondyke No. 2 and 3, Orleans mill site, Lake Natalie placer, Lake Natalie mill site, Lake Natalie ditch and water right, The Claire March, Mountain Boy Extension, Julieth mill site and the big Hurley tunnel, which is intended by a 4,000-foot bore to develop the entire property.

In order to better facilitate the development of so large an enterprise the company has just installed a 16-drill Reidler compressor with a battery of three 100-horse power boilers, powerful engine and a complete electrical plant. In addition they have built a 5,500-foot wagon road, 10 feet wide in the clear and on only a 6 per cent. grade. What will prevent them later to lay rail to connect with the railway at Gladstone? Instead of a plank water flume they have laid a four-inch steel pipe 3,000 feet to their penstock, which takes the flow of Lake Natalie. This supply of water being 258 feet higher than the camp, gives them sufficient pressure to run a water-wheel if they so desire, as the pipe line permits a flow of 1175 gallons per minute, and this from a never-failing water supply. They have also erected a large shop, tunnel house and dining room at the portal of the Hurley tunnel; an up-to-date boarding house to accomodate 40 men, complete in all details with reference to storage, sewerage ventilation, etc.; a fine assay building, barns and usual buildings required in such a camp. These past improvements alone costing upwards of $50,000. About 450 feet of work has been done on the upper group of claims; about 400 feet on the Gold Bar group, and the Hurley tunnel, which is at present being driven by hand, pending the starting of the compressor, is in nearly 1,000 feet. This tunnel is one of the largest in the county, being 7½ feet in width on the bottom; 6½ on the top and a height of 8½ feet—when timbered these dimensions are reduced all around by about one foot. The Hurley tunnel encountered at 450 feet a vein carrying mineral of a width of 6 feet; at 650 feet the second vein was encountered, showing a width of about 7 feet and at 800 feet they encountered the third and best vein on which they have now commenced to drift. The most important strike yet made by the Natalie, however, is a vein about 5 feet in width, good milling ore, carrying values of about $12 average, which has run from their neighbor, the Occidental ground,

—Continued on Page 11.—

DID YOU HEAR ABOUT?

Jas. Kendal and Ira Torrey were down from Deer Park this week and report that region as still active and likely to be so during the winter.

Billy Cole will give a free dance to all on Friday evening, October 24, in his new building. Go and have a good time and give the new house a good warming.

Grill and Co. report that their orders for lumber are so large that at times it is difficult to get up supplies of certain dimensions from the saw mills fast enough for patrons.

Another change in train time, fifteen minutes later than the present usual time. bringing passengers and mail into Silverton at 7:45 p. m. The new schedule will take effect soon we understand.

There has been a pressing demand for good carpenters in this county this fall. Instances has been known where mine owners had to wait over a week before being able to secure services of good mechanics.

T. Jay Hurley of the Natalie Mining company, has been at the Camp Bird Extensian mines during the week investigating that very promising mining area of which his father is largely interested in.

A dance will be given by Silverton Circle No. 183, Women of Woodcraft, and you are cordially invited to attend the social and dance. Thursday evening, Oct. 24, at the Miners' Union hall at 8 o'clock, p. m.

Registration convened on Tuesday of this week and the Board of Registration in the different precincts were busy. Everybody ought to see that they and their friends and acquaintances are registered on the last day.

The Pringle's show at the opera house played Thursday and Friday night to a crowded house, which they justly merited. To-night's show will be their last for a while in Silverton. The Pringles are always welcomed visitors in the San Juan.

Just to think that Silvertad had the great honor to be awarded the best prize for turnips at the Durango fair, We are greatly enthused over the matter and Silvertonians now feel that they did have some right, title and interest in and to the fair.

The Fraternal Order of Eagles was organized in this city last Sunday with a membership of fifty. The following officers were elected: Harold Whitelaw, worthy president; W. C. Black, worthy vice-president; Geo. Smith, worthy past president; A. K. Anderson, secretary; Ludwig Vota, treasurer; Dr. H. E. Colby, chaplain and physician; W. H. Bridgford, worthy conductor; J. T. Griswold and Louis Johnson, I. G. and O. G.; J. A. Ducet, organist. The lodge is a benovelent organization and starts off in a healthy condition.

Owing to a severe attack of rheumatism. B. Barnes, dentist, will depart for a lower altitude at an early date, probably San Diego, Calif. Mr. Barnes has transfered his business to Dr. J. S. Bailey this week, who will conduct the dental parlors on Reese street hereafter.

The very newest telephone agent at Silverton is a Mr. W. G. Douval, who succeeded Mr. Kincaid last week. Mr. Kincaid acceps a like position at La Junta. Mr. Duval is assisted by L. B. West, also from Denver, and we understand that the increased business has made it impossible for one to manage as in the past.

Of all the much needed enterprises that go to help the growth of the mining industry in San Juan county, none is now more needed than a cyaniding plant. Not only all the ores that slime their values in concentration, and certain tellurium ores, there is also portions of dumps and mill tailings where immense values could be redeemed.

One of the largest real estate sales made of late was the one of August Fast, conveying the two stores of E. L. Roberts, opposite the Silverton Meat and Produce Co. to C. C. Koenneker for a consideration of $5.800. The same agent also disposed of the property of O. P. Marfield, near the Gold King depot, to Henry Van Broken for $575.

If you want to know whether the mines of San Juan county are busy or not, just watch the pack trains moving early and late. Mine owners say they are obliged to intercede for the services of a pack train ten days ahead of time. Several pack trains from outside have come in this fall and still they are crowded with work.

Dr. Edmund Ludlow of North West University, Chicago, has associated himself with Dr. H. E. Colby of this place. The doctor having served two years since '95 in St. Luke's Hospital, Denver, and a term of four years as surgeon in The Indianapolis Central hospital, comes recommended to our people with a most complete knowledge of his profession.

DIED.—Harold, infant son of Mr. and Mrs. F. W. Koehler, aged two years and sixteen days, at 6 o'clock, Monday morning the 14th inst. Funeral was held from the family residence on Tuesday. The little one died of scarlet fever making it impossible for Mr. and Mrs. Koehler's many friends to attend, but many were the mementoes in flower wreaths, crosses and other designs, sent in from Durango and this place to bedeck the casket of the little one. Mrs. Henry Sherman attended the little boy during his entire illness. and her assistance to the bereaved parents was an act worthy of the highest praise.

W. C. Fisher returned from a trip to Rifle. Garfield county, Colo., where he went as general manager to arrange the preliminaries of the construction of the tunnel, flume and ditch line of the Rifle Irrigation company. The tunnel will be about 2,500 feet long and will run

We have a line of Ladies' and Childrens' Coats we are selling at

25 per cent. off

Also a Lot of Children' Underwear in Odds at A BARGAIN

13th ST.

T. SHEAHAN'S

New Location. NEW STOCK.

DO YOU NEED?

Paint for your House
Ash Cans for your Alley.
Brick or Lumber.
Harness for your Horse
Dishes for your Wife.
A Range for your kitchen.
In short, if you need anything from a tack to a steam engine, we are the people to see.

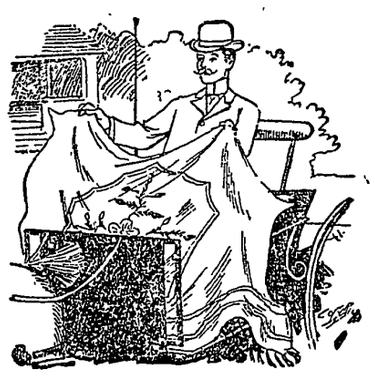
We have them in abundance at low prices.

ALSO

We are equipped with for plumbing and tin work in all their branches.

MINING MEN should get our prices on Powder, Fuse and Caps, Iron and Steel, Ore Cars, Machinery, T-Rail, Pipe and Fittings. We can make bottom brices on these goods.

STUBBS & JAKWAY,



ELEGANT RIGS

are not livery methods, but we believe our outfits are better than those sent out from many stables. Clean wagons, stylish harness, and good looking, well fed horses are our rule.

If you wish prompt, courteous attentention. and at moderate expense, come here.

SILVERTON TRANSFER CO.

Dealers in

UTE COAL

C. A. BOWMAN.

under Nigger Head hill, tapping the Grand river a short distance below Rifle town. The length of irrigation ditch line will be 24 miles with eight foot bottom, carrying 70 cubit feet of water per minute. Forty-eight thousand acres of patented land is owned by the company of which Frank W. Popples is the leading spirit. Between 60 and 70 men will be employed. Mr. Fisher has taken over Gus Heise, as foreman of the flume. Steve Carpenter as line man and U. S. Black as foreman of the scraper teams. Six other skilled workmen will also be taken from Silverton as soon as the work is under good headway. We congratulate Mr. Fisher on the position of responsibility he has succeeded to and we well know that his experience gained in Silverton and other camps well qualifies him for the task.

Last Tuesday night the friends of Mrs. Chesebro were treated to a novel but weird reception. A spook party was given at the Grand Hotel, where fifty guests assembled "dressed in their spookiest." The parlors, decorated in black, Jack O'lanterns, black cats, etc., were well filled with guests. Shadow pictures, ghost stories and witch scenes were indulged in throughout the evening. At a late hour the guests were served with a delicious luncheon on the ghost order, and as the hour of midnight drew near the spooks wended their way homeward, voting the party a success throughout.

PURELY PERSONAL.

—Ole Hanson and R. W. Hollis departed for Summitville Tuesday morning where they will remain about ten days for the purpose of surveying the underground workings of the Aztec.

—Charles M. Graff of Denver, was in our city last week and Sunday evening organizing a lodge of Fraternal Order of Eagles. About forty-nine of the boys were put through the ordeal and now have wings. The order is beneficiary and those joining will never regret so doing.

—W. Z. Kinney departed for Pogosa Springs Monday where he will join his wife who with their little girl are sojourning the e

—George W. Oliver, who has lately become interested in the Kendrick Promotion Company's interest in the San Juan, returned to his home Cohoes, N. Y., Sunday, after having thoroughly investigated our many mining resources. Mr. Oliver and brother are interested largely in the cotton seed oil industry of the United States.

—Lyman I. Henry and Henry and Ernest Bacon of Ouray were in Silverton, Monday and Tuesday.

—E. H. DeVore of Colorado Springs was in our city for a few days this week. Mining business pure and simple.

—Through continued ill health, acquired from accidental poisoning during an operation, Dr. Winters has been forced to leave Silverton for a time. He will probably spend his time at St. Kitts, a fashionable health resort in the West Indies. He wishes to thank patients for their courtesy during his late illness and trusts he may be able to resume active practice shortly.

—W. A. Fruehauff returned from a two weeks visit in Denver Sunday last.

—Joe Bayley and Cooper Anderson of Telluride can't resist further investigation of San Juan county mines. 'Tis further rumored that Bayley's mission this week is the probable project of transmitting electrice power over from Ames, San Miguel county.

—A. R Springer departed for his home near Aztec Monday morning after a short visit in Silverton.

—G. U. Ingersoll once a resident of San Juan county but now of Yuma, Ariz., was recently a visitor in Denver, and informed our informant, Moses Livermen, of this bit of news: "that he was reaping quite bountifully from mining in Arizona."

—"Uncle Charlie" Hilliker who was post-master at Durango during President Cleveland's first term, has been in Silverton during the week pleasantly renewing old acquaintances. He was a former resident of this town and county and is one of the time honored pioneers of this region. He has mining interests here also.

—J. G. Tipton of Trinidad, has been in our town several days this week. He is one of the principal sheep and wool buyers whose scope of operations extends over Colorado, eastern Utah and northern New Mexico.

—Charles C. Crawford of Chromo, Colorado, was in the city Wednesday. Crawford holds the position of district deputy head consul of the Modern Woodmen of America for the Sixth district of Colorado, and his visit here was strictly on business connected with that order here.

—C. E. McConnel of Durango, who is engaged in mining, banking, ranching, live stock and general promotion business, arrived from Durango Monday evening in company with U. R. Bagley. Tuesday these gentlemen in company with others, visited the Cement creek region looking at some mining property. They afterwards, in company with Ed. M. Brown, visited Animas Forks and Mineral Point regions. That superabundant nerve force of McConnel's will push a big mining deal to completion and he well knows that San Juan county now affords the best attractions to effect that end in Colorado.

—The friends of Miss Anna Bradford will be pleased to know that she occupies the position of superintendent of the Sanatarium at Santa Barbara, California.

—Ed. Girard, who owns mining property on Bear Creek in this county, arrived Tuesday from Ouray where he and others have been developing some very promising mining property in Yankee Boy basin near Ouray. He is justly proud not only of the good ore he has struck, but because he is on the same vein as the now famous Governor mine. He is showing both his own ore and the Governor and you cannot tell it apart. Mr. Girard and Frank Gillespie of Durango, his partner in this and other mining enterprises in this county, are soon to be classed in the ranks of the bonanza kings.

—M. T. Thompson was in the city from Durango this week, looking up location for a second-hand goods emporium.

—Patsey Fitzsimmons departed for a pleasure trip to Salida Thursday. He will be absent from the city a week or ten days.

—Mrs. Charles Jewett left for Kansas City, her old home, for a six weeks' visit last Thursday.

—W. M. Emery of Boston, but formerly a resident of the San Juan, is a visitor. At an age of 71 years Mr. Emery enjoys good health, and an annual visit to San Juan county seems to add vigor to his life.

—J. B. Petrie returned from Denver last Saturday evening. While out on his trip in various portions of the state and particularly in Denver, he conversed with prominent men from a greater portion of the states, and all had some mention to make of Silverton. "I am positively certain that Silverton will experience the influx of a far greater amount of capital and people than ever before," was his cheerful assurance.

—Mrs. R. B. Colman and little daughter, Doris, departed for their home in Elmira, New York, Thursday. Mr. Colman will depart for the same place where he has secured a position in three weeks time.

—James Lavender, a prominent stockgrower of Dolores county, was on our streets this week.

—Mr. and Mrs. Terrill, who were recent arrivals from Sheridan, Nebraska, have taken possession of and will conduct the boarding house at the North Star mine on Sultan.

THIS AS A RE= MINDER. COME AND SEE FOR Yourself

If You Wish Gold Filled Rings, Warranted for Five years Which Usually are Sold From Two to Three Dollars, go to Molique. He will sell them to you at 25 and 50 cents Other Jewelery at corresponding prices.

Ebony Goods at prices that will astonish you.

Toilet Articles and first-class Perfumes at reduced rates.

"Small Profit and quick returns" is our motto.

FRANK J. MOLIQUE, = = = SILVERTON BAKERY.

At VAN SLYCKS.

DON'T FORGET!! to order your winter SUIT or OVERCOAT, before the assortment is broken. I am bound to be at the top notch on work and fit and willing to keep at the lowest round on prices.

Business is lively in the Underwear line, owing to the great variety, and range of prices from $1.25 to $5.00 per suit.

"All kinds of" (not shoestrings) but underwear, from heavy Klondyke to finest silk. Prices made for quick sales.

Pure worsted "Atheletic" Sweaters. Specially manufactured for my trade. None better made, and as cheap as inferior goods.

You can get your complete winter outfit from hat or cap, to shoe or sox, and blanket and quilt to cover you and save you money.

At VAN SLYCKS.

SILVERTON STANDARD.

KLINGER BROS., PUBLISHERS.

ONEYEAR $2.50.
SIX MONTHS, $1.25
THREE MONTHS, 75C

SATURDAY, OCTOBER 19, 1901

Entered at the Silverton, Colo. postoffice for transmission through the mails as second class matter.

STANDARD'S POLICY.

What It Has Espoused and What It Looks Forward to.

A county government with all places filled by competent officers.

In four years time time a cash business basis and a reduction of taxes nearly one half has been the result of change in government.

Municipal ownership of electric light of Silverton. (forthcoming.)

Municipal ownership of water for the town of Silverton. (accomplished.)

A new city hall for Silverton. (can't stop it.)

A new court house for San Juan county. (an issue in next month's election.)

The completion of the sewer system. (will take effect next season.)

A greater city.

A greater county.

A greater state.

Not one vote was cast at the Republican primaries. The slate was prepared by the main squeez and the delegates were selected by an assembly of three. At the convention last Saturday thirteen Republicans attended and the main squeeze did the rest.

Had Teddy Roosevelt been the man that assassin Czolgosz tackled it is certain that this nation would never have witnessed his trial. Teddy has lived and acquired a cowboy experience in the west and it would have stood him in good play in a sudden emergency of this kind.

San Juan county is noted for cheapness with which mines are opened and put upon a paying basis. This is accomplished largely through the tunnel system of mining. The mountains are very steep and great depth is obtained quickly. It costs one third less to drive a tunnel on the vein than to sink a shaft. If water is encountered, it drains itself. All ore and waste rock is sent from the upper levels through shoots to cars in the tunnel, thereby avoiding expense of hoisting hundreds of feet. Secondly, the enormous expense to which mines in other districts are put in the purchase of expensive pumps and costly machinery is eliminated and the money saved to the stockholders.

Thos. F. Walsh and other mine owners of the San Juan county are contemplating building a rail road from Ouray to Silverton, from here via Lake City to Pueblo. The new company has asked for a reduction on the transportation of ores from the San Juan and if they fail to get the schedule lowered the road will no doubt be built. The building of this road would open up a new territory that abounds in mineral, coal, hay and grain. The money is forthcoming if the reduction is not made for the shippers of the San Juan. Its a blessing that such men as Walsh have at last said to the D. & R. G. company, "Hold, you have held up the San Juan country long enough."

As forecasted in the STANDARD last week, thirteen Republicans met at the court house Saturday and under the benign direction of the head push placed the following ticket in the field: William Lyle, sheriff; B. W. Lockhart, clerk; Nellie Tulley, treasurer; Thomas Colmer, assessor; Ellen Carbis, school superintendent; R. W. Hollis, surveyor; Theodore Dick, commissioner; H. G. Prosser, coroner; William Moyle, justice of the peace; W. J. Thompson, constable, the nomination for county judge being passed. Miss Tulley and Messrs. Colmer and Moyle, being good Democrats, got off the ticket as soon as possible, and we understand there are others to follow their example.

SILVERTON A MODEL.

The little city of Silverton in this state seems to be a model municipality, and its citizens can well point with pride to the way its affairs have been conducted. Recently the city purchased the water works plant from a company that owned it. The price was $40-000 and bonds were issued at 5 per cent. The city has a good sewer system, its streets and alleys are in good shape and yet they do not find it necessary to levy a city tax. This bonded debt for the city water works is the only debt the city has. Silverton is one of the places known as a mining camp, and although one of the oldest in the San Juan, is one of the most prosperous in the state. We know a good many capitalist who will pay a good premium for water bonds, or other kind of bonds from cities managed like that. —Colorado Springs Gazette.

CEMENT CREEK EDITION.

The STANDARD takes a pardonable pride in placing this edition before its friends, especially in view of the fact that it was issued by practically the regular force.

We can only hope that it is errorless, for the field that had to be covered in a limited time, while small in area, is large in the resources that go to make up a great mining camp, and for that reason it would be strange were the edition absolutely perfect. But we feel certain that in all essential particulars it is a reliable reflex of the mining operations and development of the wonderful Cement creek country.

ELECTION NOTICE.

STATE OF COLORADO, } ss.
COUNTY OF SAN JUAN, }

Pursuant to to the provisions of Section Twenty-one (21) of Chapter Thirty-four (34) of the General Statutes of the State of Colorado, entitled "Elections," notice is hereby given that a General Election will be held in the several voting precincts in said County of San Juan, in the State aforesaid, on the Tuesday succeeding the first Monday in the month of November, A. D. 1901, to-wit: on the Fifth (5) day of November, A. D. 1901. That on said day the following officers are to be elected, to-wit.

ONE COUNTY CLERK.
ONE COUNTY TREASURER.
ONE COUNTY ASSESSOR.
ONE COUNTY COMMISSIONER, within and for Commissioner's District No. Two.
ONE COUNTY JUDGE.
ONE COUNTY SUPERINTENDENT OF SCHOOLS.
ONE COUNTY SURVEYOR.
ONE COUNTY CORONER.
ONE JUSTICE OF THE PEACE FOR SILVERTON PRECINCT.
ONE CONSTABLE FOR SILVERTON PRECINCT.

In Witness Whereof, I have hereunto set my hand and official seal, at Silverton this 8th day of October, A. D. 1901.

[SEAL] B. W. LOCKHART,
County Clerk.

SUMMONS.

STATE OF COLORADO, } ss.
COUNTY OF SAN JUAN. }

IN THE DISTRICT COURT.

E. C. Condit, *Plaintiff*, vs. The Astor Gold and Silver Mining Company, *Defendant*. } SUMMONS.

The People of the State of Colorado,

To The Astor Gold and Silver Mining Company, the defendant above named, GREETING:

You are hereby required to appear in an action brought against you by the above named plaintiff in the District Court of San Juan County, State of Colorado, and answer the complaint therein within twenty days after the service hereof, if served within this County; or, if served out of this County, or by publication, within thirty days after the service hereof, exclusive of the day of service; or judgment by default will be taken against you according to the prayer of the complaint. And if a copy of the complaint in the above entitled action be not served with this summons, or if the service hereof be made out of this State, then ten days additional to the time hereinbefore specified for appearance and answer will be allowed before the taking of judgment by default as aforesaid.

The said action is brought to confirm and quiet Plaintiff's title in and to the Astor No. 1 lode mining claim, being U. S. Survey No. 1198; the Astor No. 2 lode mining claim, being U. S. Survey No. 1199; the Astor No. 3 lode mining claim, being U. S. Survey No. 1200; the Astor No. 4 lode mining claim, being U. S. Survey No. 1201, and the Astor No. 5 lode mining claim, being U. S. Survey No. 1202, all said lode mining claims being situate in Eureka Mining District, County of San Juan and State of Colorado, and to determine all adverse claims in and to all of said property, and for a decree that defendant has no estate, right, title or interest therein, and that the title of Plaintiff thereto is good and valid and that defendant be forever barred from asserting any claim to said property or any part thereof and for Plaintiff's costs in this behalf expended and for general relief, as will more fully appear from the complaint in said action to which reference is here made and a copy of which is hereto attached.

And you are hereby notified that if you fail to appear, and to answer the said complaint as above required, the said plaintiff will take judgment by default against you according to the prayer of said complaint.

Given under my hand and Seal of the District Court, at Silverton, in said County, this 9th day of July, A. D 1901.

(SEAL) FRANK B. BROWN, Clerk.
By FRANK L. WATSON, Deputy.

First pub. Sept. 28, 1901.
Last pub. Oct. 26, 1901.

NOTICE OF FORFEITURE.

SILVERTON, COLORADO, } August 31, 1901. }

To Joseph Barth, his heirs and assigns:

You are hereby notified that the undersigned has expended during the years 1897, 1898, 1899 and 1900 One Hundred Dollars in labor and improvements for each of said years upon the Edelweis lode mining claim, situate in Eureka Mining District, San Juan county, Colorado, the location certificate of which is recorded in the office of the Clerk and Recorder of said county, in Book 96 at page 16, in order to hold said claim under the provisions of Section 2324 of the Revised Statutes of the United States and the amendments thereto concerning annual labor on mining claims, said sum of One Hundred Dollars for each of said years being the amount required to hold said claims for each of the four years ending December 31, 1900; and if within ninety days after the service of this notice upon you by publication you fail or refuse to contribute to the undersigned your proportion of such expenditure for the said years 1897, 1898, 1899 and 1900 as co-owner and pay for the publication of this notice, your interest in the said claim will become the property of the undersigned by the terms of said section.

ALBERT MARTIN.

First pub. Aug. 31, 1901.
Last pub. Nov. 23, 1901.

Farmington Fruit Store.

All kinds of fresh fruit and vegetables wholesale and retail. Call and inspect same. Above Hoffman house, Green St.

Latest Things in Silk Waists

Hemphill & McCrimmon,

NOTICE OE UNION MEETINGS.

Silverton Federal Union No. 112, W. L. U., meets in Miners' Union hall every Wednesday evening, at 8 o clock. All laboring men are cordially invited to join.

WM. JONES, Pres.
CHAS. L. VALITON, Rec. Sec.

Tot Caused Night Alarm.

"One night my brother's baby was taken with Croup," writes Mrs. J. C. Snyder, of Crittenden, Ky., "it seemed it would strangle before we could get a doctor, so we gave it Dr. King's New Discovery, which gave quick relief and permanently cured it. We always keep it in the house to protect our children from Croup and Whooping Cough. It cured me of a chronic bronchial trouble that no other remedy would relieve." Infallible for Coughs, Colds, Throat and Lung troubles, 50c and $1.00. Trial bottle free at Cunningham's Drug store.

A. GREBLES,

PRACTICAL WATCHMARER

A TRIAL ALWAYS BRINGS CONVICTION.

I guarantee every article sold by me.

Watches,
Diamonds,
Jewelry and
Silver Knives,
Forks and Spoons

Gold Quartz cutting and setting and strict attention given to the repairing of Watches and Jewelry.

Next door to Brumfield's Studio.

Big Line of Ladies' Sacques.
Hemphill & McCrimmon.

Ernest Grill & Co.

Lumber and Feed,

wholesale and retail agents for

HESPERUS,
BLACK DIAMOND
ANTHRACITE
COAL.

BUCHANAN & SEARCY

Attorneys and Counselors

Mining and Corporation Law. Office over First Nat. Bank.

T. M. TRIPP,

CIVIL ENGINEER,

HOWARDSTILLE, COLO.

Jack Cole, of whom a very good picture is herewith presented, does not boast of his athletic qualities, in fact he cares little or nothing about his or any other person's record, but is always ready to take part in a friendly wrestling match or glove contest, and tosses for our local base ball team much to the dislike of contesting nines.

Jack's best bicycle run, made over a rough mountain road (to Silver Lake power house and return) a distance of four and one-half miles was covered in just ten minutes.

He held the hand-ball championship of Jesuit College, Denver, for two years, '97 and '98. Was captain and half-back in college team for the same years.

His foot race record for 100 yards is 10 3-5 seconds.

Running broad jump 18 feet, 9 inches.

Standing broad jump 9 foot, 8½ inches. A good average at other sports.

EXTRACTS FROM THE *Gladstone Kibosh.*

There is a limit to our patience. Two years ago Mike Blair came into this office and subscribed for the KIBOSH for his mother-in-law, stating that he would pay the next time he came into the office. He has never entered our sanctorum since. Twice during this time we left his name out of the paper when he beat his wife and once when he was sent up for ten days. Mr. Blair will do himself a favor by calling early next week or we will publish a full account of his poisoning Duley's pup.

An explosion occurred in the Angel of Mercy saloon last Monday morning. A large tank of new made Demon Delight placed near the stove began to foment and there being no vent the tank exploded with terrible force. We regret to state that the management of this delightful resort lost over one-half of the new brew and the loss is deeply felt throughout the city. John Munstee, a burro packer was killed.

He has gone to that realm that knows no sorrow, where one grand ovation of delightful bliss thrills one's heart with ecstacies of supreme delight; and while his angelic soul is being wafted over the golden steam of eternity, to the sublime heights of glory, we remain to avenge the death of "Lazy" our pet dog.

A pipe line was recently run from the Haven of Rest saloon to this office, thereby saving us many a step. We have no telephone so the gentlemanly bartender sends us down what he thinks is right and proper. Last Tuesday night while we were up to our mammoth mine Jim Stokie, a notorious lush, tapped the pipe line from the cellar of his cabin and took the drinks intended for us. His remains were discovered in the cellar the following day.

The Smelter Sampler.

Our sampling department is always in operation. Sampling and settlements made promptly.
48-tf K. & G. SMELTING CO.

Dr. Gerard, the Dentist,

Is at the Grand Hotel for a few days.

Stepped into Live Coals.

"When a child I burned my foot frightfully," writes W. H. Eads of Jonesville, Va., which caused horrible leg sores for 30 years, but Bucklen's Arnica salve wholly cured me after everything else failed." Infallible for Burns, Cuts Scalds, Sores, Bruises and Piles. Sold by S. D. Cunningham for 25c.

In the Market for Ores.

We are always in the market for your ore. Sampling and settlements made promptly and at all times.
48-tf K. & G. SMELTING Co.

Woodcraft Dance.

Silverton Circle No. 183, Women of Woodcraft, will on Thanksgiving night, Thursday, November 28, give a dance at the Miners' Union hall. 48

Dr. Gerard

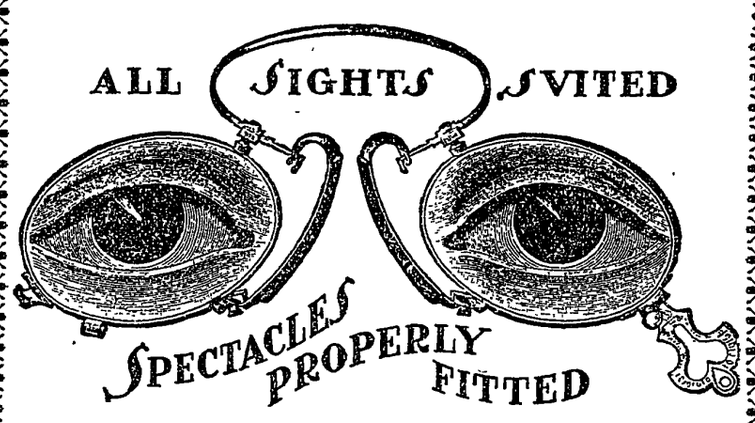
Makes a specialty of crown and bridge-work.

BUCKLEN'S ARNICA SALVE.

Will often heal a horrible Burn, Scald Cut or Bruise, Bucklen's Arnica Salve, the best in the world, will kill the pain and promptly heal it. Cures Old Sores Fever Sores, Ulcer, Boils, Felons, Corns, all Skin Eruptions. Best Pile cure on earth. Only 25 cts a box. Cure guaranteed. Sold by S. D. Cunningham, Druggist.

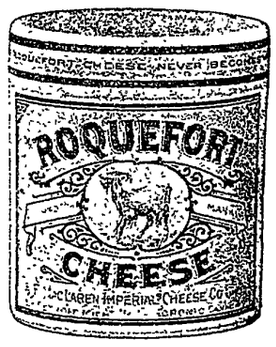
JOSEPH BORDELEAU
DEALER IN
HEAVY AND SHELF
HARDWARE
Agent for Hercules and Giant Powder. Fuse, Caps, Etc.
Stoves, Tinware, Crockery and Mining Supplies.

ARTHUR G. ROBIN & CO.
JEWELRY
DIAMONDS
WATCHES.



Stationery, Candies, Nuts, Cigars and Tobaccos.
ALL LATE MAGAZINES
WATCH REPAIRING a specialty. Our watch doctor is a sure cure for all watch ills—thoroughly expert and experienced in every watch operation.
Latest Cloth Bound Books. All the latest Novels, Periodicals and Papers

All kinds of Cheese - -
IN FACT



Everything in the way of Fancy Groceries can be had If not in stock we will gladly order for you.

Silverton Supply Co.

J. H. ROBIN, President
A. M. ROBIN, Vice-Pres.
MUNDEE, Cashier.
(Organized Under The State Laws.)

THE BANK
of Silverton,
CAPITAL STOCK PAID IN $30,000.
Transacts a General Banking Business. Issues Domestic and Foreign Exchange. Acts as Fiduciary Agents for persons or companies having Mining Interests in the San Juan Mining District.
Correspondence will receive prompt attention
SILVERTON, SAN JUAN COUNTY, COLORADO.

COUNTY MINING NEWS

Joe Morris and partner have received the contract to extend the Silver Wing tunnel, already 1,500 feet in, 300 feet further.

John Yeager took up a season's supply of food to the Sunnyside Extension this week and with a force of four men will do development work all winter.

Manager N. E. Rumery accompanied two carloads of good grade copper ore from the Congress mine at Red Mountain to the Kendrick-Gelder smelter this week.

Jim Ferguson and George McIntyre have taken a three-year lease on Golden Fleece, Eureka district, and their work is meeting with good success.

At a depth of 400 feet from the surface and by means of a 1,300-foot tunnel a new, large and rich ore body was encountered in the Idaho mine. over on Kendall mountain, last Saturday.

Martin Schneider was looking after the shipment of a carload of Dakota ore to the Kendrick smelter this week. Mr. S. and others are the recent purchasers of the bond and lease on the mine.

W. B. Weimer and George Warden, who recently took a lease on the Scotia mine, Eureka district, will ship a carload of high grade gold ore on or about the 20th inst. A small box of sorted ore of about 25 pounds that will give returns of about $35 a pound will also be shipped by express.

J. H. Robin, president, and J. B. Warner, general manager, of the Silver Ledge Mining company were in Denver this week to list the stock of the company as a preferred prospect. The company will devote an amount of money for the erection and completion of a 150 ton mill.

Tim Allen came over from Poughkeepsie gulch this week, bringing samples of ore from a rich strike he is interested in. "It will surely put me on my feet in good shape," was the remark Mr. Allen made. We are glad that such unusual perseverance as his is to be rewarded.

The Kendrick Promotion company of Denver have invested for themselves and their clients hundreds of thousands of dollars in the San Juan country during the past two years and they say they will invest more in the next twelve months than they have in the past. We are familiar with their plans for spending a considerable part of it and it will be of much benefit to San Juan county.

Denver parties have this week inspected a group of mines up Mineral creek. They report themselves as much pleased with the outlook and another deal seems to be maturing. Some six weeks ago Cripple Creek parties secured a bond on a block of ground. The Silver Ledge people are quietly and surely perfecting the initiatory of their elaborate plan of operations, and with the other important moves that are being made in relation to other mining groups, you can set it down right that Mineral creek in its entirety is not going to be distanced in the fast race of development and production now going on in San Juan county.

This week Orsa Reynolds is shipping down a carload of good gold ore from the Grand View mine at the head of Ice Lake basin. This large vein has several patented claims located on its course which show good ore bodies. The group cannot lay in a dormant state, as negotiations for sale were opened last fall by a prominent mining company now operating extensively in this camp.

Before November 1, J. B. Petrie, who now owns and controls by bond the whole of the Slide group of mines in Stony gulch, on Galena mountain, will have supplies packed up and a small force of men at work. The rich ore chute, from which the great quantities of sulphuret ore emanate on the surface, will be tapped at some depth. The cool and determined calculation of the management of this enterprise will never cry quit until the great ore chute known to exist is thoroughly exploited. San Juan county is being blessed with the sturdy efforts of good and experienced mining capital and ordinary foresight can easily conclude as to the benefit that will accrue.

Cooper Anderson came over from Telluride Monday and has been interviewing the mine owners about furnishing them with electric power from the great power plant at Ames, in San Miguel Co. We understand that he has received assurance of liberal patronage. The distance that will have to be covered by a line of transmission from Ames to Silverton is fourteen miles. It can well be remembered what a sudden advancement the mines of Marshal and Savage basins made when they obtained the use of electric power from this plant. It is looked on as a great economic factor in the increasing of the development and production of the mines. The STANDARD hopes to see the mines of this county generally and liberally equipped with this economic power.

Dr. Gerard, the dentist, will make montly trips to Silverton.

NOTICE OF DISSOLUTION.

GLADSTONE, COLO. Sept, 30, 1901.

The co-partnership heretofore existing between James C. Bowman and Jesse B. Stone is this day dissolved by mutual consent. The said Jesse B. Stone retires from said firm and business, and the said business will hereafter be carried on and conducted under the firm name and style of James C. Bowman. The said new firm assumes all indebtedness and pays and collects all accounts. JAMES C. BOWMAN.

First pub Oct. 5. 1901. JESSE B. STONE.
Last pub Oct. 26, 1901.

Try a ton or half ton or a five hundred lot of Perin's Peak coal and you will want more.

New Fall Dress Goods

Our line is now complete and can not be surpassed. Prices right, styles correct. See us for the new things.

"THE BEST OF EVERYTHING"

in Dry Goods, Clothing and Shoes.

Hemphill & McCrimmon.

Imported RHEINWEIN, (Niersteiner.)
Imported MOSSELLWINE (Brauneberger)
Imported MUENCHENER BEER (Spatenbrau)
Imported SCHERRY AND PORT WINE

A full line of Domestic Sweet and Sour Wines; the best grades of Whiskies; Pabst Milwaukee light and dark Beer and Tonic and Golden Beer delivered to any part of the City.

FINE LUNCHES A SPECIALTY.

JOHN WALTERS, BOTTLED BEER DEPOT.

Rear First National Bank.

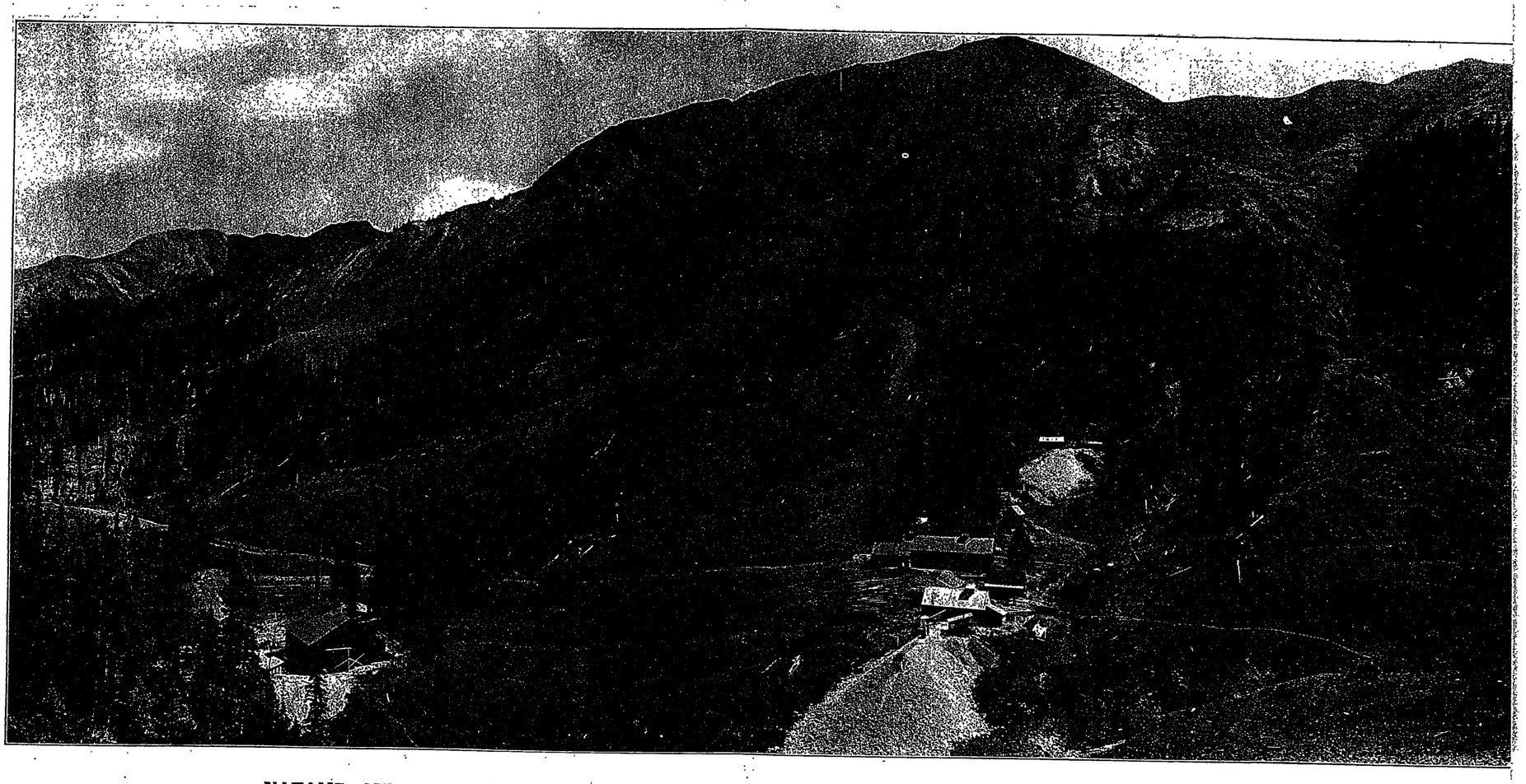
PERINS PEAK KOLE

The Best in the Market

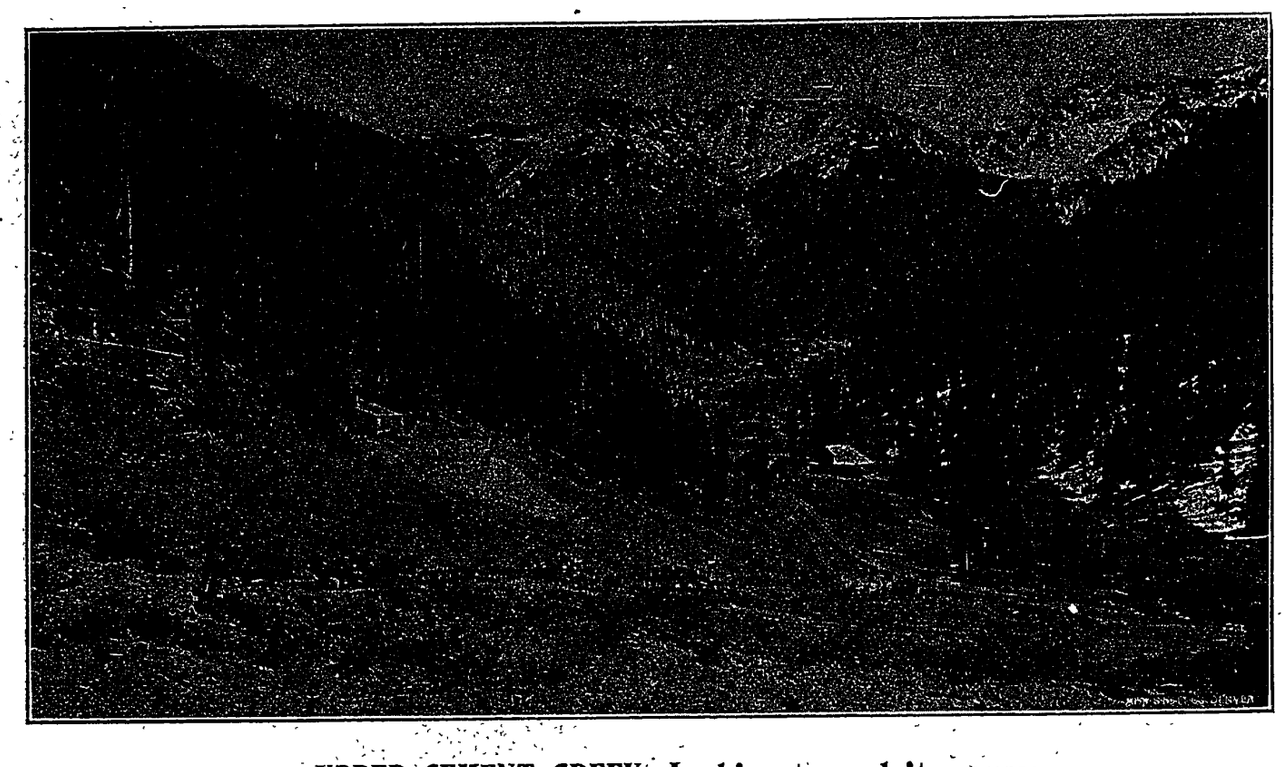
Both Domestic & Steam.

FRED GOBLE, Dealer

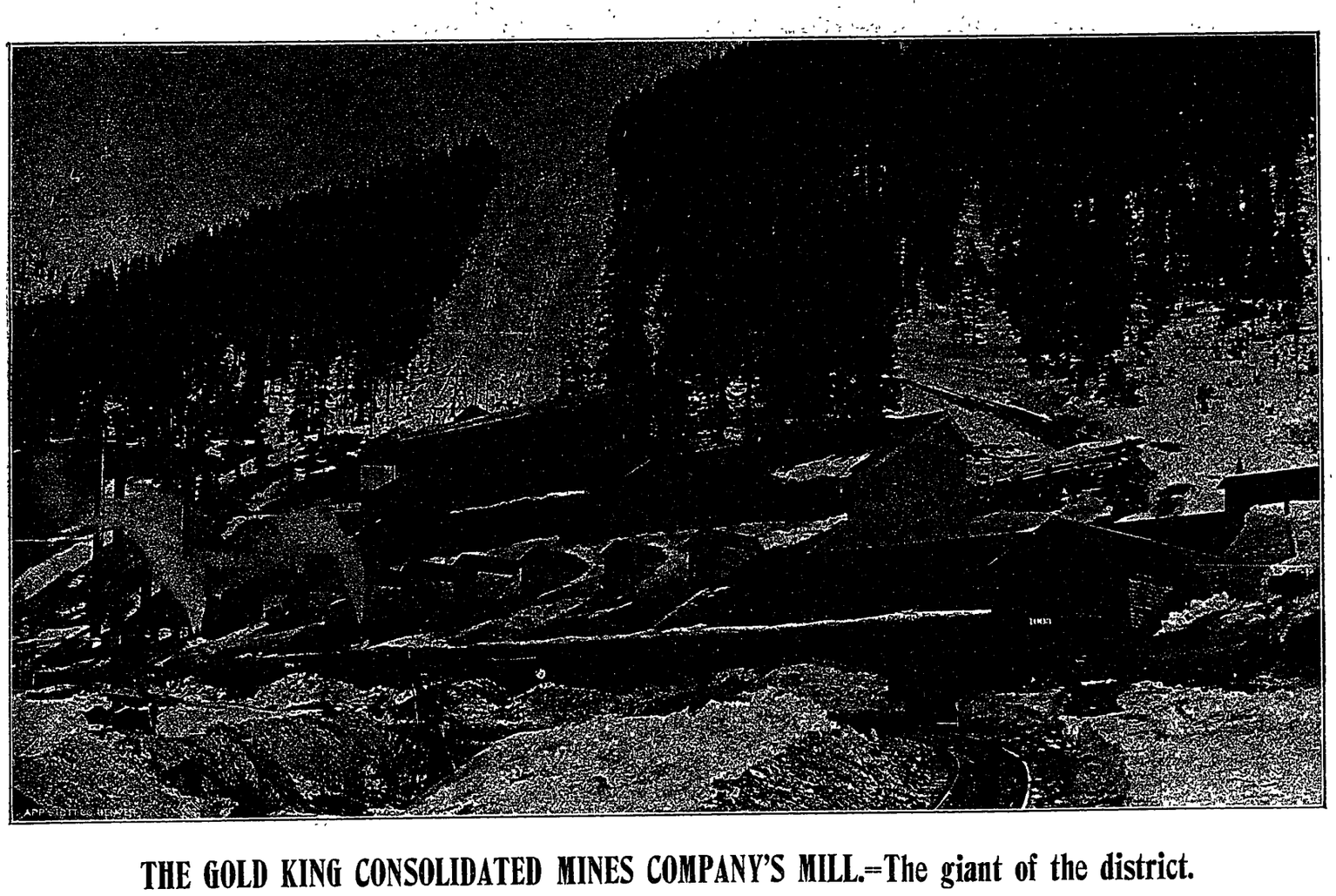
Office near D. & R. G. Depot. Phone, Red 324.



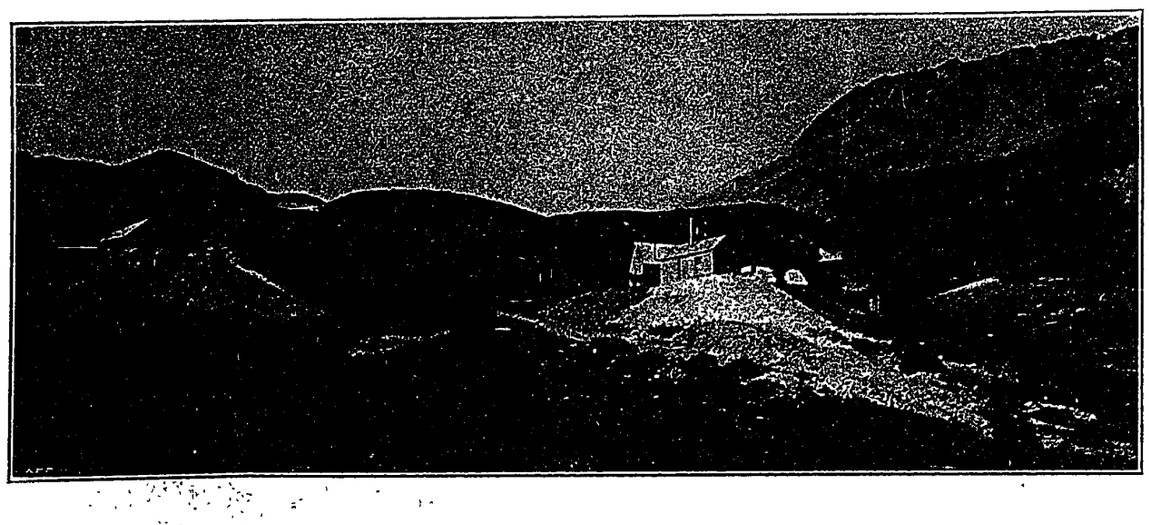
NATALIE AND OCCIDENTAL COUNTRY Where some of the big veins of Cement Creek section are being worked.



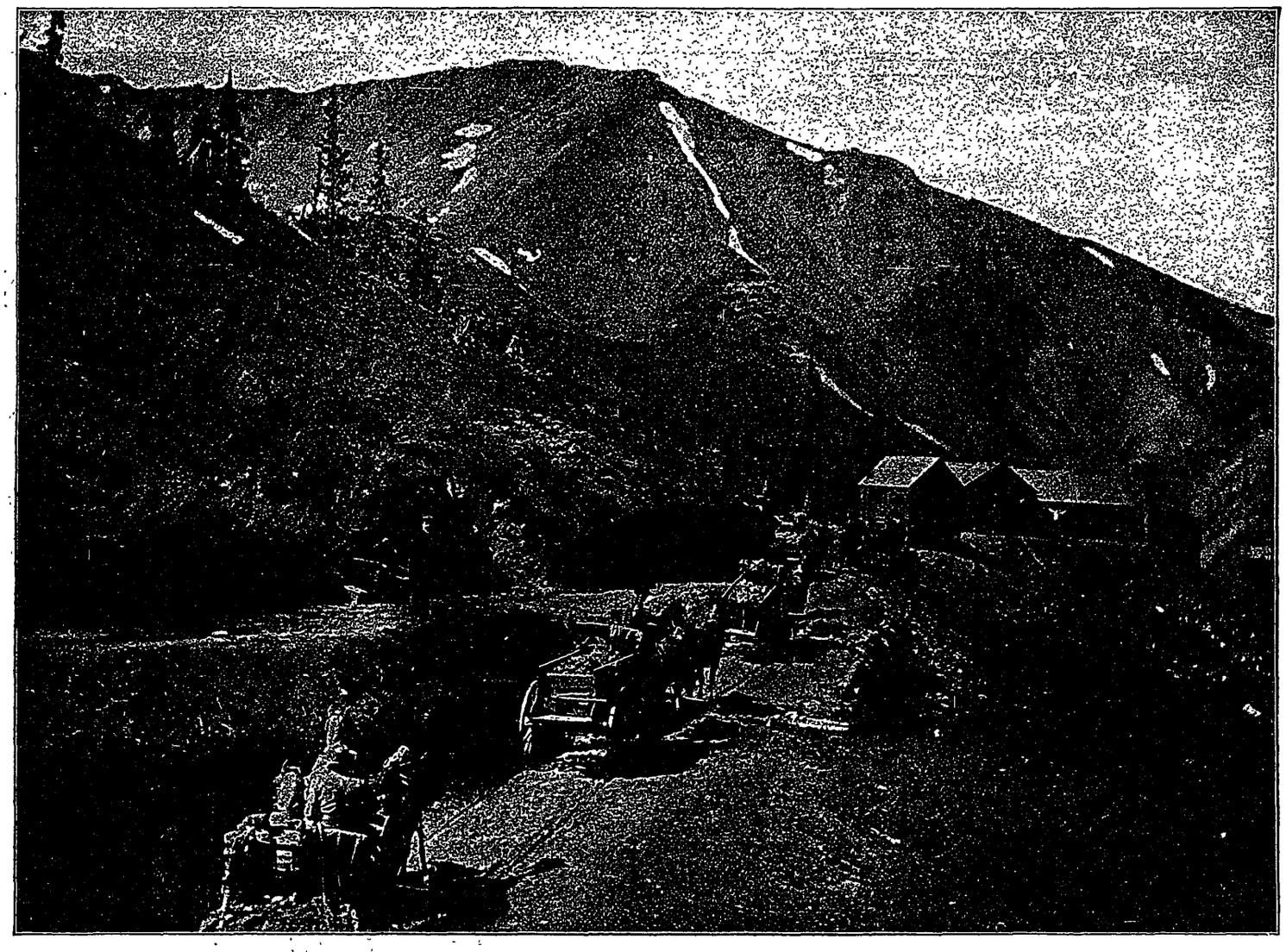
UPPER CEMENT CREEK.—Looking toward its source.



THE GOLD KING CONSOLIDATED MINES COMPANY'S MILL.—The giant of the district.



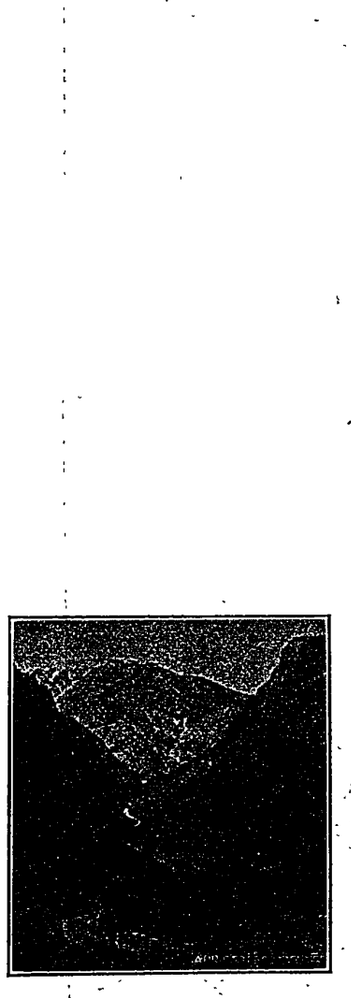
RED MOUNTAIN MINING COMPANY. Scene of their Recent Rich Strike.

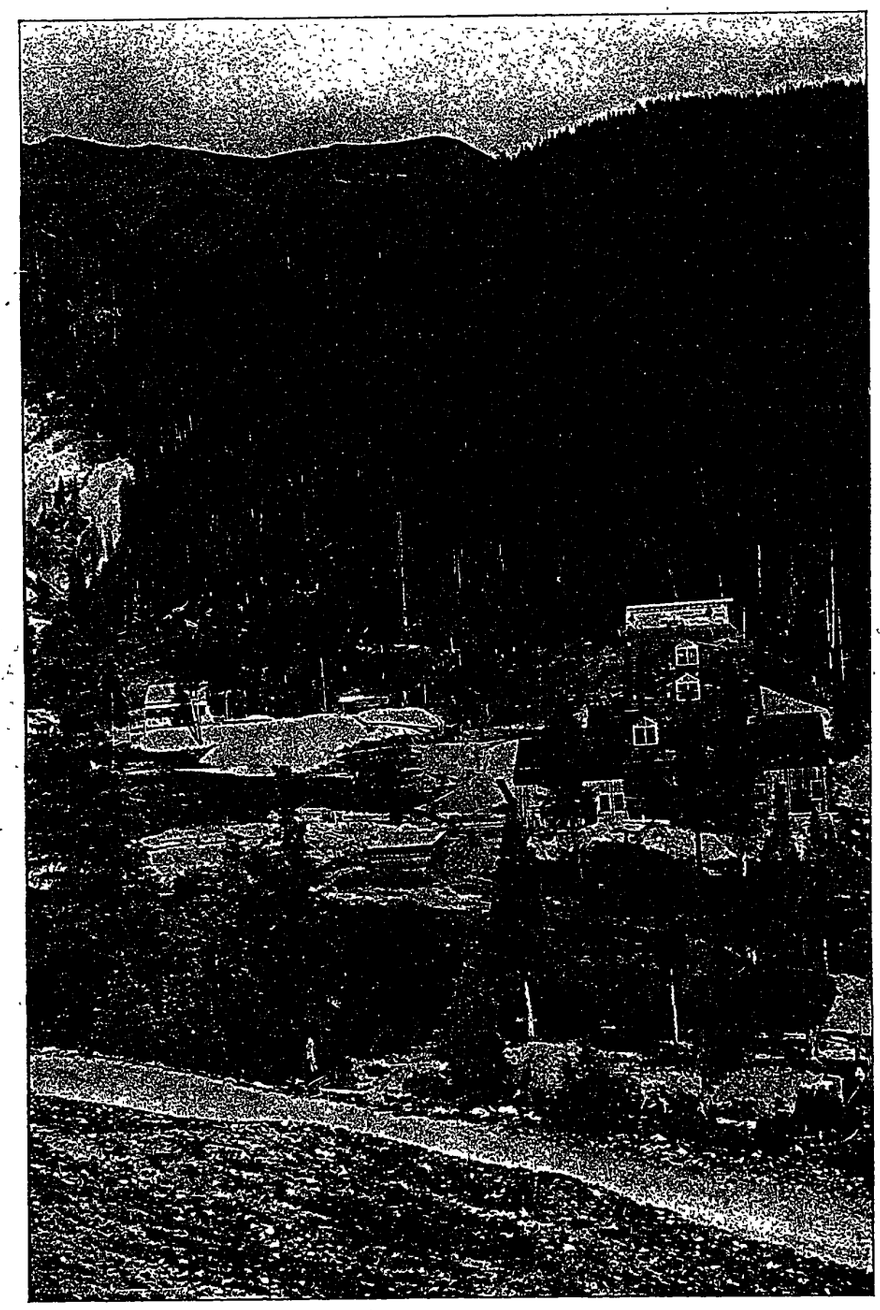


Six Ore Teams hauling ore from the Henrietta mines, five tons each.

Inside workings of the Henrietta Mines. Kendrick-Gelder Co.

KENDRICK & GELDER SMELTING WORKS.





BOSTON & SILVERTON M. and R. CO'S MILL AND MINING TERRITORY.

Silverton Standard

THE LEADING

MINING JOURNAL

OF

San Juan County.

Secure a fine Souvenir of the San Juan, containing eighty-eight views of our mines and mills, price 50 cents. $2.50 secures the Standard for a year and a Souvenir.

Parties residing on the outside should secure a copy of the STANDARD and keep posted on their interests in the San Juan.

C. A. COOPER,
Assayer.

GOLD OR SILVER, $ 75 COPPER 75C.
BOTH, - - - - - 1.00. LEAD, - 50C.

Complete price list on application.

GEO. W. BARNES, H. H. BARNES, Notary Public

BARNES & BARNES,
Lawyers,

MISS LYDIA GIBBS,
Stenographer and
Typewriter
Wingate Block.
Office Phone 15 b.
Residence Phone, Red 713.

T. H. CLARKE,
Electrical Construction
Supplies, Wiring
P. O. Box 138.

L. G. PROSSER,
Furniture Dealer
AND UNDERTAKER.

The Best line of Sewing Machines in the world.
The
STANDARD ROTARY,
WHITE ROTARY,
NEW HOME,
HOUSEHOLD,
IDEAL.
Sold here on time at Denver prices.

CENTRAL HOUSE.....

A Home Place for All.

Commercia and tourist trade Solicited.

A first-class hotel

First-class beds.
First-class tables.
Rates reasonable.

Mrs. Geo. Nolls.

MINES OF CEMENT CREEK.

(Continued from page 1.)

into the Natalie, being now 180 feet on the latter. The vein will be cut in another 200 feet in the Hurley tunnel. Its thought to be the Magnolia vein. When cut in the Hurley tunnel it will give stoping ground of 780 feet north of the Hurley tunnel, not to mention what it may do south, where the croppings show the Magnolia vein to be the strongest. The average width of the vein now is about 5 feet and as taken on the dip it will have a height of 784 feet from the present works down to the Hurley tunnel, allowing for stoping ground above it should average 1000 feet in height when cut by the tunnel, giving a tonnage from this portion of the mine alone, allowing for only 5 feet in width, although from indications it may double that, of 390,000 tons of ore.

It is thought that the Hurley tunnel, before reaching its objective point, will cut at least twenty veins. For a short distance the tunnel passes under the Thomas Jefferson and the U. S. Grant of the Occidental company.

There are many rumors as to the consolidation of these two companies. The stockholders in each are mostly identical and under one management the economies would be considerable and the Occidental could be developed by the power drills of the Natalie, bringing all ore to the mill by gravity, and concentrates to the railroad at a minimum of expense.

No company in the San Juan district stands higher in point of credit than the Natalie and its neighbor, the Occidental. For about seven years they have been operating in this camp and have never given an obligation for supplies, materials or wages, paying spot cash, and frequently anticipating payments. Mr. Thomas J. Hurley, vice-president of the Exploration Company of New York, is president of both corporations. Mr. James Lewis, who has mined in this district has acted as superintendent of both companies since their organization. George W. Brown of Boston is treasurer of the Natalie and Francis E. Pinto, Jr., of New York, treasurer of the Occidental. Both of these companies have pursued the old-fashioned conservative policy of thoroughly developing your property before erecting a mill. This will now be done next season when an up to date 200-ton mill will be erected as sufficient ore is now exposed in the various workings to supply such a plant.

IN RICH DRY GULCH.

A Locality Where "Something Has Been Doing."

In Dry gulch, one of the best known localities of Cement creek, the prospector has done good work. All the veins of the gulch are large and of one general character—gold, silver and copper bearing. Among the properties worthy of seven claims owned by John Butler, Edward Fox and Patrick and William Lonergan, and now under bond and lease to R. W. Hollis. Four tunnels, aggregating over 1,400 feet, have been run on these properties—one 900 feet, another 300 feet, the third 175 feet and the fourth 65 feet in length. Large bodies of milling ore have been opened up and considerable quantities of a better grade mined and sold at a good profit. Often pockets of rich gold ore are encountered, in one instance running 90 ounces. Eight men are at present employed on the property.

The Daniel Webster and Senator are owned by William and Dennis Sullivan and E. O. and Henry Wolcott. The development on this property consists of a 460-foot shaft and about 500 feet of drifting. The vein is a large one carrying low grade values in gold, silver and copper, although considerable ore has been shipped at a profit. Work was started up this week on the claims under the supervision of William Sullivan with a force of eight men.

The Hawkeye and Badger, owned by John Carver, are two properties with a good showing of the regular values of the locality, a four-foot streak of milling ore having been opened on the former, while a smaller streak of shipping ore is in sight.

The Blizzard is owned by John Carver, William Sullivan and Frank Prevost. A few tons of ore have been shipped from this prop- which gave smelter returns of 92 ounces in silver and 7-10 of an ounce in gold.

The Tincup, owned by B. S. Nichols of Pomona, California, and the Widow Donnelly of Salida, Colorado, is one of the old time producers, having been a shipper to Pueblo before the days of the railroad. No work has been done for some time on the property beyond the annual assessments, but its recent bonding to Salida parties for $10,000 means that it will be operated quite extensively another season.

"Jack" Gray owns four claims at the head of Dry gulch on the north range of mountains, on which considerable development work has been done. They are the George lode, Mountain Quail, M. T. and Summit. A 550-foot tunnel has been run to cut veins on the Mountain Quail and M. T. claims. A cross-cut at the end of the tunnel has been driven to cut the M. T. lode, and after 65 feet more will have been driven an upraise will be made for air. At the end of this drift a fine body of lead and an eight-inch streak of black copper have been encountered. A cross-cut is being driven about half way along the main tunnel to intersect the Mountain Quail shaft, with about 60 feet to drift. At the beginning of this cross-cut a fine body of high grade ore was encountered. The development done on these claims in former years are about as follows:

Mountain Quail vein and 50 tons of ore taken out and shipped that gave returns of 20 per cent. copper. 9 ounces in silver and $2 in gold. A shaft 40 feet deep was sunk on the M. T. vein and five tons of ore were taken out and shipped. This ore was high grade, going 286 ounces in silver and 1.5 ounces in gold. At the point this vein was cut, 250 feet from the surface, it gives by test 15 per cent. copper, 20 ounces in siver and good values in gold. On the east end of the M. T. lode a shaft 45 feet deep was made on the vein and 75 tons of ore were taken out and shipped that gave smelter returns of 100 ounces in silver and 40 per cent. in lead. The upraise from the tunnel will when completed intersect this shaft. The Summit lode, lying near the ridge of the mountain, has been tested by a 65-foot tunnel on the vein and a 40-foot shaft. Two carloads of ore, giving returns of 40 per cent. lead and 10 ounces in silver, where shipped from the Summit. The group of claims are surrounded by valuable properties. At the west end lies the Blizzard, at the north extreme the Sailor Boy, now a rich shipper, at the east the Tincup and Vanderbilt, two noted shippers in bygone days. These mines consolidated with those mentioned would with development make a group hard to surpass in the San Juan. A tram line one mile in length would place the ores at the Silverton, Gladstone and Northerly railroad track.

KENDRICK SMELTER

One of San Juan County's Substantial Concerns.

The Kendrick - Gelder pyritic smelter, located immediately above the city on Cement creek, was completed and put in successful operation last fall. It was built by the Kendrick & Gelder Smelting company for the purpose of meeting the demand for a market for the copper ores of the district. It has a capacity of 150 tons every 24 hours, its product being a 50-per cent. copper matte which goes to Denver works for further treatment. The present capacity is now being increased by the raising of the air jackets on the 120-inch furnace and increasing the height of the 60-foot smoke-stack. A 100-ton briquetting machine for the bricking of concentrates and flue dust is being added to the plant.

During the summer months power is furnished by water conducted through a flume a mile and a quarter long dropping onto a 120-horse-power DeReimer water wheel. In winter, when the use of this power is often impracticable, a 100-horse power engine does the work. Another engine of the same capacity will shortly be added to run the matte and ore crusher, it being necessary in copper smelting to make a preliminary matte, crush it and run it through the furnace the second time to gain the required 50 per cent. of copper, although this has been frequently done here on the first run with 7 per cent. ore. Ordinarily 700 degrees of heat are required.

Plans are now under way for the erection by the company of a 200-ton mill for the making of copper-iron concentrates, an undertaking never before attempted in the San Juan, but known to be entirely practicable, as several such mills are in successful operation in Montana on much lower grade ores than the average here. A tramway from mine to mill will be built to eliminate a heavy hauling expense. These improvements will be completed early next season.

The building and operation of this smelter has been of untold benefit to Silverton and San Juan county. Besides giving steady employment to from 50 to 75 men, it has opened a market for the ores of hundred of prospectors who would otherwise have had to wait for other facilities. All season long hundreds of tons of ore have come to this smelter in small and large lots, the shippers invariably receiving pay on sampling, and the sampler is always in operation. Already contracts have been signed for the delivery of 3,000 tons of ore this fall by others than the regular small shippers.

The company is a reliable and substantial concern and merits the patronage and good will of all our people. The smelter is officered by W. F. Kendrick. president, F. C. Kendrick, treasurer and general manager; E. W. Walters, superintendent and metallurgist; R. C. Tooke, auditor.

TOWN OF GLADSTONE

The Lively Little Village at the Head of Cement.

Gladstone was founded some fifteen years ago, when the Sampson mine attracted many prospectors to that vicinity and caused a demand for a supply point nearer than Silverton. The town is prettily located in a little valley at the foot of Bonita mountain, nine miles from this city, and is the terminus of the Silverton, Gladstone & Northerly railroad.

The town is the abiding place of about a dozen families, several business houses and the editor of the Kibosh. The Gold King mill, which employs about forty men, is of course the industrial attraction of the place, while the mine, but a mile and a half distant, furnishes considerable business to local merchants.

J. C. Bowman, the general merchant of the little city, carries a large stock and does a thriving business. Mr. Bowman is also the town's postmaster.

Joseph Landry conducts a wet goods emporium on the main street of the town and aims to cater to the wants of the thirsty.

Fred C. Grebles conducts the large hotel, which is also the Gold King mill boarding house. Mr. Grebles also has charge of the Natalie company's boarding house at the corner of Twelfth street and Maiden Lane.

One of the important fixtures of the town is the Kibosh, whose editor, despite his eccentricities, is a man of considerable force. We understand that since the paper was established, in July, 1899, it has steadily grown in usefulness to the community. The STANDARD wishes the mythical publication

A Fiendish Attack.

An attack was lately made on C. F. Collier of Cherokee, Iowa, that nearly proved fatal. It came through his kidneys. His back got so lame he could not stoop without great pain, nor sit in a chair except propped by cushions. No remedy helped him until he tried electric Bitters which effected such a wonderful change that he writes he feels like a new man. This marvelous medicine cures backache and kidney trouble, purifies the blood and builds up your health. Only 50c at Cunninghams drug store.

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EXPRESS
And all kinds of Haulin promptly attended to.

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continued success.

Gladstone is the center of an attractive prospecting field in addition to the gigantic operations already under way in that territory and will no doubt continue to grow with the development of the splendid country that surrounds it on all sides.

THE HENRIETTA MINE.

One of San Juan County's Great Properties.

While Cement creek is showing up wonders to the mining world with but superficial development in a large number of mining properties, there is nothing in the entire region that is more phenominal than the history that the development of the Henrietta mines is presenting. Situated on the eastern slope of Red mountain, it is in the center of the richest copper belt now known to Colorado. In the ore bodies of this belt we find the richest combination of copper ores that were ever chemically compounded in nature's laboratory. A casual resume of the nature and production of the different mines in Red mountain shows that never before have such rich copper ores with their attendant values been disclosed and recorded in mining annals. In the Henrietta and parallel veins are found enargite and stromerite—two of the richest compound copper ores known to mining science. In this strain it might be well to slightly compare these characteristic ore values with the great and historic copper regions of other mining camps. While the ores in these outside districts are chemically of simpler analysis, it is to be carefully noted that vast fortunes have been made from them that more than equal the fortunes that history records the potentates of old to have possessed.

In the famous Michigan copper belt the average grade of crude ores handled does not exceed five per cent. In the great Montana copper mines the mean average values do not exceed seven per cent., while the great copper belt of Idaho, particularly the Seven Devils country, the average is 11 per cent. In Millionaire Clark's mines at Jerome, Arizona, the average valuations of the best grades of the ores handled do not exceed 20 per cent. It must also be remembered that in obtaining these values that magnetic attraction and the various modes of concentration have been resorted to and every last advantage that the science of economics could resort has been practiced to make the mines of these outlying districts produce profitably.

In the Henrietta and other mines of this immediate copper belt the gauntlet of heavy costs attending the production of good grade ores had to be run. They did not and could not resort to the economic advantages that strong capital has installed in the copper mines of the states above mentioned. To say nothing of the great low grade ore reserves that are shown by the development and extraction of its shipping values the Henrietta has made a great showing. The ores had to be wagoned down a steep mountain wagon grade to the railroad, about two and a half mines, and then transported by railroad to the Kendrick smelter, and thus handled three times before reaching the smelter bins. Now a strong company with a large subscribed capital will soon build a tramway and combination mill at the tram base at the railroad on Cement creek.

The members of this company reside in Cohoes, N. Y., and not only represent a strong combination of wealth but are astute financiers. The plans for the mill are complete and preliminary work will soon start. Its completion depends on the clemency of the weather at present.

When the cost by wagon to this base was $1.25 per ton and the production averaged 30 tons per day, it can easily be seen what a tramway means for the greater production to follow. The writer has seen in the three upper levels of the mine 6 inches to 2½ feet of solid high grade copper ore impacted in the ore body of the vein and along side in all these levels a body of sulphides of copper and iron whose width in the entire lengths showed an average width of 6 feet. In places this low grade ore body has been cut at a width of 18 feet and in other places narrowed. The entire ore body is massive, and to say nothing of the high grade ore this low grade body will compare in average valuations to the best of the famous copper mines of the world. The system of developing levels showed in the month of August that the upper, or No. 1 level, was in 300 feet; No. 2, 560 feet; No. 3, 800 feet, besides several thousand feet of side cuts, winzes, and developing stopes. Only in these three levels has the ore bodies and vein been shown and the remarkable widths of from 20 to 50 feet of vein matter has been disclosed. Down the mountain at a vertical depth of 400 feet below No. 3 level, the No. 7 level at said date was completed 600 feet. 300 feet below No. 7 the No. 10 level was driven 400 feet. The intermediate levels will be made from the upraise that will connect and systematize the entire workings. Up to June, this year, an aggregate valuation of $1,800,000 was in sight and the economic handling that the tramway and mill will do for the low grade ore body when in operation will greatly add to these figures. While periods of great profits were experienced, since the present management has operated, there has been an immense and costly outlay on an elaborate and unavoidable plan of development. The great ore reserve now in sight will handsomely reward this outlay. It is also to be noted that in none of the great copper producing mines of the world are the ores as uniformily massave and high grade and consequently no other operated district can show as heavy a tonnage from the same space of development. The greatest and largest ore bodies of whatever character in the world have only been made famous by the economic appliances that ingenity and the experience of man could devise. When these advantages are added (and they soon will be) the Henrietta will become one of the world's famous bonanzas.

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MAMMOTH TUNNEL Co.

has Planned to Become One of San Juan's Best.

The consolidation of the Mammoth Tunnel & Mining company and the Red Mountain Mining company at a meeting of stockholders of both companies at Denver last week means a corporation that will result profitably to all concerned.

Prior to the consolidation the former company prided itself on controlling a considerable portion of the famous mineral zone of the upper Cement, while the latter stood monarch of the situation with large territory and a key, in the form of a tunnel site, to the Prospect basin and the Red mountain mining section.

The 30 or 35 claims now belonging to the new company in Prospect basin have through assessments and surface develoment proven enough to satisfy and to justify an investment of capital in their further development at greater depth. Among the most promising claims of the company's possessions are the Hercules, Round Top, Slide and Wyandotte, by reason of these having received more attention than the rest, more in particular the former mentioned claim, which is now being worked through a shaft on the vein, from which $30 ore is being mined for the market. But this scratching of the surface does not suit the occasion when such advantage for deep mining presents itself. Men at the back of this Cement creek enterprise are principally Pittsburg and Chicago people and if future operations hinge on the endeavors of A. A. Brown, president and general manager, there will be nothing left undone to make one of the biggest producers of this section. The Mammoth tunnel, entering at the very base of that old mountain of mineral, will cut the most prominent vein at a depth of from 2,500 to 2,700 feet.

Not alone has the company concentrated its operations in the Red Mountain section, but has acquired under lease and bond several claims worthy of mention adjoining the Gold King mine and out of which some excellent ore is being mined.

Under the recent new incorporation the following officers and directors were installed: A. A. Brown, president and general manager; James Stewart, secretary and tresurer; Peter Alldred, vice-president; J. S. Parks, Elmer King, John J. Munzer, directors.

LATER.—Since the above has been placed in type we learn that the Hercules ore body has widened to the full width of the shaft. We were shown pieces of solid lead ore of which some 15 tons have been hoisted from the new strike. We further understand that the work on the company's properties will be concentrated this winter on the big tunnel project, which contemplates starting in at the base of Red mountain on Cement creek and running through to a point near the Yankee Girl on the other side, and that everything is in readiness to begin operations at once.

CEMENT IN GENERAL.

A Look at Several Properties Along the Creek.

Cement creek is about twelve miles in length, starting near the Ouray county line at the western base of Hurricane peak and flowing in a general southerly direction to Silverton, where it empties into the Animas river. Looking up the stream Boulder and Bonita mountains are to the right, while to the left are Anvil, Red and Brown mountains. To the right are Hancock, Illinois, Grassy, Cascade, Tiger and South Fork gulches in the order named. On the left are Soda, Henrietta, Niagara, Topeka, Ohio, Porcupine, Minnesota, Fairview, Georgia, Prospect and Dry gulches in the order named.

Telluride, Colorado, people with Ed. Lavender at the head, will at an early day, investigate some recently acquired territory near Hurricane peak.

Comparative scratching of the surface on the Joe and John mines lying between Dry Gulch and Prospect basin has brought forth five cars of fine galena ore. The Langolf Brothers own the properties.

Epluribus and Grand Mogul, on Bonita mountain above Gladstone, and owned by Theodore Dick and Col. F. M. Snowden, are two promising gold milling propositions. Both veins are opened up through a long tunnel and are being drifted on at this time.

The Danver group, in Hancock gulch and owned by Hemphill and Bunce, have been worked by the owners quite steadily in a small way for several years. Considerable development has been done on the group and good lead and silver ores have been opened up in several places.

Rasmus Hanson, one of the oldest propectors and mine owners in San Juan county, pinned a portion of his faith years ago in the upper most section of Cement and to date owns the old established Smuggler, Silver King, Mountain King and Mountain Queen on Bonita mountain.

Like all other properties in nearly every section of our county deep mining is required to properly drain and develop ore bodies, and no less in particular with a group of claims in Snow Slide gulch owned by A. Grebles and sons. Twelve feet of milling ore is the width of one of their claims that awaits capital.

Up Georgia gulch about seven miles are located a good group of prospects being worked by D. J. Fisher and A. H. Ray. They are going to develop the claims into paying propositions if hard work counts for ought. These claims known as the Money Musk, M. & M. Extension, Arkansaw Traveler, Hornet, Mark Twain and Little Lena lie between the Brooklyn and Hoosier Boy and so far good result have been attained by assessment. The Hornet shows a 14 in. vein that gives returns of 29 per cent copper and 5 ozs. in silver. The claims also join those of the Hopewell.

The Queen Anne group (more in particular the Queen Anne mine) is one of the oldest mines in the upper Cement creek district, but not until within a short time ago when a small company, composed of Robert and E. P. Watson, M. B. Holt and G. H. Stoiber, took under lease this property, has systematic development been done. Two hundred feet of drifting on the Queen Anne vein has opened up some nice ore.

The Bald Eagle, situated on Anvil mountain, about three miles from Silverton, is an old location recently opened up by Butler Bros. and John and William Carver. A tunnel 600 feet long was driven by the former owners, but they missed the vein that the new ones were lucky enough to open up—a four-foot lead of mineralized rock carrying a 12 to 14-inch streak of lead-silver ore assaying from 63 to 113 ounces in silver, 12 to 24 per cent. in lead and $2 to $5 in gold. In one place there is quite a showing of galena. The property is only 600 feet from the railroad track.

The properties on upper Cement creek worthy of mention in these columns is the Ruby Bell in Georgia gulch, the Quail in Fairview gulch and the Bartlett in Prospect basin. They are owned by Hosea and H. J. Levis of Pittsburg, Pa., and were located in 1881. About 400 feet of work has been done on the Ruby Bell, which shows a big vein carrying copper and silver. The best tests ever had out of the workings were 56 ozs. silver and 25 per cent. copper. The copper streak is about eight inches in width and averages about 12 per cent. The Quail is a gold-galena vein, the gold values averaging about $13 per ton. About 400 feet of work is done on this property. The Bartlett, while carrying other values, shows best in tungsten, the ore when concentrated in the vein testing 55 per cent. of tungstic acid.

On the eastern slope of Red Mountain and about five and a half miles from Silverton are situated the Del Mino and Boycott group of eight lode claims, one placer claim and a water right, the property of Frank Wetzel of this city. The property covers the territory between the mouth of Prospect basin and Dry gulch and thus commands one of the best tunnel sites in the San Juan. The water right covers the flow out of Prospect basin. Most of the eight locations are old ones, they being in part the property for which the Fisher mill was built. About 1,000 feet of work has been done on the group, mostly tunneling and drifting. On the Del Mino two good-sized and continuous veins of low grade gold ore have been opened up. On the Boycott proper is

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The largest sum ever paid for a prescription changed hands in San Francisco August 30, 1901. The transfer involved in coin and stock $112,500 and was paid by a party of business men for a specific for Bright's Disease and Diabetes, hitherto incurable diseases.

They commenced the serious investigation of the specific November 15, 1900. They interviewed scores of the cured and tried it out on its merits by putting over three dozen cases on the treatment and watching them. They also got physicians to name chronic incurable cases, and administered it with the physicians for judges. Up to August 25 eighty-seven per cent. of the test cases were either well or progressing favorably.

There being but thirteen per cent. of failures, the parties were satisfied and closed the transaction. The proceedings of the investigating committee and the clinical reports of the test cases were published and will be mailed free on application. Address JOHN J. FULTON COMPANY, 420 Montgomery St., San Francisco, Cal.

A DOUBTING THOMAS.

Had His Falling Hair Stopped, and Dandruff Cured, Without Faith.

H. B. Fletcher, Butte, Mont., Oct. 20, 1899, says: "Like many other people, I have been troubled for years with dandruff, and within the last few months, my hair came out so badly that I was compelled to have what I had left clipped very close. A friend recommended Newbro's Herpicide. I confess that I doubted his story; but I gave Herpicide a trial; now my hair is as thick as ever, and entirely free from dandruff." "Destroy the cause, you remove the effect." At druggists, $1 00. Herpicide is a delightful hair dressing for regular use. For sale by A. Taft. 83.

DENTISTRY.

Dr. B. Barnes, Dentist, is permanently located in Silverton. Office on Reese St. between 12th and 13th streets.

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Successor to Woolery & Kroeger

CLARK'S ROOMING HOUSE

One Door Above the Hoffman House.

Everything new and first-class. Would be glad to see the old friends, also the new

centered a chimney rich in black or arsenical copper. In several places on this property over a foot of the ore has been opened up which smelter samples at the lowest 16 per cent. in copper, 16 ounces in silver and small values in gold. Although Mr. Wetzel has several tons of this ore on the dump, he has never made a shipment, preferring to wait until the mine was in shape for large and continuous production. In this connection it may be well to state that this week Mr. Wetzel disposed of his millsite and an adjoining lode claim near the mouth of Dry gulch to the Kendrick & Gelder Smelting company.

The Tom Turner mine, situated about half-way between Gladstone and Grey Copper gulch, has been a producer of a large amount of high grade ore. Owing in the first place to the death of one of the principal owners, a three-fourths interest in the mine was not in condition for negotiations of any kind until lately. In the meantime a considerable portion of the hundreds of feet of tunneling caved in, thus unfortunately rendering a good leasing proposition inaccessible to the efforts of leasers with little or no capital. Besides the high grade ore, a large body of $40 stuff was uncovered in the various levels and shows continuously on through the Florence ground, which covers the extension of the Turner vein. This large ore body has been uncovered at intervals for a distance of over 1,500 feet. The Tom Turner vein is only one of many good opportunities for progressive capital, and when this region is well known by close investigation mining men must marvel at its wonders.

The Brooklyn mines in Georgia gulch, owned by Uncle John Harris and his deceased brother's estate, have upward of 1,300 feet of development completed. This is the same vein and a southwest extension of the famous Henrietta vein. Large bodies of ore are uncovered, some of which is high grade. A 4-foot width of the ore was sent in car load shipments to the smelter this season and showed values over $19 to the ton. This class of ores seems to be particularly adapted for heat concentration. The Brooklyn and extension makes one of the best showings of massive ore bodies for the development in the San Juan. Its character as with nearly all the Red mountain ore admits of a great tonnage from a meager amount of development. As a very high grade ore has been encountered it can well be said that the depth below, contains marvelous riches, as is proven in every instance in the deepest developments in these characteristics of ore in this, Colorado's richest copperbelt.

The Crown Prince group of five claims has been steadily worked during the season. New buildings have been erected at the main tunnel level, which is now in a distance of over 400 feet, counting side drifts also. The Crown Prince-Liverpool vein lies directly parallel to and above the Henrietta vein in Prospect basin, and is in the heart of the copper belt. The vein varies in width, in some places showing the great width of 50 feet of mineralized matter. Different ore chutes have been encountered showing enargite, bismuth iron and silver, sulphides of copper and stromerite. A strong company with headquarters at Beloit, Kansas, is developing this property and encountering about the same characteristics as to vein and ore that the Henrietta development disclosed. Several openings on the 3,000 feet of the vein the company controls show good copper ores and development will certainly make a great mine.

Among the tungsten mines producing the comparatively new mineral in quantites are those belonging to Mrs. M. Leslie and sons and another group belonging to Theo. Grabowsky, et al. From the Leslie group of five claims 1,100 pounds of concentrates of good quality of tungsten was the product of a test run made at the Fisher mill, one mile from the claims, last year. A 315-foot tunnel has opened up one of the veins that is found not only to be continuous, but the quality of the ore is as good as the best uncovered in any of the surface workings. Theo. Grabowsky has one of the largest if not the very best tungsten prospects in Dry gulch, or for that matter, Cement creek.

Near the Yukon mill on the east slope of Red mountain is a large group of promising mining claims belonging to C. A. Shugart. Upwards of 3,000 feet of development work has been completed on the cross-cut tunnels and drifts on the veins which have exposed to view immense quantites of sulphide iron and copper ores carrying gold and silver. Some of the veins contain ore that tests prove to be high grade. Being near the railroad, it is looked upon as a desirable property that large capital will not allow to remain idle very long. Large bodies of matting ores are in sight.

The Peacock group of seven claims, owned by a Durango company, has been prosecuting development through the entire season. Several thousand feet of tunnels show on their claims, which join on to the Henrietta group on the west. On the Peacock claim two parallel tunnels show a continuous body of gold ore in one and chutes of tungsten ore in the other. It is said that an outside company has a bond on the property and is responsible for present operations.

A 100-foot contract was let recently on one of the claims of the Minnehaha group, South Cement, by Mrs. A. L. Cotton, the pioneer mining woman of San Juan. There are three claims in the Minnehaha group, all of which have produced small batches of ore sufficient to prove that the strong veins carry a $20 gold product. We understand that Miss Marie Hollingsworth is interested to a small extent in these properties.

The Prodigal Son, Panama and Pilgrim Father mining claims and millsite, opposite Hancock gulch, are owned and being worked by Dr. Pascoe. On the Prodigal Son a shaft 100 feet deep has been sunk. A good body of copper and iron pyrites associated with galena is the character of ore. The main values and bulk of the ore lie in the pyritic body, which is an excellent smelting ore.

The Irene, situated up Topeka gulch, has been developing and shipping ore steadily for over a year. At present five men are leasing and are shipping out good ore which is a high grade galena with some copper. This property is traveling a developing and producing gate that is fast bringing it into the list of great mines. Depth increases the gold and silver values.

The Vanderbilt, in Dry gulch, one of the old time producers, is owned by the members of the former firm of Skinner Bros. & Wright of Denver. The ore is of the same character as that of the gulch in general, and it is understood that with little development plenty of mineral of a good shipping quality can be opened up.

Lack of space forbids detailing the mining possessions of Kloster, Gilmore and Lonergan, a home company that owns a big scope of country in South Cement. The trio, like many other owners of prospects adjacent to large mines, are taking advantage of the big tunnels driven to cut veins deep.

We learned upon a visit to Gladstone last Sunday that George Petterson is negotiating a salo on his Big Colorado. South Cement. Consideration and party to whom the prospect is to be transferred are not known, but we do know that George is letting go of a good piece of mining property.

J. C. Bowman and Fred Grebles own two claims on Bonita mountain, the Pride of Bonita and the Pride of the Rockies. These two Prides are among the oldest claims in the Gold King gold belt and produced some excellent ore seven or eight years ago.

The Bismark and Theresa are two patented properties on Red mountain owned solely by W. F. Koehler. About 1,200 feet of work have been done on these claims, on both of which have been opened up large veins of free milling gold ore.

Tony Tam has several properties scattered here and there about Gladstone, a few of which can be made immediate shippers. Tony has been a contributor in the making up that upper country since the earlier days.

Among the Mammoth Tunnel company's officers mentioned in another column of this issue we unintentionally omitted the name of Geo. W. McClure as one of the directors.

Democratic Ticket.

The Democratic county convention last night nominated the following ticket: Miss Marie Hollingsworth, clerk; Curt S. Casad, sheriff; Miss Nellie Tulley, treasurer; Ole M. Lee, commissioner; Josiah Watson, county judge; Thomas Colmer, assessor; Fred Schurman, coroner; Finney Jones, surveyor; Charles Dale, school superintendent; John Carver, justice of the peace; William Moyle, constable; John F. Melton and Frank L. Watson, respectively chairman and secretary of the county central committee. It is a strong ticket and will undoubtedly be elected from top to bottom.

Next week the STANDARD will review the records of the candidates and tell why they should all be decisively elected.

CHURCH NOTES.

PEOPLE'S CHURCH.

The pastor missed the honor of the chairmanship of the State Association by being compelled to give up the visit to Denver this week.

Services on Sunday at 11 and 7:30. Morning sermon topic—"Converted to——what?" Evening sermon on "Purity, Peace and Power."

Wednesday prayer meeting 7:30—will be held in the parsonage. Every one is cordially invited to attend.

Advertised Letter List.

Following letters remain uncalled for at the postoffice in Silverton, Colo., for the week ending October 17, 1901.

Bizjak, Anton	Job, Enamuelli
Barry, David	Kennedy, Fred
Batista, Salvini	Lee, Jas A
Barcatta, Agustus	Lurney, Cora
Bertoldi, Givegio	Locke, W. A
Corcoran, James	McKianley, J E
Chase, E P	Mc'onnell, W W
Dearington, Cornelius	Martin, Rd
Frasier, Adam	Santoni, Geo
Guglielmo, Funnel	Thompson, Will
Harrison, Alex	Talbot, Geo
Healey, Stephen	Williams, Cas
Jackson, John	Werryton, J W

FOREIGN

Stifus, Pete (2)	Fortunato, Delsant
Valentino, Martino	Crivelli, Wm
Grou, Lorenza	Pietro, Bonazura
Francesco, Signor	Vincenzo, Serichio
Bizjak, Anton	Iceria, Domenico
Geldo, Pasquicietti	Frane, Eleste
Sodedland, Perins	Baramasco, Luigi
Meneghan, Francesco	

Parties calling for any of the above letters will please say "advertised" and give date of list. MATILDA MCCARTNEY, Postmistress.

Filed For Record.

From October 11 to 17, inclusive.

Elmer L. Lyons to S. G. Munn, mining deed - Alletha.

Chris Hanson to John R. Curry et al; mining deed—Minnie.

John M Gundry to the Ledge M. & M. Co., mining deed—Silver Ledge et al.

Erek Peterson to John L. Abbey, mining deed--Great Western and I. Creek.

F. H. Hinderer to W. D. Stanger, warranty deed—Silverton property.

Mrs. R. E. Dickenson to John L. Estey, warranty deed—Eureka property.

D. J. Wells to J. R. Curry et al, mining deed—Iron Maguet.

Frank Wetzel to Frank C. Kendrick, mining deed—Del Mino millsite.

George W. Howard to Miss Annie Jellick, war. mining deed—Winnemucca.

Geo. W. Bausman to National Cash Register Co, chattel mortgage — cash register.

Martha A. Tschudi to B. F. Boyd, warranty deed—Silverton property.

County treasurer to Isaac W. Rice, tax deed—Eagle Bird.

Frank C. Kendrick to K. & G. S. Co., mining deed - Lizzie.

Theodore D ck to William K. Brayden, warranty deed—Silverton property.

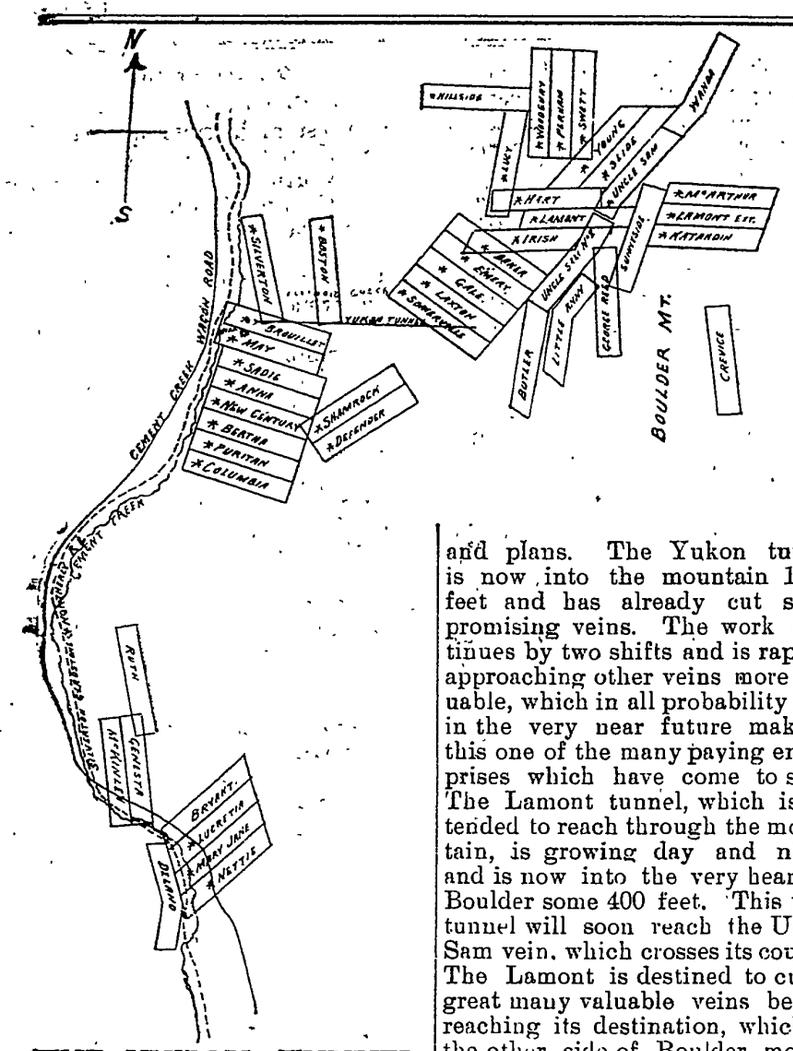
C. E Robin to Peter Grella, warranty deed—Silverton property.

Emma Roberts to C. C. Koenneker; warranty deed—Silverton property.

Matthew Reynolds to William Fararo, warraty deed - Silverton property.

Michael Perino to Bartolomeo Perino et al, war. deed - Silverton property.

Elmer Goodwin to L. G. Prosser, chattel mortgage—personal property.



THE YUKON TUNNEL.

The Boston & Siverton M. & R. Co.'s Big Project.

The Boston and Silverton Mining & Reduction company's property is conveniently situated on Boulder mountain about three and one-half miles from Silverton up Cement creek. The many valuable acquisitions to this property during the past two years give to it a large and almost continuous sweep of territory and embraces adjacent to the mill the Yukon and Lamont tunnels and some thirty-three claims, many-of which show value and are sufficienty developed to insure patents. The plat of the group herewith printed gives an excellent idea of the company's properties and plans. The Yukon tunnel is now into the mountain 1,000 feet and has already cut some promising veins. The work continues by two shifts and is rapidly approaching other veins more valuable, which in all probability will in the very near future make of this one of the many paying enterprises which have come to stay. The Lamont tunnel, which is intended to reach through the mountain, is growing day and night and is now into the very heart of Boulder some 400 feet. This tuntunnel will soon reach the Uncle Sam vein, which crosses its course. The Lamont is destined to cut a great many valuable veins before reaching its destination, which is the other side of Boulder mountain.

The company was organized in Colorado in 1894 and has its main office at 94 Court St., Boston, Mass. Among the substantial fixtures acquired by the company is a fine 80-ton mill, a picture of which is given elsewhere in this issue. Officers and directors of the company are R. F. Baker, Prest.; E. R. Perham, Treas.; Chas. S. Hart, Asst. Sec'y.; Chas. W. Swett, V.-Prest.; Andrew A. Lamont, Sec'y and Gen. Supt., and Moses W. Emery, Geo. A. Bronillett, Arthur McArthur and Dr. Laxton, Directors.

We wish the enterprising Boston and Silverton M. & R. Co. the success it deserves for its bulldog sticktoitiveness.

Another Large Mill.

Architects and engineers are making and drafting plans for the new concentrating works to be erected on Cement creek to treat the ores of the Henrietta and Lizzie mines of the Kendrick and Gelder Smelter company. The entire framing of this big concentration plant is to be made and fitted at the sawmills in the valley during the winter, and the timber seasoned, so all that will have to be done in the spring will be to put the timbers in place and fasten them to complete the entire frame work. The machinery is being ordered now, so that it will be ready ahead of time, in order that there may be no delay in receiving the same, ready for placing it in the mill.

The mill will be known as the Oliver Reduction Mill, and will have a capacity to start with of 200 tons per day, and so built that it can be increased to handle 500 tons of ore daily. All of the concentrates from this mill will go direct to the Kendrick and Gelder smelting works. A wire tramway, capable of handling at least 500 tons per day, will connect the mill and No. 7 level of the Henrietta mine, about 5,000 feet distant.

A number of eastern stockholders have been in this community the past few weeks to personally inspect the Henrietta and Lizzie mines and the Kendrick and Gelder Smelting company, and in each instance have returned east with a personal knowledge that the smelter is up-to-date and modern, and that the mines have more ore than can be taken out in an ordinary lifetime.

The erection of the Oliver concentrating plant is for the handing of the milling ores of the Henrietta and Lizzie mines. The smelting product of the mines will go direct to the smelter, while the milling ore will pass through the Oliver mill, and the concentrates from there to the smelter, and increase the output of the mines accordingly.

The
Kendrick Promotion
Company

have successfully invested hundreds of thousands of money in buying mines, building smelters, and developing mines in the San Juan district for companies with which they are connected.

WE ARE IN A POSITION TO OFFER MINES AND MINING STOCKS

of this district that will make big profits to investors. Now is the time to buy either stocks or properties, similar to what it was in Cripple Creek just before the boom. Write us for full particulars. We are one of the oldest, as well as most successful, mining firms in the state.

THE KENDRICK PROMOTION COMPANY,

Exchange Building, Denver, Colo., 720--736 Inclusive.

FOR
Groceries
That Are Groceries,
go to
O. BALLOU & SON.
'Nough Said.

San Juan MEAT MARKET
Bert Brown & Co., Proprietors.

Vegetable and Produce. - - - -

Fresh and Salt Meats.

Satisfaction Guaranteed. -:- Give us a trial. -:- Supplying mines a specialty

Cor. Greene and 11th Streets

"You will have to hurry," and subscribe for the Standard, if you wish to keep up with the San Juan.

W C Ferrill curator
Nat. history society

Silverton Standard

VOLUME XV — SILVERTON, COLORADO, JULY 2, 1904 — NUMBER 32

MINES AND MINING IN SAN JUAN

DEEP TUNNELS LARGE VEINS

The crosscut being driven on the Missouri Fred property, Boulder mountain, is making about a foot a day.

The Gold Tunnel and Railway company is running its mill 12 hours a day on ore that's being sorted out from the dump and low grade ore from the Lookout.

Fifty-five feet of ore, all a free milling proposition, is what the Gold Prince company has crosscut during the past month's work in their lower tunnel.

The manager of the Venetian Mining company forwards to the main office of the company every evening a daily report of the progress made on the property.

Manager Condit of the Astor Mining company informed the writer Monday morning that the machinery for the new mill had been shipped from Denver.

A contract for a 100 foot drift and upraise on the Fitz Lee claim on Bear mountain, has been let by the Woods Investment company to John Dryer and Joe Martin, who started in Tuesday.

George Crawford's Red Mountain special, carrying some eighty passengers, may be the first salute for the rehibitulation of one of the oldest and most famous mining camps at one time in the state of Colorado—Red Mountain.

George Noll and Jack Slattery and Dave Cunningham are working a small force on assessments on the Buffalo Boy and other claims, some of which are already on the list of shipping propositions, on Galena mountain.

The final payment of the $500,000 total was made last Thursday to the one time owners of the Sunnyside Extension properties, W. F. Popple, Rasmus Hanson, et al., and to the Gold Prince company was delivered the deeds to one of the largest mining propositions in San Juan county.

Can anyone tell The Standard if the Reliance Mining, Milling and Tunnel company, incorporated in 1886, is still alive? It was supposed to have operated in the Eureka mining district with Mr. Geo. Deming as president and Levi E. Bander as secretary.

Charles Whitton is developing a prospect, line of the Denver & Rio Grande, two miles south from town, west slope of Kendall mountain. The claim shows three to five inches of galena mixed with quartz that gives assay returns of 30 ounces silver and 20 per cent. lead.

It has been decided by the Supreme Courts of several states that a tunnel cannot be driven through the property of another to reach ground beyond. If A starts a crosscut tunnel on his own ground, and undertakes to reach a claim located beyond B's claim, B may stop A, if he is so disposed.

Mangus Anderson and Gus Eckhart have secured a contract for driving fifty feet on the Sapphire Mining company's property above Eureka. Development at present consists of a 300-foot tunnel and the 50-foot contract is to extend the tunnel to the point of intersection with the vein being driven for.

All machinery for the Astor Mining company has been ordered shipped from Denver and on or before the 10th inst., will witness the installation of the 39,000 pound Scotch Marine boiler and 37,000 pound engine with 125 horse power generators. George Van Bocken will have full supervision of the installation of the machinery at the mine near Eureka.

John H. Meager finished his building contract for the Bullion King Mining company last Saturday at which date the last piece of electric drilling machinery was unloaded on the ground ready to be put in place. Contractors are breaking ground for the installment of the power drills in the crosscut planned to tap the Bullion King lode proper at a distance of about 600 feet.

Louis Fritz and Al Renis have started working their Gold Lake–Bumblebee group, comprising seven claims, in Spencer basin. A cabin 15x28 feet has been erected and everything is in shape for a successful summer's campaign so far as lodging and grub are concerned. Two of the claims are rich in free gold, which fact has been sadly overlooked by mine buyers in this section. There's a good deal of water to contend with as a sinking proposition and the boys owning the property can't do much more by way of development than working assessments. A crosscut driven from a thousand feet below, possibly might open up a second Cripple Creek. A company with plenty of means is wkat is required in Spencer Basin.

Ludwig Votta shipped a 25-ton carload of lead ore from the Winning Card lode, Galena mountain, to Durango Thursday. The claim is a new location and the ore was broken from grass roots. "Lud" is a hustler and besides owning claims of his own, he has a lease on a good block of ground in the North Star, of King Solomon mountain, from which he will market about 25 tons of first-class gray copper Monday next.

On Sultan mountain, about one and one-half miles south from the Molas mine, Ben Ogle and E. J. Kirk are working the old Sam Brown location and are taking some good lead-gray copper therefrom, which rounds up values in lead-silver of $55 per ton. The ore is a splendid proposition for a lead smelter, inasmuch as it runs all the way from 20 to 74 per cent. lead. The main question is as to quantity. The claim is developed by only two assessments. It is said that the ore streak is improving as the tunnel advances.

Fred Steinecker, representing a Durango syndicate of wealth, is working a small force on a group of claims above Gladstone, Indications for reaching the "promised land" at an early date are good. Steinecker, prior to his advent as a mining man in San Juan county, was the proprietor of a livery stable in Durango and drove stage between Durango and Silverton 29 years ago. He is a German by birth. He's a mining man, now, with a mighty good showing in front and lots of money to back him for development. San Juan county extends Mr. Steinecker a cordial welcome.

The Mines Surety Company, operating on Sampson mountain near Gladstone, whose workings show thousands of feet of development in large bodies of low grade ore on the Natalie and Occidental properties, resumed operations on the Natalie with a force of about nine men early in the week. The property has been lying dormant for some time past for causes known to the officials of the company and the resumption of work thereon is very likely owing to the exhaustive efforts of Thomas Jefferson Hurley, president of the corporation. The fact of renewed activity being established in that section is very gratifying to the community at large.

William Feigel, superintendent of construction at the Treasury tunnel, Red mountain, was down from that mammoth enterprise Sunday and Monday on a still carpenter hunt. He succeeded in harpooning five knights of the hand-saw and jack-plane and bore them back in triumph to the scene of office, bunk house, etc., construction, which will occupy several months, Sunday. Feigel wanted at least a dozen carpenters, but prior returning to Red Mountain arrived at the conclusion of the wicked flea while no man pursueth. Treasury tunnel has made a wonderful stretch toward the development of a large area of the Red Mountain country.

Henry Lilly formerly of Silverton but of late a hardy prospector in the La Platas, was in town a couple of days this week and expressed his belief that the La Platas are bound to boom at no far distant day. "The May Day has taken the initial step as a rich producer," said M. Lilly, "and there are a good many other claims in close proximity to that young bonanza that are bound to follow her, just as soon as sufficient development shall have been done on them." There are a good many men working in the camp and all feel confident of a successful outcome. Lilly's property, in which he is interested with R. J. Williams, is four miles from the Neglected and within a mile of Parrot City. One of the claims of the property is in a body of iron sulphides adapted to concentration—assays running all the way from $2 up to $26 per ton, gold predominating. Wm. M. Boyle is working six men on development. Honest John tunnel is being steadily pushed ahead. John Hocking and Sam Birdseye are doing some good for themselves working on a lease. Harry Brown, brother of Bert Brown of this city, has also adopted the life of a La Plata prospector and works early and late.

The small force employed by the Barnes brothers on the Robert Bonner, South Lookout mountain, are making excellent progress in the lower tunnel driven on the vein which is now into the mountain some 400 feet. As nearly as can be estimated by surface and underground measurements, the face of the tunnel lacks but a few feet from being under the original ore shoot from the upper workings which from the manipulations of the Abbotts, former owners of the Bonner, produced in the neighborhood of $23,000. As will be remembered considerable of this output comprised free gold quartz of exceedingly high values and should the shoot being driven for prove continuous from surface to lower tunnel, old time values of course being taken into consideration, the Barnes brothers who are operating the property on a bond and lease will never have regretted

Continued on page 5.

DID YOU HEAR ABOUT?

Help wanted at the Grand hotel.

Ole Lee has purchased the John Thomas ranch near Hermosa.

There will be no services at the Episcopal church next Sunday evening.

George Crawford's eastern special into the San Juan next Friday will carry eighty people instead of sixty as reported last week.

Charles Yoho will hold the raffle of his pianola at the Hub saloon, Thursday night, July 21. If you have not secured a chance, do so at once.

Dr. Davis of Durango will be in Silverton July 10 and 11 prepared to fit those needing glasses or other work in connection with the eye, ear, nose and throat.

Ed. McCabe is doing a fine business with Casad's patent picture frame. Get him to put you up an Elk head similar to that on exhibition at the Hub saloon. It's well worth $5.00, the price asked.

At 5 o'clock Friday afternoon the flag pole was raised on the ball ground. A keg of Schulz was in attendance and the perspiration flowed merrily down.

A. H. Firey is out and around after a 3-week's siege of pneumonia. Though slightly disfigured through the loss of several pounds of flesh he insists that he's still in the ring.

William Schultz, of the Silverton Brewery, which turns out week by week the purest and best beer ever brewed in the state of Colorado, is an excellent entertainer, notwithstanding the abnormal capacity of a newspaper scribe.

The Rebekah banquet given at the Miners' Union hall Monday was a gratifying success to all interested. Among other features of the entertainment dancing was indulged, some thirty couples gracing the floor.

The interior of the Uno Club saloon building owned by August Fast and occupied by Pete Rasmussen, has been re-floored, repainted and re-papered and presents a seek no further appearance to admirers of first-class decorative art.

The recent increased business at the M. Brumfield store has necessitated the employment of an extra man. Mr. Paul Klavon, late ef Chilicothe,, but more recently of Mancos, Colo., has every appearance of a business getter. Mr. Brumfield will give his attention to the photo department almost exclusively hereafter.

Fourth of July celebration committee have worked like beavers and have all matters pertaining to even the slightest detail in regard to the Fourth down pat. Among other decorative departures from the old is that of a flag pole 65 feet high with a flag 10x25 feet to match.

Major E. H. Cooper, one of the promoters of the Venetian Mining company, made this office a visit Thursday and stated that an excursion party comprising about sixty stockholders in the company will arrive in this city July 24, for the purpose of examining the mineralized trail blazed by Adna Lampson.

The Standard will do its part in advertising San Juan by the distribution of a goodly number of it's large picture books to the Geo. Crawford excursionists who, no doubt, will appreciate the gift. Newspapers with special write-up answers a purpose for the time being but the Standard picture book will be kept as a San Juan souvenir. Who will do as much ?

John R. Thomas, chief chemist of the United States Pottery works at Melville, Ohio, was a recent arrival in this city. Mr. Thomas put in several days looking at our big producing mines which have been placed on a paying basis through hundreds of thumping stamps, concentrating machinery, etc., and also very carefully examined several great mining propositions, which are as yet merely in the embryo state of development. The gentleman having visited Cripple Creek and all of the camps of prominence in the state, unhesitatingly gives the palm to Silverton, which is as yet merely in its earliest infancy.

Detroit Journal: A new play by Hal Reid, entitled "A Homespun Heart," was acted for the first time in Detroit in Whithey's yesterday afternoon before an audience of the usual size, that is to say, one that was limited only by the capacity of the theatre. Like all of Mr. Reid's dramas, the present piece contains much that for want of a better term has come to be called "heart interest;" indeed several of the scenes were appealing and moving to a degree seldom achieved by the play purveyor to the popular price houses. The author is especially commended for having held the reins of his fancy tight and for not allowing his sentiment to run away with him in two or three scenes that done by a less experienced hand, might have developed tendencies of mawkishness that would have spoiled what is as it stands, a good play. The Christmas scene, without which a Reid play would not be recognizeable, is admirably managed, as is the scene picturing the worship of a family. There is much good tempered humor in the piece of the rough sort fitting to the personages of the play. "A Homespun Heart" opens at the Ballou opera house, one week, beginning July 11. Admission, 25, 35 and 50 cents.

Night was Her Terror.

"I would cough nearly all night long," writes Mrs. Chas. Applegate, of Alexandria, Ind., "and could hardly get any sleep. I had consumption so bad that if I walked a block I would cough frightfully and spit blood, but, when all other medicines failed, three $1.00 bottles of Dr. King's New Discovery wholly cured me and I gained 58 pounds." It's absolutely guaranteed to cure Coughs, Colds, La Grippe, Bronchitis and all Throat and Lung Troubles. Price 50c and $1.00. Trial bottles free at Cunningham's drug store.

Cunningham's
Drug Store
WATCHES, CLOCKS, JEWELRY.

We have moved three doors above our old location into the Bert Brown new building and will in connection with the drug business carry a first-class line of Jewelry,

All kinds of repairing done in a first-class manner.

Toilet Articles, Perfumes, Souvenirs,
Navajo Blakets and Curios.

The Silverton Supply Co

IS A GOOD PLACE TO BUY GROCERIES
REASONABLE PRICES.

Has its own Bakery, Pastery and Bread always fresh.

Has its own warehouse on track and can fill wholesale orders on short notice.

FRESH FRUIT
Fresh Vegetables
AND A
Fine Line of Groceries
To Select from.

N. A. BALLOU,
WHOLESALE AND RETAIL GROCERIES,
1157 Green Street. Phone 52.

PURELY PERSONAL.

—Mrs. W. Z. Kinney is in Denver this week.

—Ernest Grill left for his Boulder home Wednesday for a few week's visit.

—Miss Cecil Thornley of Gladstone, is visiting with the family of Alvin Kearney.

—Miss Cecil Thornley departed for a visit with her father at Delta, Tuesday morning.

—Mrs. George Thornley, of Gadstone, is visiting for a week or two with relatives in Delta.

—Ray Brown, of Golden, Colo., is a new member of the Silverton base ball team, having arrived last week.

—Mrs. Toney Tam has been on the sick list for about two weeks. At last account she was slowly improving.

—Col. Snowden was an outgoing passenger to Durango Monday, for a few days visit with his daughter in that city.

—Mr. Milton, Sr., and Doctor Milton, the dentist, went out on Tuesday morning's train en route to Pagosa Springs.

—Frank Ely departed for Pitkin to take charge of the construction of a ten stamp mill, Wednesday.

—Dr. Dawson has returned from Pueblo and contemplates making Silverton his residence for the summer.

—Mrs. Ed. O'Driscoll and children returned from an extended and very pleasant visit in Kansas, last Saturday night.

—Oliver Matthews, an old time Silvertonian but of late a resident of Colorado Springs, was an incoming passenger early in the week.

—George Van Bocken, machinist, came in from Aztec Wednesday. He is to place the machinery in the mill of the Astor Mining company.

—J. B. Lazaer, bank examiner, was an arrival Tuesday night. It is useless to say that he found First National Bank affairs in first-class condition.

—Fred Bunker and Judge Pendleton of Aztec, N. M., were in the city this week. They are the principal owners in the Little Bessie mine in Minnie gulch.

—Jim Hall, that persistent Ricoan who holds first place on the list of pioneers in that section was in Silverton this week, the guest of Elery W. Hunt.

—E. E. Nusbaum, W. J. Rattle and R. W. Hollis drove over to to Ouray Tuesday, Mr Nusbaum departing for Chicago, Messrs. Rattle and Hollis returning to this city Wednesday.

—John Sloan, who worked for many a moon in the Esmeralda, then took a few days lay off in the hot waters of Pagosa, was in town during the week. He is to take in the World's fair and also his old home in Tennessee.

—Mrs. Ovens and daughter of Durango, are in town for a few days.

—Miss Nellie Molique is enjoying the hospitality of friends in Durango.

—Theodore Grabowsky of the Gold Spur Mining company, returned from Denver Tuesday.

—Mrs. Ed. Walter returned from a pleasant visit in Durango of a week's duration Wednesday evening.

—Johnnie King, barber, is with us again having, he says, bid Denver farewell forever. Mrs. King will arrive in Silverton later on.

—W. J. Rattle of the Esmeralda and Grand Mogul properties, was an arrival last Saturday week. We understand for an extended stay.

—W. J. Lee returned from Old Mexico last Friday evening where he has been mining the past two years. He intends returning in the near future.

—C. W. Bloodgood of the Big Colorado, will attend a stockholders' meeting of his company next week in Denver and incidentally visit a few days with his wife and daughter.

—Nathan Gregg, who hails from Denver, and J. O. Harrison, of Pine Bluff, Arkansaw, were arrivals Tuesday. The gentlemen are large owners in a mining property above Eureka.

—E. E. Nusbaum of Chicago, and W. J. Rattle, of Ohio, were interviewing mining properties in this section in which they are largely interested, during the week.

—D. C. Thomas, who is said to be interested in the Green Mountain property, Cunningham gulch, looked the property over Monday and Tuesday and departed for his home in Wellsville, O., Wednesday.

—T. Feageans, W. F. Parker and Leon Hills are the latest to take up a summer residence, having as their profession ball playing. The trio are direct from Chicago although Mr. Hills was at one time a resident of Silverton.

—Tuesday Tom Annear and Ben Russell departed for St. Louis where they will disport themselves with the mermaids of the lake, etc., etc., at the big fair in a very becoming manner. Russell is billed to return to Silverton the 17th of July.

—Adna Lampson of the Venetian Mining company, departed for Chicago Wednesday. Of late Mr. Lampson has been badly afflicted from rheumatism and it is hoped that change of altitude and surroundings will prove beneficial.

—Mrs. George Hemphill and little son Archie departed for St. Johns, New Brunswick, Friday. They will be absent about three months during which time the World's Fair at St. Louis will be visited.

—Chas. W. Sweet, accompanied by his son Freeman, are out from Boston. Mr. Sweet, as owner of a large block of stock in the Boston and Silverton Mining company, has much to see, as recent development of this property has opened up ore in good quantity and quality.

—Messrs. Geo. R. Bidwell of New York and Herbert Cassard of Baltimore, are reviewing their interests in the Mines Security company, viz: The Ruby Basin M. and T. Co. and the Natalie-Occidental M. and M. Co. T. J. Hurley, as manager has much to show these gentlemen.

—Major E. H. Cooper, lecturer on the "Cliff Dweller," Dr. H. W. Ferry and Walter Smith, all of Chicago, Ill., were arrivals Tuesday night. Wednesday the gentlemen visited the workings of the Venetian Mining company's properties, Cement creek, in which it is said Major Cooper is interested.

—Jay E. Calibean and Bob Mornway came in from the opal geodes of Ute Creek Monday. Fourth of July celebrations still possess attractions, it "don't make no difference where you are nor what you are doin'," the brazen throated bugles, the big bass drum and the alluring soda pop, all possess charms it were hard to puncture.

—A. C. Trout, an extensive mining operator, who has been looking around Utah for several months past arrived in town the latter part of last week, stopped over with Ralph Thompson in the Benson block and is hunting a good mining proposition in San Juan county.

Safeguard the Children.

Notwithstanding all that is done by boards of health and charitably inclined persons, the death rate among small children is very high during the hot weather of the summer months in the large cities. There is not probably one case of bowel complaint in a hundred, however, that could not be cured by the timely use of Chamberlain's Colic, Cholera and Diarrhoea Remedy. For sale by all druggists.

Brutally Tortured.

A case came to light that for persistent and unmerciful torture has perhaps never been equaled. Joe Golobick of Colusa, Cal., writes: "For 15 years I endured insufferable pain from Rheumatism and nothing relieved me though I tried everything known. I came across Electric Bitters and it's the greatest medicine on earth for that trouble. A few bottles of it completely relieved and cured me." Just as good for Liver and Kidney troubles and general debility. Only 50c. Satisfaction guaranteed by S. D. Cunningham, druggist.

The Leading Tailor

WM. SHEARER,

Successor to Peter Nelson

For a Summer Suit of Chothes. Clothes cleaned and pressed. Prompt attention given to all work.

MASONIC BUILDING 209 THIRTEENSH ST.

THE CROOKE-FULLER HARDWARE COMPANY

Hardware,

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Mine and Mill Supplies

GUNS, FISHING TACKLE, ETC.

POWDER, CAPS, FUSE. REFRIGERATORS.

Plumbing and Tin Shop in Connection.

SILVERTON STANDARD.

KLINGER BROS., PUBLISHERS.

Entered at the Silverton, Colo. postoffice for transmission through the mails as second class matter.

OFFICIAL PAPER OF SAN JUAN COUNTY

ONE YEAR, $2.50.
SIX MONTHS, $1.25
THREE MONTHS, 75C

SATURDAY, JULY 2, 1904.

One of the great attractions in the horticultural exhibit at the Louisiana Purchase Exposition, is the seedless apple, propagated by John F. Spencer, of Grand Junction, this state. As the tree is said to be blossomless, it is bound to be free from worms and solid enough to withstand the severest frost.

The probabilities are that within the next thirty years wars will be numbered among the have beens—boards of arbitration having been called into requisition to settle tke difficulties between nations involved. The pipe of peace will then be smoked cross-legged by his royal nibs Nicholas and the Mikado, with the probability of a growler of beer thrown in. Thirty years, however, is a long time from start to finish, and what might transpire during that epoch it were difficult to predict.

Colorado is about as far inland as any state in the Union, yet she furnishes her quota to Uncle Sam's navy. According to data compiled by the navy department, there were in the last fiscal year 390 enlistments in Colorado, 904 in Missouri, 112 in Kansas, 101 in Nebraska, 417 in Indiana and 80 in Oklahoma. These are all interior states, and, with the exception of Missouri have no navigable rivers, so the romantic glamor of a "life on the ocean wave" may be considered as the reason why so many of their young men offer themselves for service under Uncle Sam's pennant.

St. John's Day Masonic Association entertainment at Mancos, according to the people who attended from here. both Masonic and otherwise, was on the very top shelf of the princely entertainments invariably given by the fraternity in which King Solomon a few hundred years ago took more than passing interest. Our worthy representative in congress, H. M. Hogg, delivered one of the most eloquent orations on Masonry ever heard in that section of the union. Other features of the entertainment were highly enjoyable—in fact, everything was. The hospitalities of the Mancos people are way above par and will not soon be forgotten on the Silverton end of the line.

PUBLIC SENTIMENT--THAT'S ALL.

The following extracts taken from our exchanges would suggest that the outside world does not sanction the flimsy justice of the modern petit court. Home sentiment is equally strong—it always has been—but what are you going to do about it. More anon.

At Silverton yesterday, the man Brown, who assaulted and threatened to shoot Editor Klinger, was fined $5 and costs. Must have a friend at Court. Klinger will carry the matter to the higher courts.—Telluride Journal.

A. A. Brown, the Silverton mining promoter who made the gun play at Editor Klinger of the Standard the other day, was fined $5. If he had shot the newspaper man, he would have probably been assessed as much as $10. Journalistic hides are not worth much now, anyway.—Telluride Examiner.

Tuesday at Silverton A. A. Brown, a mining promoter went into the office of the Silverton Standard and it is alleged pulled a gun on O. W. Klinger, one of the editors. Before shooting, however, Brown concluded he would read the riot act to his intended victim. While engaged in this brave task Klinger's aged father showed up with an old gun which distracted the bad man's attention and gave O. W. a chance to hotfoot, closely followed by the heavyweight promoter and his gun. But Klinger escaped and Brown was forthwith arrested. The trouble arose over the Standard's criticisms of Brown's promotion schemes.—Times, Pagosa Springs, June 25.

Silverton had a small excitement Tuesday morning when A. A. Brown, a mining man, went into the Standard office and began telling Editor Klinger about a little graveyard scheme he was promoting and his intentions of using the editor's carcass to start the thing going. While Mr. Brown was in the midst of his argument which, it is said, he illustrated with a six-shooter, Editor Klinger's father appeared on the scene with a firearm and compelled Brown to put his artillery in his pocket. Just at this juncture Editor Klinger was seized with an intense thirst and started for the Hub saloon on a brisk trot. Whether he invited Brown to go with him or not we do not know, but it seems Brown went and there ran into an officer who took him in charge. Brown claims that items have appeared in the Standard detrimental to his mining operations.—Dolores Star, June 25.

One Lady's Recommendation Sold Fifty Boxes of Chamberlain's Stomach and Liver Tablets.

I have, I believe, sold fifty boxes of Chamberlain's Stomach and Liver Tablets on the recommendation of one lady here, who first bought a box of them about a year ago. She never tires of telling her neighbors and friends about the good qualities of these Tablets.—P. M. Shore, Druggist, Rochester, Ind. The pleasant purgative effect of these Tablets makes them a favorite with ladies everywhere. For sale by all druggists.

When billious take Chamberlain's Stomach and Liver Tablets. For sale druggists.

Chamberlain's Colic, Cholera and Diarrhoea Remedy.

This remedy is certain to be needed in almost every home before the summer is over. It can always be depended upon even in the most severe and dangerous cases. It is especially valuable for summer disorders in children. It is pleasant to take and never fails to give prompt relief. Why not buy it now? It may save life. For sale dy all druggists.

Matthew Reseigh.

Night of Sunday, June 26, at 10:10 Matthew Reseigh died at the Barmouth hotel. The disease was pneumonia and the last sickness was of about a week's duration.

Mr. Reseigh had followed the occupation of mining for the past fourteen years in Colorado and when overtaken by the fatal disease he was employed on the Unity tunnel by the Silver Lake people. While prostrated on his bed of pain with the light of life slowly but surely dying out, deceased received the very best of medical attendance and careful nursing that could be procured, all of which, however, proved of no avail, and the pain racked form sank into the inanimate.

Mr. Reseigh was born at St. Just, Cornwall, England, 45 years ago. In 1895 he made his first advent to Silverton and during the years that have passed since that period the greater part of his time was passed under ground in the various mines of the camp. A wife and three children survive him in Cornwall and two brothers and a sister in this state, namely, Thomas Reseigh, wno resides in Silverton and John and Bessie whose home is in Denver. He was a member of the Miners' union and was buried from the hall of that order Tuesday afternoon.

K. of P. Notes.

The Knight rank was conferred on Esquire George Tennick last Wednesday evening by Snow Flake Lodge No. 61.

A vote of thanks is extended to the W. of W. band, plus a box of good cigars by Snow Flake lodge, for their kindness in heading the processions and rendering music for the funeral occasion of Bro. Reynolds and the Memorial procession to the cemetery.

Rathbone Sisters and Knights, don't forget the invitation to the installation of officers of the K. of P. lodge, July 6, 04.

Thos. R. Ovington, Grand Chancellor Commander, K. of P., is a very enthusiastic worker. Snow Flake lodge feels highly gratified to have received a visit from him and hopes that it will not be the last.

Take Notice.

All who have not paid dog tax since May 1 or for the ensuing year, must pay on or before July 1 or dog will be killed.

A. B. AVERY,
Town Marshal.

Cured of Chronic Diarrhoea After Ten Years of Suffering.

"I wish to say a few words in praise of Chamberlain's Colic, Cholera and Diarrhoea Remedy," says Mrs. Mattie Burge, of Martinsville, Va. "I suffered from chronic diarrhoea for ten years and during that time tried various medicines without obtaining any permanent relief. Last summer one of my children was taken with cholera morbus, and I procured a bottle of this remedy. Only two doses were required to give her entire relief. I then decided to try the medicine myself, and did not use all of one bottle before I was well and I have never since been troubled with that complaint. One cannot say too much in favor of that wonderful medicine." This remedy is for sale by all druggists.

Japalae.

Get a can of Japalae to brighten up your furniture. Fred Goble has a supply of it on hands.

WANTED—A good girl for general house work, by Mrs. W. N. Searcy. Apply at once.

FAMILY HOTEL

MRS. E. SHAW.

Special Rates for Ladies who are Looking for Work. Employment Found.

Only first-class assistants are employed by Williams, the painter in his painting and paper hanging business, 1113 Green street.

For up-to-date work go to Freeman & Lamb's barber shop. First door south of Doud's livery barn. Phone, "Red-724."

D. W. Williams, "The Painter," has just received a new consignment of wall paper. 1113 Green street.

You are always "next" at Freeman & Lamb's. Best baths in the city.

OLD DISCARDED JEWELRY There is a small fortune's worth of it hidden away in nearly every home. Probably no one values it. Bring it to us we will transform it into new Jewelry or give you its value in cash. Henry Deitrich, the only Manufacturing Jeweler and diamond setter in San Juan.

Ice cream made to order at Mrs. E. Shaw's. 'Phone Red 812.

GOOD NEWS FOR MOTHERS AND DAUGHTERS.

How often do we see a naturally beautiful face marred by wrinkles, blackheads, blotches and pimples, caused in the majority of cases by inactivity of the pores of the skin? These minute openings fail or are unable to perform their natural functions, hence the skin is disfigured.

We are pleased to say that the new remedy Paracamph makes the skin soft, smooth and healthy, by creating a natural activity in the pores.

When applied, Paracamph opens the pores, stimulates circulation, removes congestion and any inflammation by inducing perspiration. It draws out the impurities and removes Black-heads, Pimples, Blotches, etc., in a perfectly safe and sure manner.

If applied freely to the face twice a day, morning and night, and rubbed in well, then covered with a hot towel for two or three minutes, it will not only cool and soothe but remove the troubles and impart a healthy peach bloom glow to the skin that will please even the most particular woman.

Paracamph positively does not contain anything that will injure even the most delicate skin. It is a clean, safe, cooling, soothing, application that every mother and daughter can use every day in the year with pleasing and satisfactory results.

A trial will convince you. So get a bottle of Paracamph to-day from your druggist, if it fails to do what we claim, go back to your druggist, the man you know, and get your money. We guarantee every bottle to give satisfaction.

Sold only in 25c, 50c and $1.00 bottles. —The Paracamph Company, Louisville, Ky., U. S. A.

For Sale by

S. D. CUNNINGHAM.

On the Diamond.

The base ball feature of the Fourth of July celebration seems to outshine all other attractions. There will be at least four teams in the field battling for supremacy in the San Juan, viz: Durango, Silverton, Silver Lake and last but not least, Gold King. At the present time the Silver Lake team looks good to the average critic, as the pennant winners. The Gladstone team claim that they have "dough to burn" on their chances. Durango and Silverton teams are "sawing wood." The teams will line up as follows:

Sunday, July 3, Silver Lake vs. Gold King, 10:30 a.m.—Matched game for $100 aside.

Sunday, July 3, Durango vs. Silver Lake, 2:30 p. m.

Monday, July 4, Silverton vs. Silver Lake, 10:30 a. m.

Monday, July 4, Silverton vs. Durango, 2:30 p. m.

The Silverton base ball team went to Durango last Sunday morning and lined up on the Smelter City diamond at 2:30 that afternoon against the team of that city with a hope that they might return in the evening with nine foreign scalps dangling at their belts. These hopes were all for naught, however, and instead of bringing belt ornaments above mentioned the boys returned entirely shorn of their locks, but not out of humor by any means. The score at the end of a nine inning game was 11 to 8 in favor of Durango, and this little rebuff will only serve to put new life and better action in future contests.

Absence of the Silverton team would ordinarily defeat the pleasure of local fans, but upon this occasion it didn't. A team has just been organized at Gladstone and known as the Gold King team, which contains foreign talent—that is, boys from the big windy city in Illinois who have located in Gladstone and their initial game was put up on Silverton grounds against the Silver Lake team Sunday afternoon. The latter team was altogether too fast for the new aggregation, but after a little practice they hope to put up a better quality of ball. Score at the close of the fifth inning was 9 to nothing in favor of Silver Lake, and rain drove players and spectators from the grounds.

The latest acquisition at the home of Mr. and Mrs. W. P. Rideau is a baby girl, on Wednesday morning. It's weight was 10 pounds.

Advertised Letter List.

Following letters remain uncalled for at the postoffice in Silverton, Colo., for the week ending July 1, 1904.

Brady, Frank R (2)	Guiltoyle, J E
Freed, Nellie	Hardesty, Cal
Person, L M	Reeser, Frank (2)
Reese, A L	Ruane, Anthony
Sweeny, John	Seal, P
Tomner, Frederic (2)	

Parties calling for any of the above letters will please say "advertised" and give date of list.

AUSTIN M. REED,
Postmaster.

Spring has arrived and with it the desire to remove old worn out and shabby colors from both exterior and interior of dwellings and replace them by new. D. W. Williams, the painter, does all such work to a charm, 1113 Greene St.

Fifty Years the Standard

DR. PRICE'S CREAM BAKING POWDER

Improves the flavor and adds to the healthfulness of the food.

PRICE BAKING POWDER CO.
CHICAGO

MINES AND MINING.

Continued From Page One.

their venture. Some of the richest free gold specimens ever taken from any of the mountains environing Silverton were produced by the Bonner some ten or twelve years ago, and, according to indications, there are bunches of the same material awaiting uncovering at greater depths.

William Bird of 31 years mining experience in this county during which he has accumulated a group of six claims situated above Eureka and has done about $10,000 worth of labor thereon, was in town Monday taking a brief respite from assessment work. As a big milling proposition Mr. Bird's group is A I, although it was turned down a few months ago by a certain outfit who proposed to buy the entire San Juan mining country on jaw-bone. Millions of dollars in sight were figured out by the expert of the "investment company" on every claim that he examined. Boulder mountain, Maggie gulch, Eureka and other mining sections were all investigated much to the detriment of the honest prospectors who put up for horse hire and ultimate disappointment. Mr. Bird recently struck ore in one of his tunnels that gave returns of 50-100 ounces gold and 10 15-100 ounces silver.

To the Public.

Having contracted with Mr. George Crawford to provide rooms for his party of sixty guests on the evening of July 9, and as it is impossible for me to do so in the hotel, I would deem it an especial favor if those having rooms they can rent me for one night would notify me not later than Wednesday of the coming week, their names, number of rooms and street numbers.

Respectfully,
C. L. PETHERBRIDGE.

Fourth of July Excursions—One Fare for Round Trip.

One fare July 2, 3 and 4; final limit July 6, 1904. To all points in Colorado and New Mexico on the D. & R. G. R. R.

H. HUSSEY, Agent.

WM. FEIGEL,
Millwright & General Contractor
For the Construction of Concentrating Mills and Mine Work.
SILVERTON, COLO.

CHAS. SCHEER,
PRACTICAL PLUMBER
and Steam Fitter.
Headquarters at
Joseph Bordeleau's

ANYTHING YOU WANT?
TELEPHONE 344 BLACK.
Ladies' and Childrens' Shoes.
Groceries and Gents Furnishings

Our Photograph Department is still the leading gallery in Silverton.

BRUMFIELD

Fred Goble
Wholesale and Retail Dealer in
LUMBER AND COAL,
Screen Doors, Sash, Doors, Lime, Cement and Mining Timbers.
The Perins Peak Coal.
PHONE 46-A.

DOUD BROS.
EXCHANGE LIVERY
OPPOSITE GRAND HOTEL.
SADDLE HORSES. DRIVING HORSES.
AGENTS FOR
HESPERUS COAL.

Men's Straw Hats. Fine line Lowest Prices.

Big 4th of July Sale

at the Big Store.

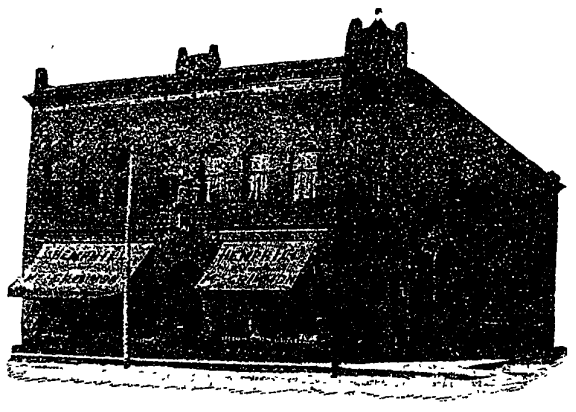
25 cts Fast Black Sox 2pr for 25 cents.

Intending buyers of clothing and furnishings will find in this sale an opportunity to save some money on their Fourth of July fixings in above line of goods.

OUR STORE WILL BE OPEN ALL DAY TO-MORROW, (SUNDAY) TO ACCOMODATE THOSE COMING IN FROM THE HILLS.

MENS' SUITS.

We cannot say too much about our line of mens' clothing—the Crousse & Brandegee make. This is one of the finest makes of mens' clothing manufactured in America to-day. Perfect fitting. Best materials and guaranteed to hold their shape.



MENS' SUITS.

We are selling these suits to the best dressers in San Juan county, our sales of clothing this season having doubled over last year, and for style and fit they are the peers of the so called tailor-to-the-trade suit and cost at least one-fourth less.

During this sale we will have some special values at $12.50, $15.00, $16.50, $18.50, and $20.00.

If you need a suit you will consult your own interests by seeing this line before you make your purchase.

Mens' Shirts---Monarchs, Cluetts and Crowns ---the finest line of dress shirts in town, $1.00 up.	J. B. Stetson Hats for this sale only $4.00 $4.00	Men's Cravenette Rainproof Coats, ¼ off $16 coats, $12 20 coats, 15 27 coats, 21
Men's shoes. Snow's fine dress shoes. This sale $4 a pair.	Men's hats. Best values. All styles at $1.50, $2.50, $3.00	Men's Neckwear. Fine new line, at 50 & 75 cts
Men's underwear of any description. High grade cotton at $1.50 a suit.	Men's pants. Odd Suit Pants worth $5 and $6. Sale price $3.95	Men's Pants. One lot worth $2.50 to $3.00. Choice at $195 pair

WYMAN BLOCK **Hemphill & McCrimmon** WYMAN BLOCK

Home Life in Italy

In all Europe the most maligned country and nationality is Italy and the Italians, with regard to the upper middle and middle class men, says the London Telegraph. Of the aristocrat there is nothing to be said; competent authorities have declared him to be neither better nor worse than his compeers in other countries. Aristocratic society is cosmopolitan. The middle-class husband in Italy is the most long-suffering and hard-worked, one may venture to say, in all Europe, and while his aggravations are many his retaliations are few. To those who look on from the heights of foreign superiority it is a continual wonder that he does not break out oftener than he does. Conditions, of course, have much changed in the last fifteen years; there is more money and consequently more comfort, but also greater necessities and demands. The more modest type of the middle-class husbands, whose means are as a rule very limited, will make money go farther. He will have, perhaps, from £2 to £3 a week, and with this will support a wife and from three to six children in such a way as to show no signs of real poverty. His house will have few comforts, his food will be of the simplest, while his wildest diversion will be an occasional visit to a cafe and his habitual one a walk along the Corso or a stroll on the Pincio to hear the band play.

It must be taken into consideration that if his house is bare, it is flooded with the sunshine which only Italy provides, and if he is cold he has only to put himself in the sun, which is always called the "Italian stove." With all his poverty, he is hospitality itself. He will invite people to his table, making no apology for its simplicity, and will make it seem a feast by his cordiality and high spirits. He welcomes friends in the evening in his family circle, and is in the habit of returning such visits.

But where the middle-class man, both rich and poor, shines above his fellows, is as a father. He will make any sacrifices for his children, and what is rarer, lives with them, so to speak, and enters into their daily life. No stowing away in the nursery with a governess for his children. A nurse there is, but he and the children's mother think of everything, and the youngsters to the public school and overlook their lessons at night. If there is a nurse, she is usually a foreigner, either French or German, and her duties are more to keep the children clean and walk out with them than anything else. Certainly Italian small children are not attractive, because over-indulged; but later their manners are charming, because they are always with their parents, and they thus unconsciously learn ease of manner and gracefulness of speech.

The Experience of All

"How many valuable lessons there are that we insist on paying for at the high cost of experience," said Uncle Hiram, "when we might get them for nothing if he would only be willing to profit by the experience of others!

"Take, for instance, the case of my young nephew, William, who is just now making a boat, whittling it out with his jacknife.

"I find him trying to split off a big slab of wood from the block by prying at it with the blade of his knife, and I try to explain to Willie that it won't do to use a knife as he would a crowbar, that a knife isn't intended for such use, and that if he keeps on prying with it like that he'll break the blade off, sure. But William knows better, and he keeps on prying, and pretty soon he snaps the blade off and then he comes to me with the broken knife and says:

"'Uncle Hiram, the blade broke.'

"But he had to learn that lesson for himself, and he will break off another blade or two before he will have learned the lesson convincingly; and it will be just the same with all the boys that come after him.

"Twenty or thirty years from now, Willie, grown older then and wiser by experience, will be telling his nephews or his own sons, maybe, that it isn't safe to try to pry logs apart with a penknife; but his sons and nephews will think they know better, just as he thought, and go on just the same, till they have learned, as he did, by breaking their knives.

"Would that the bitter lessons that we insist on learning in this hard way by experience were confined to those that we learn in our youth, in whittling boats!"

About Feasts in Fiction

There are certain people who have been known to dislike the "Pickwick Papers" because there is so much eating and drinking in them. But, as a matter of fact, Dickens, fond as he is of giving his characters a good meal, does not introduce cakes and ale into his novels to a greater extent than do other great authors. Thackeray commented on the frequent banquets in Scott's works, and Lord Byron's poems are full of feeding. The fact is that the great majority of readers enjoy a banquet, and one of the next best things to participating in a banquet one's self is to read the details of feasts in fiction. This maxim applies with even greater force to the younger generation. Sir Conan Doyle has given it as his opinion that an author who can interest boys will do well in his profession, and in the recipe for interesting boys is included the rule, Never scamp the description of a meal—give it in detail.

The thousands of young readers who have devoured Harrison Ainsworth's "Tower of London" probably remember the little suppers in the stone kitchen with greater pleasure than almost any other portion of the romance. There was a magnificent spaciousness about those meals which could not fail to appeal to the reader. The very word "pasty" is a poem, and the mention of "chines of beef" and the like convince him that this time he has really got hold of a classic.—London Globe.

ESTABLISHED 1876
Silverton Meat & Produce Co.
DEALERS IN ALL KINDS OF
Fresh and Salt Meats, Ham, Bacon, Kettle Rendered Lard, Del Norte Creamery Butter, San Luis Valley Eggs and Vegetables of All Kinds
Supplying Mines in Any Quantity
AT BED-ROCK PRICES
Brick Building 1125 Green Street

Independent Meat Market
C. H. H. KRAMER.
Wholesale and Retail Butcher.
FRESH FISH. FRESH MEAT.
Vegetables, Cured Meats and Poultry.
Rohrig & Kramer's Old Stand.

SAN JUAN SMELTING AND REFINING CO.
F. C. KENDRICK, General Manager E. W. WALTERS, Supt. and Metallurgist
Purchasers of Gold, Silver and Copper Ores. Special rates on tonnage of low-grade ore.
SAMPLING and SETTLEMENTS MADE PROMPTLY
AND AT ALL TIMES

Joseph Bordeleau,
DEALER IN
HEAVY AND SHELF
HARDWARE
Stoves, Crockery, Tinware and Mining Supplies.
Agent for Hercules and Giant Powder Fuse, Caps, Etc.

L. G. PROSSER,

Furniture Dealer

AND UNDERTAKER

The Best Line of Sewing Machines in the World,

THE
STANDARD ROTARY
WHITE ROTARY
NEW HOME
HOUSEHOLD
IDEAL

Sold Here on Time at Denver prices.

ERNEST GRILL & CO.

Lumber and Feed

Wholesale and Retail Agents for

HESPERUS
BLACK DIAMOND
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PETE ORELLA

SOLE AGENT FOR

ANHEUSER-BUSCH, LEMP'S and ZANG'S
BOTTLED AND KEG BEERS

Also Agent for—The Original Manitou Ginger Ale and Mineral Waters. - - - -

Phone 7-C P. O. Box 217 Silverton, Colo.

THE WORLD MOVES

So Do I

And if you want a prompt delivery of goods or baggage see that you have WM. LESTER do it. Ring up phone Silver 102 or N. A. Ballou's Store.

All trains arriving and departing reached in due season and baggage carefully handled.

The Silverton Transfer

WM. LESTER, Prop.

MISSOURI PACIFIC RAILWAY

THE WORLD'S FAIR ROUTE

The Louisiana Purchase Exposition, or World's Fair, St. Louis, is in all respects the greatest ever undertaken in any country. It is more than ten times the size of the Pan-American Exposition at Buffalo in point of floor space in the exhibition palaces, twice as large as the Columbian Exposition at Chicago, about three times larger than the last Paris Exposition.

The Missouri Pacific is the direct line from Colorado to St. Louis, having double daily through chair cars, tourist and Pullman sleepers and dining cars.

Very low trip rates will be made from this great show.

For further information see your nearest agent or write,

H. B. KOOSER, G. W. F. & P. A.

ELLIS FARNSWORTH, Traveling Passenger Agent.

17th and Stout Streets, Denver, Colorado.

Rats on Shipboard.

The rat is a great traveler. The hold of a ship is to him an earthly paradise. He always finds goods there and various kinds of provisions. Embarkation has no difficulties for him. He works by night, when no one can place obstacles in his way, and while the ship is moored to the quay. He enters by passing along the ropes, communicating freely between the vessel and the dock.

Fad for Abalone.

In California there is a fad for eating abalone, a large mussel, which furnishes the beautiful shell used for ornamental purposes. The Chinese have eaten them for years, but until recently Americans scorned them as food. Now abalone chowder, soup, and even abalone steaks are considered great delicacies in San Francisco.

Japs Take Balloon Course.

A number of Japanese staff officers have been instructed at the school of military ballooning at Aldershot, England, which is the most important one in the world. Officers are taught to take important observations from great heights, as well as the making of maps and taking photographs from both free and captive balloons.

Promenade at Khartoum.

Lieut.-Col. Newnham Davis went to Khartoum expecting to see a barbaric city, but found a promenade laid out along the river bank and lighted by gas lamps; snug, respectable little red brick villas, a new and quite comfortable hotel, and all the usual buildings of an English cantonment.

Korean Names.

The Koreans write their names as the Chinese do, with the surname first. They usually have three names; first, the surname; second, a generation name, borne by all members of a family in a generation, however numerous the cousins may be, and third, the individual name.

His Rule of Business.

A fair young thing, who buttonholed a Wall-street magnate and asked him what was his rule of business, is puzzling over his answer. "Very simple. I pay for something that I can't get with money I haven't got, and then sell what I never had for more than it ever cost."

Remarkable English Echo.

An echo in Woodstock Park, Oxfordshire, England, repeats seventeen syllables by day and twenty by night. One on the banks of the Lago del Lupo repeats fifteen. One on the north side of Shipley church in Sussex, England, distinctly repeats twenty-one syllables.

Making Cotton in Japan.

Employes in Japanese cotton factories get only 8 to 14 cents for a day's work of eleven or twelve hours. The work, however, is much less strenuous than in this country, and much time is wasted in loafing, talking, laughing and drinking tea.

Pranks of Magnetic Needle.

A German professor says that over a large area of central Russia the magnetic needle does not point north or south. It is in one part deflected to the west, and at another part to the east, and at one place it points due east and west.

Pride and Vanity.

The foundation of pride is the wish to respect one's self, whatever others may think; the mainspring of vanity is the craving for the admiration of others, no matter at what cost to one's self-respect.—F. Marion Crawford.

M. B. HOLT

Mining Engineer

Phone Black 543

U. S. Deputy Mineral Surveyor

FINNEY JONES

CIVIL ENGINEER

Cor. Reese and 13th

SILVERTON, COLO.

JAMES DYSON,

CIVIL AND MINING ENGINEER

U. S. Deputy Mineral Surveyor

Office on Reese Street, between 14th and 15th near the county offices. No. 1437. P. O. Box 118.

J. S. BAILY

DENTIST

Residence Phone
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Silverton Colorado

C. A. COOPER

ASSAYER

Gold or Silver	$ .75
Both	1.00
Copper	.75
Lead	.50

Complete price list on application.

The Schulz Brewery

BREWER OF

HIGH-GRADE LAGER

WM. SCHULZ, PROPRIETOR.

Our new brews under the present management have reached a high grade of perfection. Its pureness is guaranteed. Ask for it, as it is sold by all first-class dealers.

.. CIGARS ..

Pure Tobacco and Clean Manufacture is the reason.

ANDRE'S CIGARS

An Industry in Silverton.

Our respected fellow citizen, James C. Bowman, store keeper of Gladstone, managed to dig up enough, after having gone through Thursday night's burglarism, to pay his liquor license for the ensuing year. The old man's face was drawn down into hard lines, in fact he looked as pale as a ghost from the terrible experience he had undergone, yet, by a simple twist of the wrist, on one of the lockers of the last safe the burglars forced him to open, Mr. Bowman managed to outwit the wicked men out of some $1300 concealed in a drawer of the safe. Virtue meets its own reward, meaning, of course, Mr. Bowman, and the $1300 saved. For the future Mr. Bowman will doubly bar his doors and fling North Pole Bob on the outer bastion.

Killed in a Cave-In.

Friday night 24th ult., Bettiole Mineola was instantly killed by a cave-in which occurred in stope No. 9, Silver Lake mines. Mr. Mineola was a native of Tyrol, Austria, where he leaves a wife and four children to mourn his loss. He had been on this side of the Atlantic but about six weeks during which time he was employed by the Silver Lake company. He was honest and industrious, a man of good habits and highly respected by all with whom he came in contact. Two surviving brothers are residents of Colorado, namely, Angelo who resides in Silverton and Ben whose residence is in Central City. The funeral occurred from the Catholic church at 2:30 Sunday afternoon and was very largely attended.

She is a Mystery.

A mysterious woman who arrived at the Last Chance barn on horseback a few mornings ago from Ouray via Silverton is causing a good deal of talk about the country, and particularly at Ouray. After leaving the horse at the Last Chance barn she went to the Occidental for a bed but only remained a short time, getting up at breakfast time and then disappearing as mysteriously as she came, leaving at the hotel her riding habit and part of a wig. Manager E. P. Jordan of the Last Chance got in communication with the owners of the horse and saddle at Ouray and turned them over. He says he did nothing of the kind with the rider, though, and knows nothing of the woman, whence she came nor whither she went.—Lake City Times.

No mysterious woman tallying with the above description was noted as having passed through Silverton either on horseback or on foot, from Ouray or anywhere else. Might have been, however, that the mysterious visitation in Lake City was on the Phantom ship or the Flying Dutchman line.

Obituary.

Mrs. Nina Revello, wife of Paul Revello, formerly of the Silverton firm of Lorenzon, Grivetto & Revello, but of late a residant of Denver, died in that city June 25, as the result of an operation performed on her for tumor. The remains, accompanied by the sorrowing husband of the departed, arrived in this city Wednesday evening, many friends of Mr. Revello and his dead wife repairing to the depot upon the arrival of the train. Funeral services were conducted from St. Patrick's church Thursday afternoon at 2 o'clock, Father Riordan officiating. Sympathies for the bereaved husband and sisters of the deceased, Mrs. John Lorenzon and Mrs. Joe Gravetto, are extended.

Working Night and Day.

The busiest and mightiest little thing that ever was made is Dr. King's New Life Pills. These pills change weakness into strength, listlessness into energy, brain-fag into mental power. They're wonderful in building up health. Only 25c per box. Sold by S. D. Cunningham.

CHATTEL MORTGAGE SALE.

Notice is hereby given that at 10 o'clock in the forenoon of Saturday the 9th day of July, A. D., 1904, at the residence of Theo. Dick, in Silverton, Colorado, I will sell at public auction for cash, for the best price obtainable therefor, one upright boiler and engine, one hydraulic washer, one Troy Mangle, one shirt machine, one laundry wagon, one set of shafting and hangers, two laundry stoves and other laundry appliances, by virtue of the power and authority contained in that chattel mortgage, of record in book 87, at page 87, of the San Juan county records, given by J. R. Stahlnecker to W. D. Stanger, to secure a promissory note therein described, of which I am the present owner, to pay the balance due on said note, the interest thereon, and all costs, expenses and charges touching the same.

Dated at Silverton, Colo., June 16, 1904.

JOHN F. SORGE.

First pub June 18; last July 9, '04.

NOTICE OF ADJUSTMENT DAY.

Estate of Thomas K. Holden, deceased.

The undersigned, having been appointed administrator of the estate of Thomas K. Holden, late of the County of San Juan, in the State of Colorado, deceased, hereby gives notice that he will appear before the County Court of said San Juan County, at the Court House in Silverton, in said county, on Monday, the 25th day of July, A. D., 1904, at the hour of 10 o'clock a. m of said day at which time all persons having claims against said estate are notified and requested to attend for the purpose of having the same adjusted. All persons indebted to said estate are requested to make immediate payment to the undersigned.

Dated at Silverton, Colorado, this 16th day of June, A. D., 1904.

GEO. HEMPHILL,
Administrator of the Estate of Thomas K. Holden, deceased.

First pub. June 18; last July 9, 1904.

NOTICE OF ADJUSTMENT DAY.

Estate of Mrs. Hilda Olson Deceased.

The undersigned, having been appointed Administrator of the estate of Mrs. Hilda Olson, late of the County of San Juan in the State of Colorado, deceased, hereby gives notice that he will appear before the County Court of said San Juan County, at the Court House in Silverton in said County, on Monday the first day of August A. D. 1904, at the hour of 10 o'clock a. m. of said day, at which time all persons having claims against said estate are notified and requested to attend for the purpose of having the same adjusted. All persons indebted to said estate are requested to make immediate payment to the undersigned.

Dated at Silverton, Colo., this 25th day of June, A. D. 1904.

HENRY OLSON, Administrator of the estate of Mrs. Hilda Olson, Deceased.

First pub. July 2, 1904.
Last pub. July 23, 1904.

SUMMONS.

STATE OF COLORADO, } ss. In the County Court.
COUNTY OF SAN JUAN, }

MAGDALENA K. HUG, Plaintiff, }
vs. } Summons.
ALBERT HUG, Defendant. }

The People of the State of Colorado to Albert Hug the defendant above named, Greeting.

You are hereby required to appear in an action brought against you by the above named plaintiff, in the County Court of San Juan County, State of Colorado, and answer the complaint therein within thirty days after the service hereof, if served within the State of Colorado or by publication; or, if served out of the state of Colorado, within fifty days after the service hereof, exclusive of the day of service; or said action may be regularly set for trial the same as though such appearance had been made and issue had been joined on such complaint.

The said action is brought by plaintiff to obtain a decree of divorce, dissolving the bonds of matrimony now existing between plaintiff and defendant, on the ground of desertion and non-support for more than one year last past. To secure the care, custody and control of all the children of Plaintiff and Defendant and for Plaintiff's costs and general relief as will more fully appear from complaint in said action to which reference is here made and a copy of which is hereto attached.

And you are hereby notified that if you fail to appear, and to answer the said complaint as above required, the said plaintiff will apply to the Court for the relief therein demanded.

Given under my hand and the seal of said Court, at Silverton, in said County, this 21st day of May A. D. 1904

JOSIAH WATSON,
[SEAL] Judge and Clerk.

First pub. July 2, 1904.
Last pub. July 23, 1904.

4-Room House, 2 lots and Furniture $ 750
4-Room House, 2 lots and Furniture 775
5-Room House, 1 lot and Furniture 1000
9-Room House, 4 lots and Furniture 4000
3-Room House, 2 lots and Furniture 600
5-Room House, 2 lots 1200
6-Room House, 1½ lots 1000
4-Room House, 2 lots, 1000
6-Room House, best location in city, 2 lots, 2000
Two houses 3 lots, - 1600
4-Room House, 1 lot, 450
4-Room House, 2 lots, 400
Three Houses, 2 lots, 1500

$2,800 in business building in principal block on Green Street. Will net 35 per cent. on the investment.
$5,000 Property that will return 25 per ct
$1,200 Property that will return 25 per ct.
4-Room House, 2 lots, a bargain, - - $950
6-Room House, 3 lots, modern, - - $1,100
Several Houses for sale on the installment plan with small cash payments.

THE R. H. Cooper
Real Estate Agent.

THE BERT BROWN MARKET
AND
LIVE STOCK COMPANY.
Wholesale and Retail dealers in
MEATS AND PRODUCE.

Beef, Pork, Mutton, Veal. Dry and Green Vegetables Butter, Eggs,

Sugar Cured Hams and Bacon. Pickles and Kraut.

Cheese, Salt and Fresh Fish, Oysters, Game, Poultry

TRY OUR OWN MAKE Breakfast Bacon, Kettle Rendered Lard, Corned Beef, Pickled Pork, Dry Salt, Sausage of all kinds

WE GUARANTEE SATISFACTION.

Supplying Mines a Specialty. Give us a Tria
Cor. Green and 11th St. SILVERTON, COLO.

PROCEEDINGS

OF THE

Board of County Commissioners of San Juan County,

For May and June, 1904.

May 4, 1904.

RESOLUTIONS.

Resolved, That County Treasurer be authorized to sell all tax sale certificates on Anna Crooke lode, Sur. No. 806 for $58.48. All taxes for 1900, 1901, 1902 and 1903 to be paid in full by purchaser, and tax of 1895 cancelled, all to be paid within 30 days from date.

Resolved, That County Treasurer be authorized to sell all tax sale certificates on the Belladona lode, Sur. No 4803, for $275.64. All taxes for 1900, 1901, 1902 and 1903 to be paid in full by purchaser. All to be paid within 60 days from date.

BILLS ALLOWED.

ORDINARY REVENUE FUND.

To Whom Issued.	For What Purpose.	Warrant No.	Amt Claimed.	Amt. Allowed
Mrs. Hodge	Janitor work	5951	$25 00	$25 00
Town of Silverton	Electric Lights	5952	14 70	14 70
Doud Bros	Coal	5953	28 85	28 85
Fred Goble	do	5954	12 65	12 65
L. G. Prosser	Merchandise, (court house)	5955	8 25	8 25
Silverton Standard	Printing Reports	5956	18 05	18 05
" "	Stationery	5957	5 75	5 75
C. S. Casad	Boarding Prisoners	5958	93 00	93 00
do	Services as Sheriff	5959	19 95	19 95
J. A. Sanger	Services	5960	4 75	4 75
L. G. Prosser	Mdse., jail	5961	11 60	11 60
C. S. Casad	do	5962	4 75	4 75
W. E. Lester	Hauling Ashes	5963	4 50	4 50

ROAD FUND

To Whom Issued.	For what purpose.	Bill No.	Amt. Claimed.	Amt. Allowed.
B. Harwood	Road Order, east district	883	$70 00	$70 00
Chas. Carlstrum	do do	884	27 50	27 50
Chris Hansen	do do	885	27 50	27 50
Harding Morris	do do	886	5 00	5 00
Jeff Ingle	do do	887	10 00	40 00
Jos. Bordeleau	do do	888	40 20	40 20
James Pilling	do do	889	2 50	2 50
Fred Goble	do do	890	48 33	48 33
R. L. Hines	do west district	891	91 60	91 60
M. Sullivan	do do	892	32 50	32 50
Jos. Bordeleau	do, do	893	5 00	5 00

POOR FUND.

To Whom Issued.	For What Purpose.	Bill No.	Amt. Claimed.	Amt. Allowed.
Josephine Boyd	Boarding Paupers	310	$60 00	$60 00

June 7, 1904.

RESOLUTIONS

Resolved, That County Treasurer be authorized to accept the sum of $311.81 in payment of taxes for 1898 upon Lot 13, Block 12, Town of Silverton, Lots 7 and 8, Block 4, Reeses' Addition to said Town, and the Bausman Tract, provided same shall be paid within ten days from date.

Resolved, That County Treasurer be authorized to accept payment of the taxes for the year 1903 upon the railway belonging to the Silverton, Gladstone & Northerly R. R. Co. upon and for the basis of an assessed valuation of $30,000, same to be paid within ten days from date.

UNFORSEEN CONTINGENT FUND.

To Whom Issued.	For What Purpose.	War. No.	Amt. Claimed.	Amt. Allowed.
Jno F. Melton	Horse hire	871	$10 00	$10 00
Harry Patterson	Services	872	11 00	11 00
B. W. Lockart	Cash Advanced Land Office	873	6 60	6 60
Hubert Work	Care of insane for April and May	874	293 50	293 50

POOR FUND.

To Whom Issued.	For what Purpose.	War No.	Amt. Claimed.	Amt. Allowed.
T. G. McCarthy	Burying Paupers	311	$12 00	$12 00
Josephine McCoy	Boarding "	312	60 00	60 00

ROAD FUND.

To Whom issued.	For What Purpose.	War. No.	Amt. Claimed.	Amt. Allowed.
Jos. Bordeleau	Road Order, west district	894	$ 90	$ 90
Joe Reynolds	do do	895	22 50	22 50
B. Harwood	do east district	896	163 00	163 00
C. B. Shaw	do do	897	15 00	15 00
Albert Ehlert	do do	898	17 50	17 50
Chris Hansen	do do	899	57 50	57 50
Jeff Ingle	do do	900	70 00	70 00
Chas. Carlstrum	do do	901	50 00	50 00

ORDINARY REVENUE FUND.

To Whom Issued.	For what Purpose.	War. No.	Amt. Claimed.	Amt. Allowed.
F. S. Whitelaw	Services District Court	5964	$70 00	$70 00
Walter O'Malley	do Court Bailiff	5965	10 00	10 00
Mrs. Hodge	Janitor Work District Court	5966	9 00	9 00
Mary I. Mesechre	Services as Court Stenographer	5967	40 00	40 00
Frank L. Watson	do District Court	5968	195 15	195 15
do	do do	5969	215 55	215 55
do	do do	5970	138 95	138 95
do	do do	5971	79 45	79 45
Wm. Arstingstall	Juror Certificate, District Court	5972	2 65	2 65
Dan Pertyjohn	do do	5973	10 15	10 15
Ben Wright	do do	5974	2 65	2 65
S. D. Cunningham	do do	5975	2 65	2 65
Norman Cameron	do do	5976	10 15	10 15
Henry Sherman	do do	5977	20 45	20 45
J. H. Slattery	do do	5978	19 40	19 40
Joe Seyfer	do do	5979	10 15	10 15
Theo. Dick	do do	5980	10 15	10 15
A. J. Kirk	do do	5981	7 65	7 65
George Jewett	do do	5982	10 75	10 75
James Aveline	do do	5983	10 15	10 15
John Gray	do do	5984	7 65	7 65
Clifford Bros	do do	5985	10 15	10 15
Gus Malchus	do do	5986	2 65	2 65
T. J. Hurley	do do	5987	7 65	7 65
Ben Freeman	do do	5988	10 15	10 15
H. S. Born	do do	5989	2 65	2 65
R. H. Cooper	do do	5990	7 65	7 65
Thomas Gifford	do do	5991	2 65	2 65
Aug. Berquist	Juror Certificate, District Court	5992	$ 2 65	$ 2 65
Reynolds & Pearce	do do	5993	5 15	5 15
C. S. Casad	Witness Certificate do	5994	9 25	9 25
John Rowland	do do	5995	5 15	5 15
Josiah Watson	do do	5996	5 15	5 15
Richard Pearce	do do	5997	5 15	5 15
A. F. Hood	do do	5998	11 75	11 75
Henry Olson	do do	5999	5 30	5 30
James Pulliam	Services as District Attorney	6000	180 00	180 00
C. S. Casad	Attendance County Court	6001	54 00	54 00
do	Services District Court	6002	504 10	504 10
do	Services Coroner's Inquest	6003	7 85	7 85
do	Boarding Prisoners	6004	78 00	78 00
Josian Watson	County Court Fees	6005	55 15	55 15
do	do do	6006	13 50	13 50
A. J. Kirk	Juror Certificate, County Court	6007	2 65	2 65
John N. De Hines	do do	6008	2 65	2 65
Henry Sherman	do do	6009	23 85	23 85
Dr. J. S. Fox	Services as County Physician	6010	50 00	50 00
Mrs Hodge	Janitor Work	6011	25 00	25 00
Jos. Bordeleau	Merchandise	6012	1 80	1 80
Fred Goble	Coal, (Jail)	6013	11 80	11 80
Town of Silverton	Electric Lights	6014	15 90	15 90
Out West Printing Co	Stationery	6015	243 20	236 95
Frank L. Watson	Postage	6016	6 00	6 00
W. H. Crooke	Services, Coroner's Jury	6017	2 65	2 65
A. J. Vivian	do do	6018	2 65	2 65
Ernest Grill	do do	6019	2 65	2 65
Sam Selig	do do	6020	2 65	2 65
J. F. Campbell	do do	6021	2 65	2 65
J. L. Mitchell	do do	6022	2 65	2 65
John S. Fox	do do	6023	2 15	2 15
Jennie Walker	do do	6024	2 15	2 15
Angela Sartoris	do do	6025	2 15	2 15
Henry Damschroder	do do	6026	2 65	2 65
H. G. Prosser	do as Coroner	6027	5 20	5 20

B. W. LOCKHART, County Clerk.

NOW RATES VIA MO. PACIFIC.

Effective at once the Missouri Pacific will sell tickets, Colorado common points to St. Louis and return for $29.00, good until Oct. 31, with ten days stopover at Kansas City.

CITATION AND NOTICE TO ATTEND PROBATE OF WILL.

STATE OF COLORADO, } ss.
COUNTY OF SAN JUAN, }

In the County Court in and for said County.

In the matter of the Probate of the last Will and Testament of B. G. Puckett, deceased.

The People of the State of Colorado to Lizzie Hand, Rilda M. Copeland, Huldah A. Stephenson, Etta M. Neely, E. Walter Puckett, George Swan, Frankie Puckett and Mrs. Emma Staples, (formerly Emma Puckett,) and to all legatees, devisees and heirs at law of B. G. Puckett, deceased, greeting:

You and each of you are hereby notified that an instrument of writing purporting to be the last will and testament of B. G. Puckett, deceased, whose place of residence was San Juan county, Colorado, has been presented to the County Court of said county for probate, by T. F. Neely, whose place of residence is Ouray, Colorado, and which last will and testament purports and undertakes to devise and bequeath the following described property, towit: Lots numbered 16 and 17 of block 41 of the town of Silverton, in the county of San Juan, and State of Colorado, together with all improvements thereon situated, including the house, furniture and outbuildings; and the 18th day of July, A. D., 1904, has been set by said Court for hearing the application for probate of said instrument as the last will and testament of said B. G. Puckett, deceased; therefore, you and each of you are hereby cited, commanded and required to be and appear before the said County Court, at the county court room, in Silverton, San Juan county, Colorado, at the hour of ten o'clock a. m. on said 18th day of July, A. D., 1904, then and there to attend the probate of said will before said court, and further to do and perform what shall then by the said court be required and adjudged.

Witness Josiah Watson, the Judge and ex-officio clerk of the said county court, at Silverton in said county, this 23d day of May, A. D., 1904.

{ SEAL } JOSIAH WATSON,
Judge and ex-officio Clerk.

First pub. May 28; last June 18.

NOTICE OF STOCKHOLDERS' MEETING OF THE BIG COLORADO MINING AND MILLING COMPANY.

GLADSTONE, COLO., June 4, 1904.

You are hereby notified that the Regular Annual Meeting of the Stockholders of the Big Colorado Mining and Milling Company will be held at Denver, Colorado, July 4, 1904, at 10 o'clock a. m., at the office of L. B. Robinson, Kittredge building, for the purpose of the Election of Directors and Officers for the ensuing year, and such other business as may come before the meeting.

C. W. BLOODGOOD,
Secretary of the Big Colorado Mining and Milling Company. 29-3t

ADMINISTRATOR'S NOTICE.

Estate of MARTIN SCHNEIDER, Deceased.

The undersigned, having been appointed Administratrix of estate of Martin Schneider, late of the county of San Juan in the State of Colorado, deceased, hereby gives notice that she will appear before the County Court of said San Juan County, at the Court House in Silverton in said County, at the June, Term, 1904, on the second Monday in July next at which time all persons having claims against said estate are notified and requested to attend for the purpose of having the same adjusted. All persons indebted to said estate are requested to make immediate payment to the undersigned.

Dated at Silverton, Colo., this 4th day of June, A. D. 1904. MRS. LINA SCHNEIDER,
First pub. June 11, 1904. Administratrix.
Last pub. July 2, 1904.

NOTICE OF FORFEITURE.

To John Session, his heirs and assigns:

You are hereby notified that I have expended during the year 1903, $100 on the Yellow Bird lode mining claim situated in Animas Mining District, San Juan county, Colorado, of which the location certificate is of record in Book 116, page 348, in the office of the Recorder of San Juan county, Colorado, in order to hold said claim under the provisions of section 2324 of the Revised Statues of the United States and amendment thereto approved January 22, 1880, concerning annual labor upon mining claims, it being the amount required to hold said lode claim for the period ending December 31, 1903.

If within ninety days after the last publication of this notice if you fail or refuse to contribute your proportion of said expenditure as co-owner, your interest in said claim will become the property of the subscriber, your co-owner who has made the required expenditure by terms of said section and amendment thereto

Dated at Silverton, Colorado, this 21st day of January, A. D. 1904.

First pub. May 7, 1904. IRA A. TORREY.
Last pub. Aug. 6, 1904.

NOTICE OF FORFEITURE.

To L. A. Phillips his Heirs and assigns:

You are hereby notified that we have expended during the year 1903, $100.00 each on the Bumble Bee, Gracia, Recapture, Earl, and Gold Lake lode mining claims situated in Animas Mining district, San Juan county, State of Colorado, of which the location certificates are of record, viz: Bumble Bee, in Book 99, page 490; Gracia, in Book 99, page 486; Recapture, in Book 99, page 489; Earl, in Book 111, page 74; and Gold Lake, in Book 99, page 330 in the office of the Recorder of San Juan county, Colorado, in order to hold said claims under the provisions of section 2324 of the revised statutes of the United States and amendment thereto approved January 23, 1880, concerning annual labor upon mining claims, it being the amount required to hold said lode claims for the period ending December 31st, 1903.

If within ninety days after the last publication of this notice you fail or refuse to contribute your proportion of said expenditure as co-owner, your interest in the said claims will become the property of the subscribers, your co-owners, who have made the required expenditure by terms of said section and amendment thereto.

Dated at Silverton, San Juan county, this 18th day of January, A. D. 1904.

First pub. May 7, 1904. LOUIS FRITZ
Last pub. Aug 6, 1904. AL. RENNIS.

BOSTON AND SILVERTON M. AND R. CO.

SILVERTON, COLO., May 9, 1904.

To the Stockholders of the Boston and Silverton Mining and Reduction Company:

You are hereby notified that the Annual Meeting of the Stockholders of said corporation will be held at the office of the Company, to-wit: the office of W. N. Scarcy Silverton, Colorado, on Tuesday, the fifth day of July, 1904, at nine o'clock in the forenoon, for the following purposes, namely:

First. To elect Directors, and all other necessary officers for the ensuing year.

Second. To transact any and all other business which may come before the meeting.

28-3t A. A. LAMONT, Secretary.

NOTICE OF ADJUSTMENT DAY.

Estate of Matthew Reynolds, deceased.

The undersigned, having been appointed administrator of the estate of Matthew Reynolds, late of the County of San Juan, in the State of Colorado, deceased, hereby gives notice that he will appear before the County Court of said San Juan County, at the Court House in Silverton, in said County, on Monday, the 25th day of July, A. D., 1904, at the hour of 10 o'clock a. m., of said day, at which time all persons having claims against said estate are notified and requested to attend for the purpose of having the same adjusted. All persons indebted to said estate are requested to make immediate payment to the undersigned.

Dated at Silverton, Colorado, this 20th day of June, A. D., 1904.

FRANK B. BROWN,
Administrator of the estate of Matthew Reynolds, deceased.

First pub. June 24; last July 15, 1904.

C Ferrill curator
Nat. history &c

Silverton Standard

VOLUME XIV — SILVERTON, COLORADO, FEBRUARY 21, 1903. — NUMBER 13

MINES AND MINING IN SAN JUAN

DEEP TUNNELS LARGE VEINS

Reilly Bros. of Chattanoogo are completing a 75-foot tunnel contract on the Bonanza Boy, in Mill gulch, owned by William Feigel of this city. The tunnel is being driven to crosscut the several veins of the group.

The Treasury tunnel at Red Mountain has closed down indefinitely after reaching a distance of 4,900 on its journey toward Telluride. The shutdown is owing to litigation over the right of the tunnel to pass through a prior location on its line of march.

The Meldrum tunnel, with one entrance between Ironton and Guston and the other on the Telluride side, is not dormant, as everybody in the Red Mountain district supposed, but is being worked from the other side by a small force of men.

Edward Haas this week entered upon the work of completing the 100-foot contract in the King tunnel that necessarily received a check last week by the blowing up of the then contractor, Bert Molinario. The contract will be completed by hand, after which work will be resumed by the company and machines used, as formerly.

Drifting on the vein continues to be the order of the day at the Little Bessie mine, in Minnie gulch. No ore is being taken out except that encountered in the drifts, the whole work being centered on development until spring, when it is expected that the property will be in shape to produce regular shipments.

The Stony Pass Mining Co., with properties in the Stony pass section, is the latest mining company organized to do business in San Juan county. The officers and directors of the new company are A. W. Hall, president, Dexter, Maine; Freeland Jones, vice-president and treasurer, Bangor, Maine; W. S. Brown, secretary, Dexter, Maine; A. A. Brown, general manager and superintendent, Silverton, Colo.; Warren F. Pope, director, East Machias, Maine; Dr. J. F. Shafer, director, Pittsburg, Pa. The property proposed to be operated by the company is that known as the C. A. Marshall group, which the owner bonded last fall to Messrs. Hall and A. A. Brown.

Gottleib and Koennecker, who are contracting on the long tunnel on the Ridgway, Maggie gulch, are prosecuting work with three men, the winter force. The tunnel is now in some 215 feet, but with the advent of spring it is understood that the owners of the Ridgway, the Eureka Exploration Co., will install power drills and push the bore to its full intended length, some 3,000 feet.

The work being done in mining in San Juan county this winter is an earnest of what the industry will amount to when the season is fully opened. All the large mines are running with practically their regular forces, while dozens of smaller properties are being developed into paying propositions. The San Juan has at last received the recognition deserved by reason of its wonderful mineral wealth.

The Mammoth Tunnel and Mining company's holdings, in Prospect basin, consisting of 28 claims, tunnel site, millsite, water right, etc., has been bonded and leased to the Stony Pass Mining company for a period of fifteen years. As soon as work can be commenced a contract of 500 feet will be let on the tunnel, while the Hercules, one of the claims of the group, will be equipped with a steam hoister by the new owners.

The Sunnyside boarding and bunk house is now one of the best equipped in the country. The capacity of the dining room has been enlarged and now 160 men can be served at once. Manager Joe Terry has also recently added a long bucket to the tramway service, so in case any of the help become sick or disabled they can be carried down over the tram in a bed. Many other improvements are going on at this great mine.

The contractors on the Champion tunnel, Sultan mountain, are this week entering the vein formation at a distance of 760 feet from the entrance. The Champion upper workings opened up an 18-inch streak of high grade smelting ore and the cutting of the vein by the tunnel will develop one of the best properties in the vicinity of Silverton. The mine, which consists of a group of several claims, including the old Jennie Parker, is owned by Messrs. Patterson, Johnson and Bordeleau.

A strike, which is believed to be of great importance on account of its location, was made this week in the Gold Mine claim at the head of Horse-shoe basin. N. F. Clark purchased this property last year for $10,000 from the Munro brothers, subsequently letting a contract for 400 feet of tunneling. The first of the three veins traversing the property was cut this week and it is said that the ore runs as high as 80 ounces in gold. This property is near the Isolde mine, and it is thought that the vein cut is probably a continuation of the Isolde. The Gold Mine is in the heart of Burrows Park gold belt and great strikes are looked for in that section this year.—Lake City Times.

From a miner who is thoroughly familiar with the Silver Ledge mine at Chattanooga we learn that the property with development ought to make one of the big mines of the state. Our informant says that the property is located on a mineral zone perhaps 300 feet wide and containing four distinct large streaks of ore. But one of the streaks has ever been prospected, and that only to a comparatively shallow depth. However, as depth is gained the mineral becomes free of zinc, which is much in evidence on the surface, and is left a massive body of galena accompanied by a streak of grey copper.

T. Jay Hurley, general manager of the Natalie Mining and Milling company, in his report to the board of directors, says that the group contains 32 claims, of which 30 are patented. The Hurley tunnel, the main developing tunnel of the group, now in about 1,800 feet, is planned to be 4,000 feet long. In addition to the main tunnel about 1,000 feet of drifting has been done on the several veins that have already been cut. From one of these veins a smelter shipment of ore was made, as mentioned recently in these columns, which show gross values of $17.50 per ton, principally in lead.

In a personal interview with Otto Mears we are given the information for publication that the extension of the Silverton Northern railroad from Eureka to Lake City will be commenced as soon as the inclemency of the weather will permit. Mr. Mears has just returned from Washington and says that all the available capital to complete this line is forthcoming. He says the road will be built through to Lake City without stop, but the part that goes over the range will be used only until the tunnel is completed, which, of course, is a gigantic undertaking, and will take a long time to put through.

On the Esmeralda mine, Minnie gulch, a shaft has been sunk to a depth of 135 feet, and a cross-cut run from the bottom a distance of sixty feet to the vein, which is now being entered. It is expected that the vein will have to be drifted on a distance of about 50 feet from its intersection with the cross-cut to reach the ore shoot, although this is only an estimate, as the dip of the shoot is uncertain. In the meantime ore is being shipped from the upper workings to the amount of about six carloads per week and it is estimated that there is enough of the same material opened up to keep up the shipments at the same rate for a year. Should the ore shoot prove continuous with depth the shaft will be sunk 300 feet deeper with the present plant and then machinery of larger capacity will have to be installed.

On January 6th the Ruby Basin Mining and Tunnel company's tunnel in Ruby Basin had reached a length of 1,100 feet. The bore will cut the Jay-La Plata Miner, December and Tornado lodes in the order named. On the perpendicular the Tornado vein ought to be only about 100 feet ahead of the breast of the tunnel, but on account of the decided dip of the lode several hundred more feet will have to be driven to reach the goal. The Tornado vein was a producer in the days of the Greene smelter in Silverton, and returns recently printed show the ore to have been worth about 175 ounces in silver, the smelter company at that time paying nothing for gold or lead. The blind vein cut in the tunnel some time ago, and of which this paper has already made mention, has widened to thirty inches and carries and shows a rich streak of ore eight inches wide and carrying values of $8 in gold, 63½ ounces in silver and 7 per cent. lead. These facts are gleaned from Supt. Lewis' report to his company.

The Roberts bill, now before the state legislature, provides for tunnel companies condemning under the eminent domain act a right of way and safeguards the owner of the property crossed by requiring plats to be filed with the clerk of the county, and a right given the owner at any reasonable time to go in and survey his property. The law provides further that any such tunnel shall be a common carrier and shall charge only reasonable prices for any carrier work. The purpose of the bill is to allow long mining tunnels to be driven without let or hindrance so far as property owners are concerned. Without entering into a discussion of merits of any particular controversy, it is nevertheless true that small claim owners who are located on the line of a projected tunnel are prone to make the projectors put up handsomely for a right of way or be continually hampered or harassed in their work, and if the Roberts bill obviates all such monkey business there can be no reasonable objection to it, especially in the home of the long tunnel enterprise.

DID YOU HEAR ABOUT?

Mrs. John Paul, who resides on Snowden avenue, is seriously ill.

Lent commences next Wednesday, and Social events will come thick and fast up to that time.

The storm of last week seems to have permanently quit business and Silverton is again basking in her wonted Italian skies.

We learn that Mr. Thos. Terrill, formerly of Silverton, is dangerously ill at Golden, Colorado, to which place he moved last year.

BORN.—Wednesday, February 18th, to Mr. and Mrs. John Pinyan, a girl. Mother and child doing well and John is not entirely helpless.

Appropriate exercises were held in the public schools of Silverton yesterday afternoon in honor of the anniversary of Washington's birthday, which occurs tomorrow, Feb. 22.

Another consignment of machinery for the municipal electric light plant arrived this week, and the final shipment is expected to be on the ground in a few days.

The price of silver has been on the rise for the past few weeks and there are some of our people sanguine enough to believe that the white metal will some day be worth fifty cents an ounce.

There were 2,108 "circle" tickets sold during 1902. This means, of course, on the route between Durango and Ridway, but as a matter of fact, the great majority of the tourists purchasing the tickets visited Silverton.

John C. Deutsch, the blacksmith, fell last Friday evening on the sidewalk in front of Doss' paint shop, an 13th street, and sustained a compound fracture of the left leg, between the knee and ankle.

The San Juan County Board of Trade is starting out right and by keeping up its good work it can do a vast amount of good for the city and county. A live Board of Trade is the best public institution any community can have.

Several persons who travel much between Silverton and Eureka make complaint that the road a short distance below Howardsville is in a deplorable condition. They are in hopes that the attention of the county commissioners will be called to the condition of the road so that the same may be placed in shape and no longer endanger life.

One of the improvements to be pushed by the San Juan County Board of Trade is the free delivery of express. Several years ago the city had free delivery for a short time, but no expressman coud be found who would do the work very long at $60 per month, the amount paid by the railroad company. It is understood now that if the system goes into effect again arrangements will be made for paying the contractor a suitable price.

Meeting of the San Juan Mining Association will be held at its rooms on Wednesday, February 25th, at 2 p. m.

The lower house of the Colorado legislature passed a bill making October 12th a legal holiday to be known as "Columbus Day."

Thursday night's Silverton train was a monster according to the Durango Democrat. Ore from this camp and lime from Rockwood.

In the county court last week a divorce was granted Mrs. Thos. Powers from Thos. Powers. Mrs. Powers will take her former name of Mrs. Mina Munyon.

Ernest Grill and wife of Silverton were passengers on the storm-tossed steamer Graf Waldersee. It was a rough and unpleasant voyage from start to finish.

A meeting will be held to-morrow afternoon at Miners' Union hall by representatives of the various labor bodies in the city for the purpose of forming a local trades assembly.

The K. of P. ball Thursday night was well attended. The refreshments served by the Rathbone sisters was elegant. Everybody enjoyed themselves until a wee sma' hour.

Mrs. Lina Morris Nash received a divorce from Jesse E. Nash in the county court on the 12th inst. Jesse may now apply for membership in the bachelors club to help fight the tax law.

At present there are four men in town suffering from wounds caused by caving ground at the Silver Belle mine.. Some steps should be taken to put the mine in shape.—Ophir Mail.

Last Sunday's Denver News contained pictures of Mrs. Lydia Palmer, Mrs. Kathleen Goble and Miss Gertrud Upton in connection with their membership in the San Juan Woman's Club.

Miss Eugenia Stroebel, who is quite well known in Silverton, having visited her brother, Herman Stroebel, here several months last summer, was married in Telluride last week to Mr. Herman Bartels of that city.

C. E. Magraw who left Silverton last month for Denver has been quite ill the past week. Mr. Magraw is at one of the prominent hospitals and is receiving the best of care from Silverton friends who are now visiting in Denver.

A small burro hitched to a rough sled loaded with furniture and a heavy-weight driver ambling down Greene street one morning this week, was a sight not calculated to lead a stranger to believe that we are a humane people.

The death rate for Silverton for 1902, counting 3,000 population, was 11 to each 1,000. This includes all persons who were injured in the mines or became ill on the outside and died in the city. There were four deaths from infectious diseases—two from tuberculosis, one from scarlet fever and one from typhoid.

GREAT CLEARING SALE!

Beginning Monday, Jan. 12, we will sell all our Winter Goods including

DRESS GOODS, COLLARETTES JACKETS, CAPES, SKIRTS. etc at discounts from 20 to 50 per cent.

T. SHEAHAN.

Cunningham's Drug Store

AMERICAN SILVER TRUSS.

In this Truse the principal heretofore so greatly desired, Has At Last Been Achieved, that of firmly and constantly holding the rupture with a gentle hand-like pressure.

Phone 6-f

Mysterious Circumstance.

One was pale and sallow and the other fresh and rosy. Whence the difference? She who is blushing with health uses Dr. King's New Life Pills to maintain it. By gently arousing the lazy organs they compel good digestion and head of constipation. Try them. On 25c. at S. D. Cunningham's, Druggist.

Many men of many minds and many men of many kinds eat at Marsh's Restaurant.

More people eat at Marsh's Restaurant than all the other "imitations" combined.

O. U. FRANKLIN,

EXPRESS

And all kinds of Haulin. promptly attended to.

A special from Montrose, Colo., dated Feb. 19, says: "What was to have been a ten-round go here last night between Whitey Watson of Silverton, and Charles Pitts of Montrose, ended in the second round by Pitts going down and out."

The ladies of St. John's Guild will give a social afternoon at Mrs. Thompson's rooms, Benson Block, on Tuesday, Feb. 24th, from 2 to 5 5 p. m. Cards. Admission 50 cents. The ladies of the Guild extend a cordial invitation to all the ladies in town.

Runaways are becoming too numerous for the safety of people, especially children. Whether they are due to vicious horses or careless drivers is a matter of speculation, but we are inclined to think that it is a combination of the two unmitigated evils.

The Ancient Order of Pyramids will on March 2 move into their new quarters, the Wyman Block, at which time they will give a grand Hard Times ball. Tickets will be sold at 99 cents per couple. No blacked boots allowed and objectionable characters barred.

William Johnson, a colored employe of the Grand, who was arrested last week on suspicion of having stolen $20 from a chambermaid at the hotel, was given a hearing Saturday last before Justice Watson and discharged, there being no evidence to hold him.

Thursday evening about 8:10 o'clock a magnificent meteor shot through the heavens in a northwestern course and sank out of sight apparently behind anvil mountain, west of town. The meteor lighted up this part of the world in a splendid manner.

The county records this week show that the Eastern Star group of claims, one of the old time properties of Poughkeepsie gulch, has been transferred by Mahlom D. Thatcher of the First National Bank of Silverton to Albert E. Reynolds, the owner of the Revenue tunnel at Ouray.

The Animas Canal, Reservoir, Water Power and Investment company, with J. W. Adams of Chattanooga, Tenn., President, and H. T. Henderson, local manager, will start building dams and constructing reservoirs in the early spring near Rockwood and up along the Animas river, and the works will be in operation by January 1, 1904. About $3,000,000 will be expended and 10,000 horse power will be sent throughout La Plata and San Juan counties over the wires of the company.

The house committee on mines and mining have reported three eight-hour bills. It is claimed that the majority bill, the Stephens, would include railroad employes in the unhealthful and dangerous occupations. The minority report is a slight modification of the Moore bill, which has already passed the senate. The second minority report is by Whinnery of Lake City, and is substantially the Stephens bill except that men must go to and come from work on their own time.

THROUGH TRAIN AGAIN.

President Cunningham of the San Juan County Board of Trade received a telegram from Senator Hallett at Denver that the D. & R. G. officials had agreed to resume the through pasienger train service to Silverton on April 1st.

While we sympathize with any community in the grasp of the snow king as the Denver papers paint the situation, it is a relief to know that the liar has let up on Silverton and is apparently devoting his energies to sections of Colorado more favored by Denver than the San Juan is.

At a special meeting of San Juan lodge A. F. and A. M., last Tueday evening the craft was quite busy. Adolph W. Helmboldt and David Edwards received the third degree. Refreshments during the midnight hour was not amiss, as was evinced in the way coffee, sandwiches and doughnuts were made way with.

Chas. L. Valiton, a resident of this city for several years until recently, attempted to commit suicide in Durango last Saturday by taking poison. The timely arrival of a physician with a stomach pump saved the would-be suicide from an awful death. Charlie has been despondent of late on account of family and other troubles and no doubt sought to end it all in the grave. His wife resides in Silverton.

The Ancient Order of Pyramids will give a Hard Times ball at Wyman's hall, on Monday night, March 21. According to the announcement "Cinthy and the hull gol-durned fam'ly will be thar agin," and all are invited to "come and jine in havin' a gude time. Neckware, gewelry, dimens, silks and satins knot aloude; finds levied on warers of sech. Tickets 99 cents. Refreshments sootable to time."

Mayor Ballou and other officials visited the Boulder creek dam this week to inspect the city's water supply. They were agreeably surprised to find that the warm weather of the past few days had filled the reservoir to nearly its full capacity. During a long period of cold weather such as we have passed through, the water in the reservoir is very apt to be at low tide, but not low enough to create a serious shortage.

The STANDARD is in receipt of a handsome booklet issued by the Mines Securities Corporation of New York, a company that holds the controlling interests in the Occidental Mining company, the Natalie Mining and Milling company and the Ruby Basin Mining and Tunnel company. In addition to several fine half-tone scenes of local interest proper with the book, it is accompanied by a splendid panoramic view, 24x36 inches, of Lost mountain and the Occidental-Natalie property.

The air ship "Swallow" laid over at Silverton Monday and the "Aero men" declared Marsh's meals the best since leaving New York.

The man who "contributes" his "tithes" to the "Trust" has to have good nourishing food. You get the best at Marsh's Restaurant.

Fifty Years the Standard

DR. PRICE'S CREAM BAKING POWDER

Awarded
Highest Honors World's Fair
Highest tests U.S. Gov't Chemists

PRICE BAKING POWDER CO.
CHICAGO

The Silverton Laundry on Twelfth street is here to stay. 'Phone 32-red. Work called for and delivered. Shirts done here. Suits dry cleaned and pressed. Rough dry done. Gloves cleaned, 25c. pair.

MRS. WAYNICK & HOWE.

CIGARS

Pure Tobacco and
Clean Manufacture
is why Andre's Cigars are the
BEST. . .

An Industry in Silverton.

SCHERER BROTHERS

Bottled Beer!

SCHLITZ'S BEER With the best of LUNCHES and CIGARS a SPECIALTY.

UNION BOTTLING WORKS.

HEMPHILL & McCRIMMON

Just Received
A New Line of
PERCALE
GINGHAM
CHAMBRAY
CALICO
AND
CRETONNE

The San Juan County
Mining Association
EMPLOYMENT OFFICE
Second Front Floor,
Wingate Block,
GOLDEN BARRETT, SEC'Y,
Silverton, - - Colorado.

BRIGHT'S DISEASE.

The largest sum ever paid for a prescription, changed hands in San Francisco, August 30, 1901. The transfer involved in coin and stock $11,500, and was paid by a party of business men for a specific for Bright's Disease and Diabetes, hitherto incurable diseases.

They commenced the serious investigation of the specific November 15, 1900. They interviewed scores of the cured and tried it out on its merits by putting over three dozen cases on the treatment and watching them. They also got physicians to name chronic, incurable cases, and administered it with the physicians for judges. Up to August 25, eighty-seven per cent of the test cases were either well or progressing favorably.

There being but thirteen per cent of failures, the parties were satisfied and closed the transaction. The proceedings of the investigating committee and the clinical reports of the test cases were published and will be mailed free on application. Address JOHN J FULTON COMPANY, 420 Montgomery street, San Francisco California. Mch.30

Pete Orella

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and Feed,
wholesale and retail
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HESPERUS,
BLACK DIAMOND
ANTHRACITE
COAL

SILVERTON STANDARD.

KLINGER BROS., PUBLISHERS.

Entered at the Silverton, Colo. postoffice for transmission through the mails as second class matter.

OFFICIAL PAPER OF SAN JUAN COUNTY

ONEYEAR $2.50.
SIX MONTHS, $1.25
THREE MONTHS, 75C

SATURDAY, FEBRUARY 21, 1903.

An exchange remarks that there is plenty of back-Bowen to our plucky Venezuelan referee.

George B. Cortelyou has been appointed and confirmed as Secretary of Commerce and Labor under the act creating a new department.

Up in Idaho last fall the Socialists helped defeat the Democratic ticket and now the Republican legislature has killed the eight hour bill. Thus do the harpooners get harpooned.

It is said that the coal miners of the east will present President Mitchell of the union $75,000 as a token of the grand work he has done for them. The gift, if made, will be entirely merited.

Strange as it may seem, the people of the south appear to approve the proposition to pension the ex-slaves out of the federal treasury. Can it be that the people of Dixie have developed the cold mercenary disposition of the frozen north?

Senator Tillman, the braggart of South Carolina, has had another public fit, this time before the New York Press Club. Tillman confined his remarks to abuse of the negro, but studiously avoided any reference to the shooting by his nephew of Editor Gonzales.

The fight in the Republican party of the state for control of the federal patronage in Colorado is waxing warm. Former Senator Wolcott is doing business in Washington, while Goudy, Stevens and others are overworking their typewriters.

The Fowler currency bill, a pet Republican measure, is again before congress, and if it doesn't pass it will be because many Republican congressional candidates last fall told a political truth for once when they disclaimed any serious love for the measure.

Governor Garvin, of Rhode Island, is a Kansas City platform Democrat, and in his first annual message to the legislature does not even refer to Cleveland or the Republican party as the cause of prosperity at the east. Governor Garvin will be called a narrow-minded anarchist for his impudence.

A stringent ruling has been made by Attorney General Miller against the various "octopi" which seek entrance to Colorado under deceptive corporative names. The opinion was delivered yesterday at the request of Secretary of State Cowie, and is on the question whether a company incorporated here under a name like "Western Investment Company" is allowed to carry on numerous kinds of business. The attorney general declares that it cannot.

The Venezuelan blockade has been raised and the whole question apparently settled by the foreign powers having claims against the South American republic signing an agreement to accept 30 per cent. of the custom revenues of La Guayra and Puerto Cabello until the debts are wiped out. United States Minister Bowen is receiving many congratulations on his success in settling the matter amicably.

Chronic kickers kick whether they have a kick coming or not. The bank failure gave some who did not lose a cent in the concern a chance to immediately predict the downfall of Silverton, and would actually shed a few tears when registering their kick. Men that never read the papers or receive a letter, only their monthly statement from the butcher, baker or merchant, kick the hardest over their misfortune in not receiving their mail on time and again predict ruin for the San Juan. Everything goes wrong with them—The Board of Trade, according to their ideas, will be a failure; this man and that man does not conduct his business right; the city officials are wrong; the county commissioners are wrong; everything is wrong. The man that is boosting for the welfare of the community does not do it in the proper manner. Now, we would advise these chronic kickers to hide out unto some lonely spot, read over a few patent medicine advertisements and select something for their liver.

CALL A HALT.

The first question put to the Silverton visitor in Denver is: "How did you get out of the San Juan?" or "How do you expect to get back?"

Isolated on account of present railroad facilities by the recent change in running trains to Silverton, we feel that we have enough to contend with without the injustice of sensational and exaggerated reports of deep snow and snowslides sent out by Silverton correspondents and eagerly grasped by the Denver dailies. The individuals who have not acquainted themselves with the San Juan and its winters, among whom might be the investor, or the tourist for that matter, are led to believe that in comparison the Klondyke has a much more congenial climate. We protest the articles of recent date penned by imaginary authors and ask that publishers be more conservative with the statements in question.

On the 17th of March the regular, never missed, sure to be, St. Patrick's dance, at the Miners' Union hall.

Dance tonight (Saturday).

GEROW.

DOUD BROS.

EXC AN E LIVERY

OPPOSITE GRAND HOTEL.

SADDLE HORSES. -:- DRIVING HORSES.

AGENTS FOR

HESPERUS COAL.

Fred Goble

Wholesale and Retail Dealer in

LUMBER AND COAL,

Screen Doors, Sash, Doors, Lime, Cement and Mining Timbers.

The Perins Peak Coal.

PHONE 46-A.

The World Moves

SO DO I

And if you wish a prompt delivery of goods or baggage see that you have WM. LESTER do it. Ring up Phone Silver 102, or at N. A. Ballou's Store.

All trains arriving and departing reached in due season and baggage carefully handled.

THE SILVERTON TRANSFER. W. E. LESTER. Prop.

BIG BARGAINS

FOR ONE WEEK ONLY

February 9th to February 14th

We will offer big bargains in Wool Hosery and Underwear. We must reduce our stock and Cash talks.

Our fine All Wool $3.50 Underwear goes this week for $2.75 per suit.
A fine grade of Wool Fleeced Underwear goes this week for $1.50, farmer price $2.50.
A Heavy Lined Wool Sock for 45c a pair worth 60c.
A Fine All Wool Ribbed Sock for 30c. worth 45c.
Corduroy Pants for $2.75 worth $4.00. Corduroy Suits $12.50 this week only $8.50.
A few Flannel Shirts left that are going cheap.

We will continue our cut prices on shoes all this week. With each cash purchase amounting to $2.00 or more we will give one dozen elegant Photos **For One Week Only.** This Offer limited to one set of Photos to each family.

Four Doors North of Postoffice — THE BRUMFIELD STORE — Main Street Silverton, Colo.

EXTRACTS FROM THE Gladstone Kibosh

The city council met in irregular session all day Sunday and passed the following resolutions to be sent to our lawmakers at Denver to be placed on our statute books:

Resolved, That it shall be a jailable offense to rob birds' nest above timberline. Resolved, that it shall be a penal offense for any white man to obstruct a snowslide while in motion. Resolved, That any male, female or adult caught stealing money, valuables, liquor or other necessities of life under the value of $10 shall be adjugded insane and be supported by the county. Resolved, That the governor appoint a newspaper man in each mining district as pie inspector for the various mine boarding houses.

****

The Gladstone Debating and Musical Society met in the rear of the Angel of Mercy saloon Wednesday evening. An appreciative audience was in attendance. The editor of the Kibosh read an able address on "Orange Culture in the Klondyke." Willie B. Good sang a pathetic melody entitled "When Papa Washed His Feet," carrying the thoughts of many of the audience back to the years of their youth. Ex-Mayor Miller, violin solo, selection from Damfino, was received in spagmotic glee. Miss Mary Mongover, who conducts the "Homespun" laundry, recited a parody on "Death." It would have been exceedingly good had she not been interrupted at short intervals by the howling of a dog outside the building. A collection of $1.20 was taken up for the purpose of importing new talent for next meeting.

Bachelors Kick.

The following protest was lately forwarded to Denver:

"If by any means our bachelor brothers in the house should so far forget their duty as to let a measure of this kind (for an annual tax on the bachelors of the state) pass that honorable body, we would most respectfully ask that you have the same amended in the following manner.

First—That any single woman in this state, being of lawful age, who does not accept the first bachelor making a proposal of marriage must pay the said bachelor's tax for the ensuing year.

Second—That it shall be unlawful for any single woman to paint, powder, wear false hair or in any way dress in a manner intended to deceive our innocent brothers, and any violation of this article shall be punishable with a fine of not less than one year in the county jail or a fine of not less than ten times the amount of the bachelor tax, or both such fine and imprisonment, at the discretion of the court, and a married man shall be disqualified from serving on juries in all causes tried under the act.

"If this act should pass the house we hope that you will use your best endeavors to have these amendments incorporated as a matter of protection for yourself as well as for your petitioners We ask you to enlist the services of Senators John Kennedy and J. Frank Adams, feeling confident that you will receive their hearty co-operation in a matter so important to the single blessedness of bachelorhood."

The signatures are:

Frank L. Watson	John E. Woods
H. J. Ritter	B. B. Galvin
Benj. Russell	H. H. Barnes
George Lacy	O. W. Klinger
Frank L. Watson	Ole Hanson
Ben B. Russell	A. P. Johnson
Frank L. Watson	John Prisk
Benj. B. Russell	Joseph Graff
Thos. Annear	Russell Fuller
B. B. Galvin) Col. C. N. G.)	James O. Aveline
	John E. Wood
Thos. Annear	L. A. Klinger
H. J. Ritter	John E. Woods,
H. H. Barnes (red ink)	Wm. Feigel
L. A. Klinger	L. L. Haines
Geo. Lacy	Rasmus Hanson
H. H. Barnes	Joe B. Warner
O. W. Klinger	Adolf Hanson

And a thousand others.

Council Proceedings.

Council meeting in regular session Monday night. Those present were Mayor Ballou, Councilmen Helmboldt, Stanger, Johnson, Melton and Wyman.

Minutes of the last meeting were read and opproved.

Applications for positions on the electric light plant were read and upon motion the matter was deferred to a later time.

Two liquor licenses were transferred.

The town treasurer, owing to former advice of the board, was not held responsible for the sum of $147 lost through failure of the Bank of Silverton.

Council adjourned.

The largest, juiciest oysters on the market—known as New York Counts—to be had exclusively at Marsh's Restaurant.

There is no remedy for headache caused by powder smoke (nitrous oxide), though there are several preparations which are represented to give relief. Sleep is the best remedy and the most effectual. Good ventilation in the mine is a preventative.—Mining and Scientific Press.

The best meats, the choicest groceries, quick, clean and wholesome cooking at Marsh's Restaurant.

Escaped an Awful Fate.

Mr. H. Haggins of Melbourne, Fla., writes: "My doctor told me I had Consumption and nothing could be done for me. I was given up to die. The offer of a free trial bottle of Dr. King's New Discovery for Consumption induced me to try it. Results were startling. I am now on the road to recovery and owe all to Dr. King's New Discovery. It surely saved my life." This great cure is guaranteed for all throat and lung diseases by S. D Cunningham, Druggists. Price 50c and $1.00. Trial bottles free.

CHEAP COLONIST RATES.

to California and the northwest from February 15th to April 30th. The Colorado & Southern will sell colonist tickets to Los Angeles, San Francisco, San Diego, Portland, Seattle and other western points, at extremely low rates. Tickets will permit of stopovers at certain points en-route. For full information, address

T. E. FISHER,
Genl. Pass. Agent.
Denver, Colorado

Nearly Forfeits His Life.

A runaway, almost ending fatally, started a horrible ulcer on the leg of J. B. Orner, Franklin Grove, Ill. For four years it defied all doctors and all remedies. But Bucklen's Arnica Salve had no trouble to cure him. Equally good for Burns, Bruises, Skin Eruptions and Piles. 25c. at S. D. Cunningham's Drug Store.

SOUTHERN RESORT POINTS

Are all best reached by the

COLORADO AND SOUTHERN RAILWAY.

And connections. Only line operating solid through trains between Colorado and Texas. Two through trains every day to Forth Worth, Cafe cars, (service a la carte.)

For particulars about your winter trip write

T. E. FISHER,
Gen'l Passenger Agt., Denver, Colo.

Good Luck

ATTENDS THE MAN WHO HUNTS HERE FOR BARGAINS. WHAT YOU NEED WHEN YOU NEED IT AND AT THE PRICE YOU CAN PAY

Guns, Ammunitions, Fishing Tackle, Paints, Oils and Glass,

Up-to-date Kitchen Utencils
Building Supplies.

Buck's Stoves, Ranges and Heaters.

CROCKERY GLASSWARE.

STUBES & JAKWAY.

Chase and Sanborn's Coffee

"Seal Brand" Java & Mocha.

Best Coffee grown in the World.

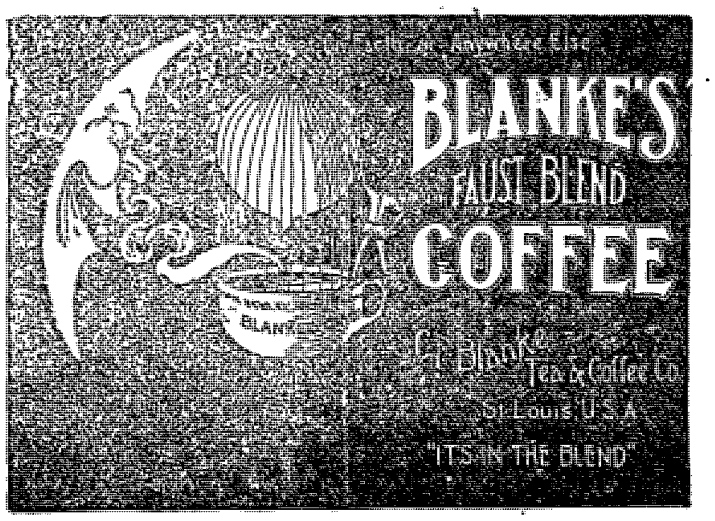
Perfection of strength & flavor.

Guaranteed absolutely pure.

No prizes go with our Chase & Sanborn "high grade Coffee, in fact, noth in goes with our coffee but cream and sugar and satisfaction.

The SILVERTON SUPPLY Co.

Grocery and Bakery. Exclusive Agents.



N. A. BALLOU

:-Wholesale and Retail Grocer-:

Phone 52. 1157 Green Street.

PURELY PERSONAL.

—Finney Jones returned from a Denver trip Tuesday noon.

—John H. Werkheiser left Sunday for Denver on a business trip.

—Mrs. C. E. Robin and son are back from their California trip. Returned last Thursday.

—Mrs. W. W. Grimes returned from a three weeks visit to Denver and Colorado Springs last Saturday.

—Taylor Whitelaw departed for Oklahoma Tuesday noon, from which section he will return to Kansas.

Fred. C. Grebles of the Gold King hotel and Chas. E. Munger left Wednesday for a business trip to Denver.

—Mrs. Arthur Hudson and children returned Wednesday from Durango, where they had been for some time.

—Alfred Harrison returned Sunday last from Minneapolis, Minn., where he has been visiting his mother for the past two months.

—Harry Ausburn, formerly of Silverton and now editor of the Mancos Times, is in Denver to undergo an operation for appendicitis.

—A letter from Martin H. Hauk locates that gentleman at Carrollton, Illinois, where he is promoting the sale of Trilby Mining company stock.

—W. P. Daniels of the Big Five Mining company was in the city this week. Accompanying Mr. Daniels from Denver was a Mr. C. W. Barry, who was installed as manager of the Howardsville tunnel.

—E. C. Campbell, who until a month ago was the local representative of the Black Prince Mining company, was a visitor in Silverton this week from Lumberton, New Mexico, where he is now in the coal and lumber business.

—J. Watson Hayden, accompanied by his father, J. Hayden of Boston, and an old-time friend, Edward Stearns of New York, are up from Durango. Some of our largest mines and mills, with other sights equally interesting in a busy mining section, are being visited by the gentlemen.

—James Montgomery arrived home Tuesday from the Camp Bird mine, where he has been working for several months. Jim says that while there are about 300 men on the Camp Bird, Ouray seems very dull. The Bachelor is closed down entirely and only about 40 men are on the Revenue.

—Robt. Hollis and J. W. Rattle were incoming passengers from Denver last Thursday. Rattle, who as the senior traveling companion of Hollis, created no little excitement at the Strater in Durango last week when he announced that his friend Hollis was missing. A snap-shot at Rattle standing on a chair in the outer hall looking through the transom of Hollis' room will adorn the album or scrap-book of more than one home in Silverton. After the porter of the hostelry had informed Mr. Rattle that Hollis could be found at the breakfast table and that the Strater did not use gas, the early morning intruder was given the ha, ha, by the twenty or more roomers who were "rubbering" to get a glimpse at the person who relentlessly intruded on their morning slumbers.

"Receiver Tom Annear of the Bank of Silverton has filed a claim in the county court of San Juan county against the Robin estate for $54,000. Wonder if this is his salary for service as receiver or was it money he had on deposit? If it was money on deposit, then why was he appointed receiver?" asks the Ouray Herald. Neither, Ernest; it is simply an effort to collect something from the estate for the benefit of depositors.

People's Reading Circle.

February Subject: "The Idylls of the King." Meeting February 23, at 7:30, at the parsonage.

PROGRAM.

Tennyson, the Mystic.....Mrs. Finch
Lancelot.....Mr. A. A. Lamont
King Arthur, the Ideal Man..T. Annear
Quinevere, Queen and Woman.....
.....Dr. E. Reavley
The Artturian Legend.....Mr, Eaves
Reading from Morte D'Arthur.....
.....W. W. Wilkinson

All those interested in this kind of thing are invited to be present.

CHURCH NOTES.

PEOPLE'S CHURCH.

Home Missionary Sunday, March 1st, Motto: "Everybody Help."

February 22nd. Morning sermon: "The Real Love," 10:30 o'clock. A social follows this service.

Sunday School at 12. W. Hessly has kindly undertaken the office of Sunday school organist. A choir of young ladies will lead the singing. Song service 11:50.

A bible class is held from 12 to 1 in the Parsonage. Everyone invited. Subject: "The Psalm of Love."

Endeavor meeting at 6:30 p. m. Mrs. Blake will lead. Subject: "Home Missions."

Evening sermon at 6:30. Closing the February course on the "Unseen World" the pastor will preach on "Three Theories of Men Concerning the Future of the Unsaved."

March 1st. Communion service at 10:30. All Christians invited.

Preparatory service at 7:30 p. m., on Wednesday. Those who desire to unite with the church please be present at this meeting.

GEO. EAVES, Pastor.

ONE NIGHT TO CHICAGO.

Chicago, Union Pacific & North-Western's famous fast Chicago Special, leave Denver daily 1:10 p. m., arriving Chicago next afternoon at 4:00 o'clock. Solid train, free reclining chair cars, drawing room sleeping cars, dining cars, buffet smoking and library cars and standard day coaches. Another fast through train, with through service, leaves Denver at 10:30 p. m. D. W. Aldridge, General Agent, 801 Seventeenth street, Denver, Colo.

John "D—mn Rock-y-feller" doesn't eat as good a steak as the "sons of San Juan" get when they eat a steak at Marsh's Restaurant.

—The last number to be given under the auspices of the Silverton Lyceum Club will be presented Saturday evening, March 7, by the Gamble Concert company, one of the most popular aggregations of talent on the road.

Special Holiday Prices.

We will give special rates on all Holiday Goods until Jan. 1st, 1903.

We have on sale the largest stock of

MOUNTED AND UNMOUNTED DIAMONDS

Ever shown in Silverton.

All Watch Repairing and Optical work guaranteed.

Remember this place has been selected as Headquarers for Santa Clause.

ALL LATE MAGAZINES

ARTHUR G. ROBIN & CO.

TAILORING

Makes or mares you. Your position often depends upon your TAILOR. Choose him with deliberation and to be on the safe side.

J. N. KLOSTER, = = THE TAILOR.

Holthoff Machinery Co.

MAKERS OF

Smelting Machinery,
Cyanide Machinery,
Chlorination Machinery,
Concentrating Machinery,
Amalgamating Machinery,
Lixivation Machinery,
All kinds of Milling Machin'y

THOS. FEIDING

GENERAL

Rand Drill Company.

MAKERS OF

Rand Cross Compond Air Compressors.
Rand Duplex Air Compressors
Rand Straight Line Air Compressors.
Rand Slugger Air Drills,
Rand Little Giant Air Drills,
Rand Little Terror Air Drills

MINING MACHINERY

1711-13 Tremont St.

P. O. Box 1571. DENVER, COLO.

Dredging in Summit County.

The New Year's edition of the Denver Republican gives the following account of placer operations in Summit county, Colorado, during the past year:

For years the burden of the annual review of mining affairs in Summit county has been the richness of the undeveloped placer beds of the Blue river, which would some day become available. The past year has advanced the consummation of this long-delayed promise more than all that preceded it and another will bring realization. While there are important lode deposits in the county, the great field of golden wealth has long been the placers, and it has required many years of gradual advance in placer mining to perfect the systems for extracting the grains of gold from the gravel beds of the Blue.

The genius of George H. Evans, an Australian engineer, has of late been applied to the problem of utilizing the forces of nature and as a result placer mining in Summit county has been resolved to a system. Given thousands of acres of gulch bottom running from 40 cents to dollars in gold to the yard, and covering bedrock to a depth of seventy feet, the problem has been to handle the deep layer of boulders and earth at a cost per yard less than the value of the gold contents. The solution of the problem has become one of the largest engineering tasks undertaken in Colorado in recent years. It has included machinery shops erected at Breckenridge at an outlay of $100,000 for the construction of necessary machinery.

The Gold Pan Mining Company has expended $700,000 in purchasing 1,700 acres of placer ground on the Blue, prospecting the same and installing the plant for its operation under the direction of Evans. Water ditched and piped to the lower end of the territory where two Evans hydraulic elevators were installed with long sluices, immense belt conveyors for carrying off the smaller boulders from the tailings and huge derrick lifts and cableways for hoisting and removing the larger debris on stone boats. A line of pipe six feet in diameter and 8,000 feet in length, fitted together in the company shops, gives a head of 420 feet against the gravel at 182 pounds pressure to the square inch. This pressure is utilized in the siphon elevators to lift to the sluices the gold-bearing earth and gravel and boulders up to eight inches diameter, while the larger boulders are handled with grapples and stone boats. Practically the entire season of 1902 was consumed in cutting the first pit seventy feet to bedrock, and another year will be required for a full test of the capacity of the plant, but the builders claim that an average of 6,000 yards of dirt will be handled daily next season and the tests of 120 drill holes sunk systematically to bedrock promises an average of 46 cents in gold to the cubic yard. The estimated value of the acreage to be washed is $40,000,000 in gold. It will be the work of many years to handle the acreage. The amount handled during the last season is placed at 12,000 yards. One nugget taken out last season was worth $300 and many of an ounce and more were cleaned up.

The Oro Grande Placer Company is employing the same system in working a large acreage below Dillon and, like the Gold Pan, only succeeded in exposing bedrock during the past season. It is composed of New York and Kansas City capitalists and managed by T. D. Harris. Bedrock lies from seventy-five to eighty feet deep. The pipe line and machinery for the big plant were built at the Gold Pan shops in Breckenridge.

On the Swan river the American Gold Dredging Company had a successful season of operating on the Peabody placer. Here the dredging system is employed. Bedrock has an average depth of forty feet and the beds are more sandy and carry fewer large boulders than do those on the Blue. Years of experimenting with lighter machinery has brought the present dredge to perfection. Powerful engines and the heaviest possible and most solidly built machinery has been found necessary to withstand the strain of tearing up the earth with buckets on an endless chain and lifting the gold-bearing material to surface, where it may be washed off on a swinging sluice, the tailings redepositing on bedrock to the rear of the floating and ever-advancing dredge boat. The buckets of the present dredge lift more than seven cubic feet of gravel each, giving a daily capacity of 2,500 yards. The estimated cost of moving the dirt is a fraction less than 5 cents a yard and the value of the ground ranges from 35 to 50 cents. The largest nuggets of gold ever found in the county were taken from the Swan beds this year, one running $800. W. W. Dyer is manager of the company. Work was commenced May 1st and ended November 15th. The same company operated the Gold Run placers on a smaller scale during the season and made a satisfactory clean-up.

The French Gulch Mining Company, H. S. Stallknecht, manager, operated an Evans elevator for two and a half months, washing 500 yards a day at a cost of 13 cents a yard. Much of the ground runs $1.50 a yard and the company is favored with a shallow bedrock. Its values are concentrated in gravel from eighteen to twenty-eight feet deep.

Tunnel Policy at Georgetown.

During the past year the shaft system has been abandoned wherever it was followed on the precipitous hills, and many shaft workings with large ore reserves are neglected until connections can be made through tunnels. The tunnel system saves pumping and hoisting plants, and the permanent expenses of their operation. The tunnels started during the past year have withdrawn miners from the shafts and production at such properties has been suspended, a condition of affairs which prevented the region from making as large a production as the ore bodies justified a year ago. During the coming year the tunnels started in 1902 will penetrate rich vein systems, as shown in the upper workings, and there is every reason to suspect that the value of the 1903 production will surpass any previous record of this district. In proportion to population, no camp in the country has done more development work in 1902 than Georgetown. The benefits of the tunnel policy will be more and more manifest in the extreme economy of mining operation, and in the rapidity with which ore bodies may be exploited.—Denver Republican.

Yak Tunnel at Leadville.

Of leading importance to the Leadville gold belt is the progress of the Yak tunnel, the property of the Yak Mining, Milling and Tunnel Company, of which H. R. Meyer of Kansas City is president. In November President Meyer, after a close inspection of the tunnel, declared that the time will come when the territory lying between the My Day mine and the Pilot Fault, over 1,000 feet east and west and equally wide, will be one of the most productive sections of the camp, and at a depth far below the tunnel level. "I believe that the day will come when the Yak tunnel will be mining as much ore as is now produced by the whole Leadville district."

During 1901 the Yak company has been carrying its network of drifts toward the east and crossing the Mike fault, the track of the ore horizon has been followed into the My Day and adjacent ground with good results.

In 1890 the Yak tunnel was projected by Engineer A. A. Blow, backed by Philadelphia capital. It runs from the Rio Grande tracks in California gulch toward the heart of the gold belt and was known at first as the Silver Cord tunnel, to which was attached a group of mines and a mill. Fire destroyed the mill in 1892. On the heels of the 1893 panic the Philadelphia men dropped out and a new company was formed, made up of Leadville, Denver and Kansas City capitalists. The tunnel is now a regular shipper of gold-silver ores, and is in nearly 10,500 feet at the edge of the gold belt. In the next 200 feet it will cut the immense deposit of the Ibex company. Yak tunnel shipments reached 1,500 tons per month in 1900, some 2,000 tons per month in 1901 and an increased figure last year, about 3,000 tons per month.

The work of extension is progressing steadily and will largely influence the gold output of the company this year. In fact, it is one of the most promising gold producers at present under way in the state.—Denver News.

The iron mines of the province of Santiago, Cuba, employ over 4,000 men. Americans employ 125 men at 85 cents per day, in manganese mining. Old copper mines are being re-opened, and the new railroad through eastern Cuba will undoubtedly promote a good many mining enterprises.

MYSTERY IN HIS RECEPTION

Diplomat Puzzled at the Greeting Accorded to Him.

The Hon. Addison C. Harris of Indianapolis, ex-Minister to Austria, related an interesting experience from the campaign of 1900 a few evenings ago at the New Willard. He had been inivted to address a political meeting one afternoon at Fort Wayne. Alighting from the train he found himself in the center of a galaxy of expectant young men and women, wearing badges marked "Reception Committee." Appreciating the supposed compliment, he advanced, extending his hand, and was greeted enthusiastically and invited to go right along to the "church." He looked confused, and said he was not aware that he was to go to any church.

"Why, aren't you the minister?" inquired one of the young ladies, naively.

"Yes, I am a minister," said Mr. Harris, recalling his diplomatic post, "but I hadn't expected to go to any church," he continued slowly, looking puzzled.

"Perhaps you would prefer to go to Sister Smith's," said another young lady.

"I don't know Sister Smith," replied Mr. Harris. "I was under the impression that I would go directly to the rink, where I am to deliver a Republican speech this afternoon."

"Oh!" exclaimed a chorus of feminine voices, and the mystery was then cleared up by the explanation that the reception committee was at the train to meet a Baptist minister who was expected to address an assembly of that denomination.—Washington Post.

A COLD-HEARTED KING.

Characteristic Remark Credited to Louis XV of France.

In the old Court of France, gambling at cards was fashionable, except when a particularly serious monarch was on the throne. Louis XIV played constantly; and there are plenty of pictures of him as he sat among the ladies who bestowed their favors upon him and his courtiers, chatting at one moment and hauling in his winnings at the next. There was charm in Louis XIV even when he was gambling, but his despicable successor seems to have carried to the gaming table all the cruel and selfish coldness which characterized him in other aspects of his life. While one evening he was playing, M. de Chauvelin, one of the courtiers, was seized with a fit of apoplexy. Some one exclaimed, "M. de Chauvelin is ill." "Ill," said the kind, coldly turning round and looking at him. "He is dead; take him away. Spades are trumps, gentlemen."

FLOWERS LOVE AND HATE.

Claim That They Are Endowed With Passions Like Human Beings.

According to a French scientist, flowers are endowed with passions like human beings, and there are few among them which cannot love and hate fervently.

"They have their sympathies and antipathies," he explains, "and if we study them closely we can easily find them out. Roses are passionately fond of some flowers, and flourish when near them. On the other hand, they speedily wither when placed near other flowers, and we must infer that it is because the latter are not congenial to them. Heliotropes and violets have a lively sympathy for each other, and in like manner there seems to be a warm friendship between pansies and carnations."

"If it can be proved that flowers can love and hate," says a German writer, commenting on this statement, "it ought not to be difficult to provo that they have souls."

Quite the latest idea in summer liveries for servants is that of a titled English woman whose coachman and footman wear white drill liveries with white pitch helmets or solar topees during the heated term.

M. B. HOLT
Mining Engineer
U. S. Deputy Mineral Surveyor

FINNEY JONES
..CIVIL ENGINEER..
Cor. Reese and 13th
SILVERTON, COLO.

Hollis & Harrison
Civil & Mining Engineers
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Office, Hoffman Block.

JAMES DYSON,
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U S. Deputy Mineral Surveyor
Office on Reese Street between 14th and 15th near the county Offices.

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ASSAYER

Gold or Silver	$ .75
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Lead	.50

Complete price list on application.

A 26-page pictorial souvenir—11x16 inches (price 50c)—with every subscription to the Silverton Standard. It contains views of every town, mill and scenic points in the county of San Juan.

The Schulz Brewery
BREWER OF
HIGH-GRADE LAGER
WM. SCHULZ, PROPRIETOR.
Our new brews under the present management have reached a high grade of perfection. Its pureness is guaranteed. Ask for it, as it is sold by all first-class dealers.

ALLIGATOR AS A BOATING COMPANION

Sportsmen Have Exciting Experience With One That Had Apparently Been Killed Several Times.

Alligators move rapidly under water, are hard to see, harder to hit, and the harpoon will penetrate only the least accessible portions of the body. Nor does the title to the hide necessarily pass with making fast the weapon.

One afternoon in the Cheesehowitzkee river I harpooned a large alligator which towed me up and down the stream for an hour or two and then sulked in its deepest part. I pulled on the line until the boat was directly over him and stirred him up with the harpoon pole. He rolled himself up on the line in the manner peculiar to sharks and alligators, and banged the boat suggestively. We rowed to the bank and, making fast to some bushes, hauled on the line until we succeeded in worrying him nearly to the boat, when he rose to the surface and attacked us with open mouth. We repelled the attack with harpoon pole and rifle. The former was promptly bitten in three pieces, but the latter apparently finished him. It was so nearly dark that we decided to carry him in the skiff a mile down the river to where our sloop was anchored. We broke the seats out of the boat, and together managed to lift the head of the alligator aboard and tie it. We then tied the other end, when the reptile came to life and landed a blow with his tail which lifted me out of the skiff into the saw grass, with the breath knocked out of my body, and my hand and face badly cut by the grass.

Boat and boatman were capsized. As my rifle had fortunately been left upon the bank, I was able to kill the alligator again. We secured him by floating the boat, under him and then bailing it out. The alligator completely filled the boat, so that my companion and I sat upon his back as we paddled down the river with gunwales unpleasantly near the water.

It was growing dark and the water around us was becoming live with alligators. While we were reflecting upon our overloaded condition, our alligator came to life aagin and shifted ballast until water poured over the gunwale. We quickly balanced the boat, only to see it again disturbed and to ship more water. A scramble for the shore followed, which we reached without capsizing and where we left our victim for the night after again killing him. In the morning our buzzard friend from the Homosassa river, surrounded by his family, was sitting above him in the tree waiting for us to attend to our carving duties.

There are drawbacks to hunting in the Great Cypress swamp. Even natives have been lost and died in its recesses. It is bounded on the east by the Everglades and on the west by a series of impenetrable mangrove thickets, alternating with deep channels. If lost one should turn his face firmly to the north, and as a guide remarked to me "he ought to get somewhere in three or four days."—Country Life in America.

STORIES OF LIFE IN VENEZUELA

Incidents That Break the Monotony of Existence in the South American Republic.

Two members of parliament have quaint stories to tell of adventures in Venezuela in times past.

An honorable baronet, while on a visit to the republic, had interviews with certain members of the government. He dined with them in the evening, and retired at a late hour. He was awakened from his sleep by a noise in his room, and saw, as he thought, one of his hosts disappear through the bedroom window leading to the veranda.

Concluding that this was a polite custom of the country, the visitor returned to sleep, but in the morning he found his trousers upon the floor, their pockets turned inside out. His old-fashioned, highly decorated chain purse was gone, but its contents were on the ground. His gold-edged cigar case and some gold charms attached to his fob had also vanished.

The Englishman went straight to the seat of government and complained to one of the ministers, who expressed his dismay, and was thereupon informed that the person seen in the room bore a resemblance to himself.

"Very strange," replied the minister, "for there is no one alive who resembles me."

"In that case," rejoined the visitor dryly, "you should have no difficulty in securing the restoration of my property."

Later in the day the Englishman discovered an anonymous package upon his room table. Opening the cover he found all the missing articles save the gold-edged cigar case and one of the charms—a little goddess in diamonds and emeralds.

Mr. Henry Labouchere went through a revolution in Venezuela some years ago.

A battle took place on the Plaza one afternoon," said Mr. Labouchere in telling his story, "and I watched it from a grass hammock on the terrace in front of my hotel. The government forces were put to flight, and I was joined by my revolutionary friends keen from the fight.

"Later one of the fallen ministers visited us and said he could show us where 250,000 silver dollars were hidden. He was as good as his word, and patriotism being sunk by my friends in obedience to the comforting moral of the place, 'Be kind to ourselves,' it was proposed to divide the swag.

"I said, 'No, don't do that; it might offend the people. Play for it!' Which was agreed to. The government man was allowed in, and we played and the government man won it all to the last dollar. So after all no harm was done."—London Mail.

A WONDERFUL MAN-MONKEY.

Chimpanzee in London Shows Intelligence of a Human Being.

Performing monkeys are the rage. There is a wonderful man-chimpanzee at the Aquarium in London. He was found on the Congo river, is 7 years old, stands 4 feet high and weighs fifty-six pounds. If he lives, which is always an open question, for chimpanzees are exceedingly delicate, he may reach the age of 40. He is marvelously intelligent and his instinct for imitation is very acute. Whatever he sees a person do he immediately starts to do himself. For example, when he travels in the train he rises and wipes the window with a handkerchief so that he may enjoy the passing view, and when he is taken to the seaside he gets a bucket and spade like the children and makes castles in the sand. He is curiously sensitive and sobs like a child when roughly spoken to. He is most industrious worker and his tricks on a tricycle are wonderful; he can ride a machine in seven different ways. He dresses like a man, but distinctly dislikes the high hat, preferring a sailor. He lives on bananas, milk and cocoa.

If a man always pays cash he is entitled to a lot more credit than he ever gets.

THE KENDRICK-GELDER
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F. C. KENDRICK, General Manager E. W. WALTERS, Supt. and Metallurgist
Purchasers of Gold, Silver and Copper Ores. Special rates on tonnage of low grade ores.
Sampling and Settlements Made Promptly
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ESTABLISHED 1876
Swift's Premium Hams and Bacons
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DEALERS IN
Fresh, Salt and Smoked Meats of all kinds. Butter, Cheese, Eggs, Lard, Vegetables, Etc. at lowest prices.
SOLE AGENTS FOR
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Independent Meat Market
C. H. H. KRAMER.
Wholesale and Retail Butcher.
FRESH FISH. FRESH MEAT.
Vegetables, Cured Meats and Poultry.
Rohrig & Kramer's Old Stand.

Notice of Forfeiture.

To A. A. Martin, his heirs or assigns:

You are hereby notified that I have expended during the year 1902 the sum of One Hundred Dollars in labor and improvements upon the Esmaralda lode mining claim, situated in Eureka mining district, San Juan county, Colorado, the location certificate of which is found of record in Books 96 and 123 on pages 356 and 162 of the records in the recorder's office of said San Juan county, Colorado, in order to hold said claims under the provisions of section 2324 of the Revised Statutes of the United States and the amendments thereto, approved January 22, 1880, concerning annual labor upon mining claims, being the amount required to hold said lode for the period ending December 31, 1902.

And if within ninety days from the service of this notice (or within ninety days after this notice by publication) you fail or refuse to contribute your proportion of such expenditure as a co-owner and the cost of this service notice, or the publication thereof, your interest in the claim or said lode will become the property of the subscriber, your co-owner, by the terms of said section 2324.

HENRY SHERMAN.

First pub. Feb. 14, 1903.
Last pub. May 17, 1903.

NOTICE.

STATE OF COLORADO, } ss.
COUNTY OF SAN JUAN, }

NOTICE.

The People of the State of Colorado to Thomas Harris and Joseph Harris, Greeting:

Whereas, Edgar Buchanan, a resident of Silverton, Colorado, has presented to the County Court of said county for probate an instrument in writing purporting to be the last will and testament of William D. Harris, late of said county, deceased, and the 30th day of March 1903, has been set for hearing the application for the probate of said instrument as the said last will and testament of said William D Harris,, deceased; and whereas, it appears from the said instrument and from other satisfactory evidence, that F. O. Sherwood is the sole legatee and devisee of said will, and that Thomas Harris of Pittsburg, Pennsylvania, and Joseph Harris of Seattle, State of Wasington, are brothers and heirs of the said William D. Harris. You are therefore commanded to be and appear before the County Court of San Juan County, at the Court House in Silverton, on the 3-th day of March, 1903, then and there to attend the probate of said will before said cour.; further to do and perform what shall then by the said court be required and adjudged

Witness Josiah Watson, County Judge of the said County Court, and the seal thereof, at Silverton, in said County, this 20th day of February, A. D. 1903.

[SEAL.] JOSIAH WATSON, County Judge.

First pub Feb. 21, 1903.
Last pub. March 28, 1903.

NOTICE OF SPECIAL MEETING

Of the Stockholders of The Big Colorado Mining and Milling Company.

Notice is hereby given that there will be a special meeting of the Stockholders of THE BIG COLORADO MINING AND MILLING COMPANY on March 16, A. D. 1903, at 10 o'clock a. m., at 603 Kittredge Building, Denver, Colorado, for the following purposes:

To increase the capital stock of the said corporation from $15,000 to $.00,000;

To ratify acts done at meetings heretofore held by Directors and Stockholders;

To examine and approve or reject accounts or moneys expended by officers of this Company.

FRANK L. REED, President.
C. W. BLOODGOOD, Secretary.

First pub. Feb. 21, 1903.
Last pub. March 14, 1903.

Advertised Letter List.

Following letters remain uncalled for at the postoffice in Silverton, Colo., for the week ending February 19, 1903.

Brown, James	Bell, Mamie
Blaylock, Mr	Byrd, Jonathan
Comi, Matt	Davis, U C
Evart, Dick	Johnson, T J
Konler, Lillie	Larson, H
Parker, W P	Pahv, John P
Roth, Louesia	Southwestern Fuel Co
Stephens, Richard H	Ward, George
Walker, Earnest	Wildd, John

Parties calling for any of the above letters will please say "advertised" and give date of list. MATILDA MCCARTNEY, Postmistress.

Bettet Than Gold.

"I was troubled for several years with chronic indigestion and nervous debility" writes F. J Green of Lancaster, N. H. "No remedy helped me until I began using Electric Bitters, which did me more good than all the medicines I ever used. They have also kept my wife in excellent health for years. She says Electric Bitters are just splendid for female troubles; that they are a grand tonic and invigorator for weak, run down women. No other medicine can take its place in our family." Try them. Only 50c. Satisfaction guaranteed by S. D. Cunningham, Druggist.

Notice of Dissolution.

Notice is hereby given that the partnership heretofore existing between Matt Chiono and G. B. Della Vadona has by mutual consent been this 9th day of February, 190., dissolved, Matt Chiono assuming all debts and all moneys due the firm are to be paid to either of said firm.

G. B. DELLA VEDONA.
MATT CHIONO.

Marsh's Restaurant is always up-to-date.

Notice of Special Stockholders' Meeting.

Notice is hereby given that a special meeting of the stockholders of the Kendrick and Gelder Smelting Company will be held at the company's office, 720-736 Exchange Building, Denver, Colorado, on Wednesday, March 25th, 1903, at 10 o'clock a. m., to take into consideration and vote upon a consolidation of the properties and franchises of this company with those of The Oliver Reduction Company and The Paradox Copper-Gold Mining Company, and if the vote shall be in favor of said consolidation to elect two directors of the consolidated company to act for the first year; to fix its proportion of the capital stock of the new corporation, and to transact such other business as may properly come before such meeting.

W. F. KENDRICK,
WM. GELDER,
GEORGE OLIVER,
M. B. CARPENTER,
Directors.

Denver, Colorado, February 10th, 1903.
13-5w

Notice of Special Stockholders' Meeting.

Notice is hereby given that a special meeting of the stockholders of The Paradox Copper-Gold Mining Company will be held at the company's office, 720-736 Exchange Building, Denver, Colorado, on Wednesday, March 25th, 1903, at 3 o'clock p. m., to take into consideration and vote upon a consolidation of the properties and franchises of this company with those of The Kendrick and Gelder Smelting Company and The Oliver Reduction Company, and if the vote shall be in favor of said consolidation to elect two directors of the consolidated company to act for the first year; to fix its proportion of the capital stock of the new corporation, and to transact such other business as may properly come before such meeting.

C. M. VAN LAW,
P. E. HOULETTE,
M. B. CARPENTER.
W. B. RYDER,
FRED BARNETT,
Directors.

Denver, Colorado, February 10th, 1903.
13-5w

Administrator's Notice.

Estate of J. N. Anderson, Deceased.

The undersigned, having been appointed administrator of the estate of J. N. Anderson, late of the County of San Juan in the State of Colorado, deceased, hereby gives notice that he will appear before the County Court of said San Juan County, at the Court House in Silverton, in said County, at the March Term, 1903, on the first Monday in March next, at which time all persons having claims against said estate are notified and requested to attend for the purpose of having the same adjusted. All persons indebted to said estate are requested to make immediate payment to the undersigned.

Dated at Silverton, Colo., this 30th day of January, A. D. 1903.

FRANK B. BROWN, Administrator.

First pub. Feb. 7, 1903.
Last pub. Feb. 28, 1903.

Notice of Special Stockholders' Meeting.

Notice is hereby given that a special meeting of the stockholders of The Oliver Reduction Company will be held at the company's office, 720-736 Exchange Building, Denver, Colorado, on Wednesday, March 25th, 1903, at 12 o'clock m, to take into consideration and vote upon a consolidation of the properties and franchises of this company with those of the Kendrick and Gelder Smelting Company and The Paradox Copper-Gold Mining Company, and if the vote shall be in favor of said consolidation to elect two directors of the consolidated company to act for the first year; to fix its proportion of the capital stock of the new corporation, and to transact such other business as may properly come before such meeting.

GEORGE OLIVER,
W. F. KENDRICK,
W. T. FORD,
M. B. CARPENTER,
GEORGE H. OLIVER,
Directors.

Denver, Colorado, February 10th, 1903.
13-5w.

NOTICE OF FORFEITURE.

To Patrick Lyons, his heirs and assigns:

You are hereby notified that I have expended the sum of One Hundred Dollars in labor and improvements during the year 1902, upon each of the following mining claims: Bonanza King Lode Mining claim, and Bonanza Queen Lode Mining claim, situate in Eureka Mining district, San Juan county, Colorado, the location certificate of which is found in book 99, page 336, and book 99, page 337, respectively, of the records in the Recorder's office of said San Juan county, Colorado, in order to hold said claims under the provisions of section 2324 of the Revised Statutes of the United States and the amendments thereto, approved January 22, 1880, concerning annual labor upon mining claims, being the amount required to hold said claims for the period ending December 31, 1902.

And if within ninety days from the service of this notice (or within ninety days after this notice by publication) you fail or refuse to contribute your proportion of such expenditure as co-owner and the cost of this service notice, or the publication thereof, your interest in the said claims or lodes will become the property of the subscriber, your co-owner, by the terms of said section 2328.

SALMON RECKARD.

First pub. Feb 21, 1903.
Last pub. April 25, 1903.

Administrator's Notice.

Estate of Bert Molinario, Deceased.

The undersigned, having been appointed administratrix of the estate of Bert Molinario, late of the County of San Juan in the State of Colorado, deceased, hereby gives notice that she will appear before the County Court of said San Juan County, at the Court House in Silverton in said County, at the March Term, 1903, on the fourth Monday in March next, at which time all persons having claims against said estate are notified and requested to attend for the purpose of having the same adjusted. All persons indebted to said estate are requested to make immediate payment to the undersigned.

Dated at Silverton, Colorado, this 19th day of February, A. D. 1903.

AMILIA MOLINARIO, Administratrix.

First publication Feb. 21, 1903.
Last publication March 14, 1903

L. G. PROSSER,

Furniture Dealer

AND UNDERTAKER.

The Best line of Sewing Machines in the world.

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STANDARD ROTARY,
WHITE ROTARY,
NEW HOME,
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IDEAL.

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IF IT'S

"HERALD WHIKEY"

It's all you want to know about it.

FOR SALE BY

John Walter,
Giacomelli & Gallo,

CHAS. SCHEER,

PRACTICAL PLUMBER

and Steam Fitter.

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Joseph Bordeleau's

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Our candies are delicious as well as healthful.

Fresh & Pure.

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B. B. B.

BIG BRICK BARN

Melton & Melton,
PROPRIETOR.

Hesperus and City Coal

DOES A GENERAL

LIVERY AND FEED BUSINESS.

HAY and Grain.

BBB

San Juan Souvenir, including panoramas, 50 cents.

Sheriff's Sale.

Notice is herey given that by virtue of a writ of execution issued out of the Clerk's office of the District Court of Arapahoe County, Colorado, which said county is now called the City and County of Denver (formerly a part of said Arapahoe county), and to me directed, whereby I am commanded to make the sum of Sixteen Hundred Fifty-Four Dollars and Sixty-Two Cents, and costs of suit, the amount of a certain judgment recently obtained against The Silver Fountain Consolidated Mining Company and in favor of Joseph H. Gibbons, at the September, 1902, term of said court, out of the lands, tenements, goods and chattels of the said The Silver Fountain Consondated Mining Company, I have levied on the following property, to-wit:

All of the right, title and interest of the said The Silver Fountain Consolidated Mining Company, in and to the Silver Fountain lode, U S Survey No. 2541, the Silver Beauty lode, U. S. Survey No. 798 or 789, or 5407, the Achiles lode, U. S. Survey No. 2780, said above lodes being mining claims situate on Green Mountain, Eureka Mining District, San Juan County, Colorado.

Now, therefore, according to the commands in said writ contained, I shall offer and expose for sale at Public Auction, all of the said right, title and interest of said Company in and to the above described property, on Saturday, the 21st day of February, 1903, at 10 o'clock a. m., at the East Front Door of the County Court House in Silverton, Colorado, for the purpose of satisfying said judgment and costs.

Dated at Silverton, Colorado, January 23, 1903.

C. S. CASAD,
Sheriff of San Juan County, Colorado.

First pub, Jan. 24, 1903.
Last pub. Feb. 21, 1903.

SUMMONS.

STATE OF COLORADO, } ss.
COUNTY OF SAN JUAN, }

IN THE DISTRICT COURT.

Cooper Anderson, *Plaintiff.*
vs.
The Gipsey Maid Consolidated Mining Company Josephine C. Blague, Edward P. Blague, Frederick H. Blague Charles C. Blague, Mary Blague Burger, Louis Schreiber, and the Unknown Successors in Trust and Cestuis Que Trustent of Giles Blague deceased. *Defendants.* } SUMMONS.

The People of the State of Colorado,
To the above-named defendants, Greeting:

You are hereby required to appear in an action brought against you by the above-named plaintiff in the District Court of San Juan County, State of Colorado, and answer the complaint therein within twenty days after the service hereof, if served within this County, or if served out of this County, or by publication, within thirty days after the service hereof, exclusive of the day of service, or judgment by default will be taken against you according to the prayer of the complaint. And if a copy of the complaint in the above-entitled action be not served with this summons, or if the service hereof be made out of this state, then ten days additional to the time hereinbefore specified for appearance and answer will be allowed before the taking of judgment by default as aforesaid.

The said action is brought to require you to set forth the nature of the interest you claim (if any) in the Richmond and Mary Spur lode mining claims, U. S. Mineral Surveys Nos. 706 and 707, respectively, situated in the Animas mining district, in the County of San Juan and State of Colorado, and that such interest (if any you claim) may be determined by the court, and that you be adjudged to have no interest whatever in said premises; for general relief and costs of suit.

In substance the complaint alleges that plaintiff is the owner in fee simple of the said lode mining claims and that his title is based upon two tax deeds of said premises executed and delivered to him and his grantors by the treasurer of said San Juan County; that in 1884 The Gipsey Maid Consolidated Mining Company, a corporation, was the owner of said premises and that by virtue of a sheriff's sale the title to said premises became vested in one Giles Blague as trustee; that in the year 1897, while the record title to said premises was vested in him, the said Giles Blague died in the State of New Jersey, leaving a will whereby he devised his estate to the defendants Josephine C Blague, Edward P. Blague, Frederick H. Blague, Charles C. Blague, and Mary Blague Burger, the defendants Charles C Blague and Louis Schreiber being the executors of his said will; that the plaintiff has no knowledge as to who are the cestuis que trustent or successors in trust of the said Giles Blague except the devises aforesaid; that the defendants as well as the successors in trust and cestuis que trustent claim an interest in the premises adversely to the plaintiff, and that the interest so claimed is without any right whatever.

And you are hereby notified that if you fail to appear and answer the said complaint as above required, plaintiff will take default and judgment against you as prayed in the complaint.

Given under our hands as attorneys for the plaintiff, at Ouray, in said State, this 17th day of January, A D. 1903.

STORY & STORY.
Ouray, Colorado.

First pub. Feb 7, 1903.
Last pub. Feb. 28, 1903.

Notice to Creditors.

DENVER COLORADO, January 26, 1903.

Notice is hereby given to all whom it may concern, that all persons having unpaid debts or claims against The Sunlight Mining and Milling Company, are requested to present the same without delay to the president of said company, M. T. Jones, Transit House, Union Stock Yards, Chicago, Illinois, by mail or otherwise.

M. T. JONES, President.

Last pub. Feb. 28, 1903.

FORFEITURE NOTICE.

To JOHN DREASLER AND LOUIS FAHRLANDER, their heirs or assigns:

You and each of you are hereby notified that I have expended the sum of One Hundred Dollars in labor and improvements during each of the years 1899, 1900, 1901 and 1902 upon each the Reineler, Lillie No. 1 and Lillie No, 2 lode mining claims, all situated in the Animas Mining district, San Juan county, Colorado, the location certificates of which are found of record respectively in Book 97 at page 426, Book 86 at page 389 and in Book 86 at page 390 of the records in the recorder's office of said San Juan county, Colorado, in order to hold said claims under the provisions of section 2324 of the Revised Statutes of the United States and the amendments thereto, approved January 22, 1880, concerning annual labor upon mining claims, being the amount required to hold said lode for the periods ending December 31, 1899, 1900, 1901 and 1902.

And if within ninety days from the service of this notice (or within ninety days after this notice by publication) your fail or refuse to contribute your proportion of such expenditure as co-owners and the cost of this service notice, or the publication thereof, your interests in the claim or said lode will become the property of the subscriber, your co-owner, by the terms of said section 2324.

JOSEPH PROBST.

First pub. Jan. 3, 1903.
Last pub. April 4, 1903.

Stockholders' Meeting.

A special meeting of the stockholders of the NATALIE MINING AND MILLING COMPANY, will be held at the office of Buchanan & Searcy, Counselors at law, Silverton, Colorado, on March 1st, 1903 at noon.

The objects of the meeting are to submit to the stockholders for their consideration and vote, the proposition of consolidation of the NATALIE MINING AND MILLING COMPANY and the OCCIDENTAL MINING COMPANY, and if the same is approved, to elect three directors of the Consolidated Company; also to submit a proposition to the stockholders for securing to the Consolidated Company treasury stock that may be sold to its stockholders or others for the company's uses.

Dated, Silverton, Colorado, January 19th, 1903. W. HAROLD COCKCROFT.
First pub. Jan. 24, 1903. Secretary.
Last pub. Feb. 28, 1903.

FORFEITURE NOTICE.

To MRS. SELLY J. HOBSON, her heirs or assigns:

You are hereby notified that we have expended the sum of One Hundred Dollars in labor and improvements during the year 1902 upon each the Silver Link and Keystone lodes mining claims, situated in the Uncompahgre and Eureka Mining districts, San Juan county, Colorado, the location certificates of which are found of record respectively in Book 96 page 170 and Book 82, page 363 of the records in the recorder's office of said San Juan county, Colorado in order to hold said claims under the provisions of section 2324 of the Revised Statutes of the United States, and the amendments thereto approved January 22, 1880, concerning annual labor upon mining claims, being the amount required to hold said lode for the period ending December 31, 1902.

And if within ninety days from the service of this notice (or within ninety days after this notice by publication) you fail or refuse to contribute your proportion of such expenditure as co-owner and the cost of this service notice, or the publication thereof, your interests in the claims or said lodes will become the property of the subscribers, your co-owners, by the terms of said section 2324.

D. L. BROWN,
M. D. BROWN.

First pub. Jan. 3 1903
Last pub. April 4 1903

Notice of Forfeiture.

To Thomas Long deceased, his heirs, and to Benjamin Prebar and L. L. Bigelow, their heirs and assigns:

You and each of you are hereby notified that I have expended One Hundred Dollars in labor and improvements during each of the years 1899 1900 1901 and 1902 upon the Free Coinage lode mining claim situated in Red Mountain mining district, San Juan county, Colorado, the location certificate of which is found of record in Book 82 at page 216 of the records in the recorder's office of said San Juan county, Colorado, in order to hold said claims under the provisions of section 2324 of the Revised Statutes of the United States and the amendments thereto, approved January 22, 1880, concerning annual labor upon mining claims, being the amount required to hold said lode for the periods ending December 31, 1899, 1900, 1901 and 1902

And if within ninety days from the service of this notice (or within ninety days after this notice by publication) you fail or refuse to contribute your proportion of such expenditure as co-owners and the cost of this service notice, or the publication thereof, your interests in the claim or said lode will become the property of the subscriber, your co-owner, by terms of said section 2324.

A. JOHNSON.

First pub. Jan. 31, 1902.
Last pub. May 2, 1902

FORFEITURE NOTICE.

To Charles Jackson, his heirs and assigns:

You are hereby notified that I have expended the sum of One Hundred Dollars in labor and improvements during the year 1902, upon the Horse Shoe Lode Mining claim, situate in Eureka Mining district, San Juan county, Colorado, the location certificate of which is found of record in Book 97, page 171, of the records in the Recorder's office of said San Juan county, Colorado, in order to hold said claims under the provisions of Section 2324 of the Revised Statutes of the United States and the amendments thereto, approved January 22, 1880, concerning annual labor upon mining claims, being the amount required to hold said claim for the period ending December 31, 1902.

And if within ninety days from the service of this notice (or within ninety days after this notice by publication) you fail or refuse to contribute your proportion of such expenditure as co-owner and the cost of this service notice, or the publication thereof, your interest in the said claim or lode will become the property of the subscriber, your co-owner, by the terms of said section 2324.

JOHN M. HOFFMAN.

First pub. Jan. 31, 1902.
Last pub. May 2, 1902.

SUMMONS.

STATE OF COLORADO, } ss.
COUNTY OF SAN JUAN, }

IN THE DISTRICT COURT.

August Fast, *Plaintiff.*
vs.
B. F. McMillan, Charles V. McMillan and Edwin R. Herron, *Defendants* } SUMMONS.

The People of the State of Colorado,

To B. F. McMillan, Charles V. McMillan and Edwin R. Herron, the defendants above named, Greeting:

You are hereby required to appear in an action brought against you by the above named plaintiff in the District Court of San Juan County, State of Colorado, and answer the complaint therein within twenty days after the service hereof, if served within this County; or, if served out of this County, or by publication, within thirty days after the service hereof, exclusive of the day of service; or judgment by default will be taken against you according to the prayer of the complaint. And if a copy of the complaint in the above entitled action be not served with this summons, or if the service hereof be made out of this State, then ten days additional to the time hereinbefore specified for appearance and answer will be allowed before the taking of judgment by default as aforesaid.

The said action is brought to quiet and confirm in the plaintiff the title to the whole of the McMillan lode mining claim, survey number 2009, and situate in the Animas Mining District, County of San Juan and State of Colorado, and to require you, the said defendants, to set forth the nature and extent of your respective claims and titles in said property and to have such claims and titles adjudged invalid, and held to be inferior to the title of the plaintiff, and also for general equitable relief, with costs of suit, as will more fully appear from the complaint in said action to which reference is here made.

And you are hereby notified that if you fail to appear, and to answer the said complaint as above required, the said plaintiff will have your default entered and judgment rendered as prayed

DISTRICT COURT SEAL. Given under my hand and the seal of said Court at Silverton, in said County, this 17th day of Janaury, A D. 1903.

FRANK L. WATSON, Clerk.

First pub. Feb. 7, 1903.
Last pub. Feb. 28, 1903.

FORFEITURE NOTICE.

To BENNIE EVANS AND LOUIE MORRIS their heirs or assigns:

You and each of you are hereby notified that I have expended the sum of One Hundred Dollars in labor and improvements during the year 1902, upon each the Puzzler, Mystery, Hidden Treasure and Slide lodes mining claims all situated in the Animas Mining district, San Juan county, Colorado, the location certificates of which are found of record respectively in Book 99 at page 502, Book 99 page 503, Book 111, page 190 and Book 111, page 189 of the records in the recorder's office of said San Juan county, Colorado, in order to hold said claims under the provisions of section 2324 of the Revised Statutes of the United States and the amendments thereto, approved January 22, 1880, concerning annual labor upon mining claims, being the amount required to hold said lodes for the period ending December 31, 1902.

And if within ninety days from the service of this notice (or within ninety days after this notice by publication) you fail or refuse to contribute your proportion of such expenditure as co-owners and the cost of this service notice, or the publication thereof, your interests in the claims or said lodes will become the property of the Subscriber, your co-owner, by the terms of said section 2324. LAWRENCE CAREY.

First pub. Jan. 3, 1903.
Last pub. April 1. 1903.

Stockholders' Meeting.

A special meeting of the stockholders of the OCCIDENTAL MINING COMPANY, will be held at the office of Buchanan & Searcy Counselors at law, Silverton, Colorado, on March 1st, 1903 at 12.30 o'clock.

The objects of the meeting are to submit to the stockholders for their consideration and vote, the proposition of consolidation of the OCCIDENTAL MINING COMPANY and the NATALIE MINING AND MILLING COMPANY, and if the same is approved, to elect three directors of the Consolidated Company also to submit a proposition to the stockholders for securing to the Consolidated Company treasury stock that may be sold to its stockholders, or others, for the Company's uses.

Dated, Silverton, Colorado, January 15th, 1903. W. HAROLD COCKCROFT.
First pub. Jan. 24, 1903. Secretary.
Last pub. Feb. 28, 1903.

A GRAND BALL

WILL BE HELD ON

St. Patrick's Night, March 17

IN THE

TICKETS $1.00.

MINERS' UNION HALL

THE BEST BRAND MARKET

AND

LIVE STOCK COMPANY.

Wholesale and Retail dealers in

MEATS AND PRODUCE.

Beef, Pork, Mutton, Veal. Dry and Green Vegetables Butter, Eggs,

Sugar Cured Hams and Bacon. Pickles and Kraut.

Cheese, Salt and Fresh Fish, Oysters, Game' Poultry

TRY OUR OWN MAKE Breakfast Bacon, Kettle Rendered Lard, Corned Beef, Pickled Pork, Dry Salt, Sausage of all kinds

WE GUARANTEE SATISFACTION.

Supplying Mines a Specialty. Give us a Trial.

Cor. Green and 11th St. SILVERTON, COLO.

1 OF 1 RECORD(S)

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Date:10/6/2017
Report processed by:
Toeroek Associates Inc||

Full Name	Address	County	Phone
TAYLOR, KENT STUART	5402 BULL RUN CIR 2 AUSTIN, TX 78727-6501 TRAVIS COUNTY	TRAVIS	(512) 258-5694

ADDITIONAL PERSONAL INFORMATION

SSN	DOB	Gender	LexID(sm)
453-98-XXXX	9/1961 (Age:56)		002492670382

Subject Summary

Name Variations

1: KAYLOR, KENT
2: KENT, TAYLOR
3: KENTE, TAYLOR
4: STUART, TAYLOR KENT
5: TALOR, KENT
6: TAYLOE, KENT
7: TAYLOR, KEMP
8: TAYLOR, KENT
9: TAYLOR, KENT P
10: TAYLOR, KENT S
11: TAYLOR, KENT STUART
12: TAYLOR, KENTE
13: TAYLOR, KENY
14: TAYLR, KENT
15: TAYLRO, KENT

SSNs Summary

No.	SSN	State Iss.	Date Iss.	Warnings
		Most frequent SSN attributed to subject:		
1:	453-98-XXXX	Texas	1968-1969	

DOBs

Reported DOBs:
9/1961

Possible E-Mail Addresses

SLAYER@CONSTANT.COM

Others Using SSN - 0 records found

Address Summary - 31 records found

No.	Address
1:	5402 BULL RUN CIR 2 AUSTIN, TX 78727-6501 TRAVIS COUNTY
2:	5402 BULL RUN CIR UNIT CRI AUSTIN, TX 78727-6501 TRAVIS COUNTY

3: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

4: 220 2ND ST
RUIDOSO, NM 88345-7559
LINCOLN COUNTY

5: 225 HANAUMA DR
BASTROP, TX 78602-7080
BASTROP COUNTY

6: 1224 WASHINGTON AVE
GRANTS, NM 87020-3113
CIBOLA COUNTY

7: 3 N SHORE TOWNHOMES
LAKE CITY, CO 81235
HINSDALE COUNTY

8: 205 HINSDALE COUNTY ROAD33 3
LAKE CITY, CO 81235
HINSDALE COUNTY

9: 4915 W CASHIN DR
TUCSON, AZ 85757-9461
PIMA COUNTY

10: 1842 N 6TH ST
ABILENE, TX 79603-6038
TAYLOR COUNTY

11: 3006 MEDICAL ARTS ST
AUSTIN, TX 78705-3305
TRAVIS COUNTY Social Services Facility

12: 5401 BULL RUN CIR
AUSTIN, TX 78727-6501
TRAVIS COUNTY

13: 5102 BULL RUN CIR
AUSTIN, TX 78727
TRAVIS COUNTY

14: 9462 BULL RUN CIR
AUSTIN, TX 78727
TRAVIS COUNTY

15: 505 CAMBRIDGE DR
ROUND ROCK, TX 78664-7602
WILLIAMSON COUNTY

16: 815 BRAZOS ST STE 809
AUSTIN, TX 78701-2562
TRAVIS COUNTY

17: 1001 S MAYS ST APT
ROUND ROCK, TX 78664-6732
WILLIAMSON COUNTY

18: TR02 BULL RUN CIR
AUSTIN, TX 78727
TRAVIS COUNTY

19: 56402 BULL RUN CIR
AUSTIN, TX 78727
TRAVIS COUNTY

20: 5462 BULL RUN CIR
AUSTIN, TX 78727-6501
TRAVIS COUNTY

21: 3402 BULL RUN CIR
AUSTIN, TX 78727
TRAVIS COUNTY

22: 504 BULL RUN CIR
AUSTIN, TX 78727
TRAVIS COUNTY

23: 3956 CORONADO RD
SNOWFLAKE, AZ 85937
NAVAJO COUNTY

24: 603 SEMINOLE RD
LEANDER, TX 78641-2327
WILLIAMSON COUNTY

25: 69 CAUSEWAY ST
BOSTON, MA 02114-1615
SUFFOLK COUNTY

26: 503 W 15TH ST 9
AUSTIN, TX 78701-1511
TRAVIS COUNTY

27: 503
AUSTIN, TX 78701
TRAVIS COUNTY

28: 903 W 15TH ST
AUSTIN, TX 78201
BEXAR COUNTY

29: 8402 BULL RUN CIR
AUSTIN, TX 78727
TRAVIS COUNTY

30: 84 NE LOOP 410 APT
SAN ANTONIO, TX 78216-5802
BEXAR COUNTY

31: 3402 BUTTERLEIGH
SAN ANTONIO, TX 78247-3179
BEXAR COUNTY

Address Details
1: 5402 BULL RUN CIR 2 AUSTIN, TX 78727-6501

Address	Dates	Phone
5402 BULL RUN CIR 2 AUSTIN, TX 78727-6501 TRAVIS COUNTY	6/1966 - 10/2017	(512) 258-5694

Census Data for Geographical Region
Median Head of Household Age: 46
Median Income: $90,833
Median Home Value: $259,124
Median Education: 15 years
Household Members
None Listed
Other Associates
None Listed

2: 5402 BULL RUN CIR UNIT CRI AUSTIN, TX 78727-6501

Address	Dates	Phone
5402 BULL RUN CIR UNIT CRI AUSTIN, TX 78727-6501 TRAVIS COUNTY	2009 - 2014	(512) 258-5694

Census Data for Geographical Region
Median Head of Household Age: 46
Median Income: $90,833
Median Home Value: $259,124
Median Education: 15 years
Household Members
None Listed
Other Associates
None Listed

3: 2318 ARNIE LN ROUND ROCK, TX 78664-6122

Address	Dates	Phone
2318 ARNIE LN ROUND ROCK, TX 78664-6122 WILLIAMSON COUNTY	3/1987 - 9/2017	(512) 255-9593

Census Data for Geographical Region
Median Head of Household Age: 32
Median Income: $130,313
Median Home Value: $275,000
Median Education: 15 years
Household Members
MORRISS, MELISSA M
TAYLOR, CHEYENNE AURORA BODIE
Other Associates
None Listed

4: 220 2ND ST RUIDOSO, NM 88345-7559

Address	Dates	Phone
220 2ND ST RUIDOSO, NM 88345-7559 LINCOLN COUNTY	7/2017 - 7/2017	

Census Data for Geographical Region
Median Head of Household Age: 39
Median Income: $50,922
Median Home Value: $140,813
Median Education: 13 years
Household Members
None Listed
Other Associates

None Listed

5: 225 HANAUMA DR BASTROP, TX 78602-7080

Address	Dates	Phone
225 HANAUMA DR BASTROP, TX 78602-7080 BASTROP COUNTY	6/2017 - 6/2017	

Census Data for Geographical Region

Median Head of Household Age: 34
Median Income: $66,110
Median Home Value: $168,985
Median Education: 13 years

Household Members

None Listed

Other Associates

None Listed

6: 1224 WASHINGTON AVE GRANTS, NM 87020-3113

Address	Dates	Phone
1224 WASHINGTON AVE GRANTS, NM 87020-3113 CIBOLA COUNTY	5/2017 - 5/2017	

Census Data for Geographical Region

Median Head of Household Age: 27
Median Income: $38,243
Median Home Value: $81,000
Median Education: 12 years

Household Members

None Listed

Other Associates

None Listed

7: 3 N SHORE TOWNHOMES LAKE CITY, CO 81235

Address	Dates	Phone
3 N SHORE TOWNHOMES LAKE CITY, CO 81235 HINSDALE COUNTY	12/2013 - 12/2016	

Census Data for Geographical Region

Median Head of Household Age: 31
Median Income: $65,705
Median Home Value: $358,929
Median Education: 14 years

Household Members

None Listed

Other Associates

None Listed

8: 205 HINSDALE COUNTY ROAD33 3 LAKE CITY, CO 81235

Address	Dates	Phone
205 HINSDALE COUNTY ROAD33 3 LAKE CITY, CO 81235 HINSDALE COUNTY	5/2016 - 9/2016	

Census Data for Geographical Region

Median Head of Household Age: 31
Median Income: $65,705
Median Home Value: $358,929
Median Education: 14 years

Household Members

None Listed
Other Associates
None Listed

9: 4915 W CASHIN DR TUCSON, AZ 85757-9461

Address	Dates	Phone
4915 W CASHIN DR TUCSON, AZ 85757-9461 PIMA COUNTY	3/2015 - 3/2015	

Census Data for Geographical Region
Median Head of Household Age: 35
Median Income: $63,715
Median Home Value: $222,000
Median Education: 12 years
Household Members
None Listed
Other Associates
None Listed

10: 1842 N 6TH ST ABILENE, TX 79603-6038

Address	Dates	Phone
1842 N 6TH ST ABILENE, TX 79603-6038 TAYLOR COUNTY	4/2013 - 3/2014	

Census Data for Geographical Region
Median Head of Household Age: 31
Median Income: $18,462
Median Home Value: $35,272
Median Education: 11 years
Household Members
None Listed
Other Associates
None Listed

11: 3006 MEDICAL ARTS ST AUSTIN, TX 78705-3305

Address	Dates	Phone
3006 MEDICAL ARTS ST AUSTIN, TX 78705-3305 TRAVIS COUNTY	9/2000 - 11/2012	(512) 258-5694

Census Data for Geographical Region
Median Head of Household Age: 24
Median Income: $29,639
Median Home Value: $304,286
Median Education: 15 years
Household Members
None Listed
Other Associates
None Listed

12: 5401 BULL RUN CIR AUSTIN, TX 78727-6501

Address	Dates	Phone
5401 BULL RUN CIR AUSTIN, TX 78727-6501 TRAVIS COUNTY	3/2005 - 2012	

Census Data for Geographical Region
Median Head of Household Age: 46
Median Income: $90,833
Median Home Value: $259,124

Median Education: 15 years
Household Members
TAYLOR, CHARLES W
Other Associates
None Listed

13: 5102 BULL RUN CIR AUSTIN, TX 78727

Address	Dates	Phone
5102 BULL RUN CIR AUSTIN, TX 78727 TRAVIS COUNTY	9/2006 - 11/2011	

Census Data for Geographical Region
Median Head of Household Age: 42
Median Income: $115,594
Median Home Value: $187,660
Median Education: 15 years
Household Members
None Listed
Other Associates
None Listed

14: 9462 BULL RUN CIR AUSTIN, TX 78727

Address	Dates	Phone
9462 BULL RUN CIR AUSTIN, TX 78727 TRAVIS COUNTY	6/2010 - 6/2010	

Census Data for Geographical Region
Median Head of Household Age: 42
Median Income: $115,594
Median Home Value: $187,660
Median Education: 15 years
Household Members
None Listed
Other Associates
None Listed

15: 505 CAMBRIDGE DR ROUND ROCK, TX 78664-7602

Address	Dates	Phone
505 CAMBRIDGE DR ROUND ROCK, TX 78664-7602 WILLIAMSON COUNTY	10/1986 - 11/2008	(512) 258-5694

Census Data for Geographical Region
Median Head of Household Age: 34
Median Income: $49,113
Median Home Value: $120,313
Median Education: 14 years
Household Members
MORRISS, MELISSA M
TAYLOR, CHEYENNE AURORA BODIE
Other Associates
None Listed

16: 815 BRAZOS ST STE 809 AUSTIN, TX 78701-2562

Address	Dates	Phone
815 BRAZOS ST STE 809 AUSTIN, TX 78701-2562 TRAVIS COUNTY	10/2001 - 3/2008	

Census Data for Geographical Region

Median Head of Household Age: 37
Median Income: $88,075
Median Home Value: $237,037
Median Education: 14 years

Household Members

None Listed

Other Associates

None Listed

17: 1001 S MAYS ST APT ROUND ROCK, TX 78664-6732

Address	Dates	Phone
1001 S MAYS ST APT ROUND ROCK, TX 78664-6732 WILLIAMSON COUNTY	12/2007 - 12/2007	

Census Data for Geographical Region

Median Head of Household Age: 35
Median Income: $45,694
Median Home Value: $99,844
Median Education: 12 years

Household Members

None Listed

Other Associates

None Listed

18: TR02 BULL RUN CIR AUSTIN, TX 78727

Address	Dates	Phone
TR02 BULL RUN CIR AUSTIN, TX 78727 TRAVIS COUNTY	6/2007 - 6/2007	

Census Data for Geographical Region

Median Head of Household Age: 46
Median Income: $90,833
Median Home Value: $259,124
Median Education: 15 years

Household Members

None Listed

Other Associates

None Listed

19: 56402 BULL RUN CIR AUSTIN, TX 78727

Address	Dates	Phone
56402 BULL RUN CIR AUSTIN, TX 78727 TRAVIS COUNTY	7/2006 - 7/2006	

Census Data for Geographical Region

Median Head of Household Age: 46
Median Income: $90,833
Median Home Value: $259,124
Median Education: 15 years

Household Members

None Listed

Other Associates

None Listed

20: 5462 BULL RUN CIR AUSTIN, TX 78727-6501

Address	Dates	Phone
5462 BULL RUN CIR AUSTIN, TX 78727-6501	3/2006 - 3/2006	

TRAVIS COUNTY
Census Data for Geographical Region
Median Head of Household Age: 46
Median Income: $90,833
Median Home Value: $259,124
Median Education: 15 years
Household Members
None Listed
Other Associates
None Listed

21: 3402 BULL RUN CIR AUSTIN, TX 78727

Address	Dates	Phone
3402 BULL RUN CIR AUSTIN, TX 78727 TRAVIS COUNTY	6/2005 - 6/2005	

Census Data for Geographical Region
Median Head of Household Age: 46
Median Income: $90,833
Median Home Value: $259,124
Median Education: 15 years
Household Members
None Listed
Other Associates
None Listed

22: 504 BULL RUN CIR AUSTIN, TX 78727

Address	Dates	Phone
504 BULL RUN CIR AUSTIN, TX 78727 TRAVIS COUNTY	3/2005 - 3/2005	

Census Data for Geographical Region
Median Head of Household Age: 46
Median Income: $90,833
Median Home Value: $259,124
Median Education: 15 years
Household Members
None Listed
Other Associates
None Listed

23: 3956 CORONADO RD SNOWFLAKE, AZ 85937

Address	Dates	Phone
3956 CORONADO RD SNOWFLAKE, AZ 85937 NAVAJO COUNTY	2/2005 - 2/2005	

Census Data for Geographical Region
Median Head of Household Age: 45
Median Income: $42,605
Median Home Value: $184,677
Median Education: 13 years
Household Members
None Listed
Other Associates
None Listed

24: 603 SEMINOLE RD LEANDER, TX 78641-2327

Address	Dates	Phone

603 SEMINOLE RD
LEANDER, TX 78641-2327
WILLIAMSON COUNTY

5/1996 - 1/2003

Census Data for Geographical Region
Median Head of Household Age: 34
Median Income: $71,816
Median Home Value: $120,300
Median Education: 14 years

Household Members
None Listed

Other Associates
RUSSELL, WILLIAM J

25: 69 CAUSEWAY ST BOSTON, MA 02114-1615

Address	Dates	Phone
69 CAUSEWAY ST BOSTON, MA 02114-1615 SUFFOLK COUNTY	10/2002 - 10/2002	(617) 722-4116

Census Data for Geographical Region
Median Head of Household Age: 33
Median Income: $14,371
Median Home Value: $1,000,000
Median Education: 12 years

Household Members
None Listed

Other Associates
None Listed

26: 503 W 15TH ST 9 AUSTIN, TX 78701-1511

Address	Dates	Phone
503 W 15TH ST 9 AUSTIN, TX 78701-1511 TRAVIS COUNTY	3/1995 - 2002	

Census Data for Geographical Region
Median Head of Household Age: 30
Median Income: $40,020
Median Home Value: $274,167
Median Education: 16 years

Household Members
None Listed

Other Associates
None Listed

27: 503 AUSTIN, TX 78701

Address	Dates	Phone
503 AUSTIN, TX 78701 TRAVIS COUNTY	3/1999 - 3/1999	

Household Members
None Listed

Other Associates
None Listed

28: 903 W 15TH ST AUSTIN, TX 78201

Address	Dates	Phone
903 W 15TH ST AUSTIN, TX 78201 BEXAR COUNTY	12/1994 - 1/1999	

Household Members
None Listed
Other Associates
None Listed

29: 8402 BULL RUN CIR AUSTIN, TX 78727

Address	Dates	Phone
8402 BULL RUN CIR AUSTIN, TX 78727 TRAVIS COUNTY	5/1993 - 5/1993	

Census Data for Geographical Region
Median Head of Household Age: 46
Median Income: $109,868
Median Home Value: $199,353
Median Education: 15 years
Household Members
None Listed
Other Associates
None Listed

30: 84 NE LOOP 410 APT SAN ANTONIO, TX 78216-5802

Address	Dates	Phone
84 NE LOOP 410 APT SAN ANTONIO, TX 78216-5802 BEXAR COUNTY	12/1990 - 12/1990	

Census Data for Geographical Region
Median Head of Household Age: 42
Median Income: $53,269
Median Home Value: $104,106
Median Education: 13 years
Household Members
None Listed
Other Associates
None Listed

31: 3402 BUTTERLEIGH SAN ANTONIO, TX 78247-3179

Address	Dates	Phone
3402 BUTTERLEIGH SAN ANTONIO, TX 78247-3179 BEXAR COUNTY	10/1990 - 10/1990	

Census Data for Geographical Region
Median Head of Household Age: 40
Median Income: $86,990
Median Home Value: $142,851
Median Education: 15 years
Household Members
None Listed
Other Associates
None Listed

Voter Registrations - 6 records found

1: Texas Voter Registration

Registrant Information

Name: TAYLOR, KENT STUART
Residential Address: 5402 BULL RUN CIR
AUSTIN, TX 78727-6501
TRAVIS COUNTY
SSN: 453-98-XXXX

Date of Birth: 9/1961
Gender: Male

Voter Information

Registration Date: 10/1/1980

2: Texas Voter Registration

Registrant Information

Name: TAYLOR, KENT STUART
Residential Address: 5402 BULL RUN CIR
AUSTIN, TX 78727-6501
TRAVIS COUNTY
SSN: 453-98-XXXX
Date of Birth: 9/1961
Gender: Male

Voter Information

Registration Date: 10/1/1980
Party Affiliation: NONE DECLARED
Active Status: ACTIVE

3: Texas Voter Registration

Registrant Information

Name: TAYLOR, KENT
Residential Address: 5402 BULL RUN CIR
AUSTIN, TX 78727-6501
TRAVIS COUNTY
SSN: 453-98-XXXX
Date of Birth: 9/1961
Gender: Male

Voter Information

Registration Date: 10/1/1980
Active Status: ACTIVE

4: Texas Voter Registration

Registrant Information

Name: TAYLOR, KENT STUART
Residential Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY
SSN: 453-98-XXXX
Date of Birth: 9/1961
Gender: Male

Voter Information

Registration Date: 9/5/2003
Last Vote Date: 11/4/2008
Party Affiliation: DEMOCRAT
Active Status: ACTIVE

5: Texas Voter Registration

Registrant Information

Name: TAYLOR, KENT STUART
Residential Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY
SSN: 453-98-XXXX
Date of Birth: 9/1961
Gender: Male

Voter Information

Registration Date: 9/5/2003

6: Texas Voter Registration

Registrant Information

Name: TAYLOR, KENT
Residential Address: 505 CAMBRIDGE DR
ROUND ROCK, TX 78664-7602
WILLIAMSON COUNTY
SSN: 453-98-XXXX
Date of Birth: 9/1961

Voter Information

Registration Date: 9/5/2003
Active Status: ACTIVE

Driver Licenses - 7 records found

1: Texas Driver License

Driver Information

Name: TAYLOR, KENT STUART
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY
Data source: Governmental: TX

Personal Information

SSN: 453-98-XXXX
DOB: 09/1961

License Information

Issue Date: 05/19/1977

Additional Driver Information

DOB: 09/1961
History: Current

2: Texas Driver License

Driver Information

Name: TAYLOR, KENT STUART
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY
Data source: Governmental: TX

Personal Information

SSN: 453-98-XXXX
DOB: 09/1961

License Information

License Type: DUPLICATE

Additional Driver Information

DOB: 09/1961
History: Historical

3: Texas Driver License

Driver Information

Name: TAYLOR, KENT STUART
Address: 2318 ARNIE LANE
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY
Data source: Governmental: TX

Personal Information

SSN: 453-98-XXXX

DOB: 09/1961

License Information

License Type: ADDRESS CHANGE ONLINE

Additional Driver Information

DOB: 09/1961

History: Historical

4: Texas Driver License

Driver Information

Name: TAYLOR, KENT STUART

Address: 505 CAMBRIDGE
ROUND ROCK, TX 78664-7602
WILLIAMSON COUNTY

Data source: Governmental: TX

Personal Information

SSN: 453-98-XXXX

DOB: 09/1961

License Information

License Type: RENEWAL

Additional Driver Information

DOB: 09/1961

History: Historical

5: Texas Driver License

Driver Information

Name: TAYLOR, KENT STUART

Address: 505 CAMBRIDGE
ROUND ROCK, TX 78664-7602
WILLIAMSON COUNTY

Data source: Governmental: TX

Personal Information

SSN: 453-98-XXXX

DOB: 09/1961

License Information

License Type: DUPLICATE

Additional Driver Information

DOB: 09/1961

History: Historical

6: Texas Driver License

Driver Information

Name: TAYLOR, KENT STUART

Address: 5402 BULL RUN CIR
AUSTIN, TX 78727-6501
TRAVIS COUNTY

Data source: Governmental: TX

Personal Information

SSN: 453-98-XXXX

DOB: 09/1961

License Information

License Type: DUPLICATE

Additional Driver Information

DOB: 09/1961

History: Historical

7: Texas Driver License

Driver Information

Name: TAYLOR, KENT S
Address: 5402 BULL RUN CIR
AUSTIN, TX 78727-6501
TRAVIS COUNTY
Data source: Non-Governmental: TX

Personal Information

SSN: 453-98-XXXX
DOB: 09/1961

Additional Driver Information

DOB: 09/1961

Professional Licenses - 0 records found
Health Care Providers - 0 records found
Health Care Sanctions - 0 records found
Pilot Licenses - 0 records found
Sport Licenses - 0 records found
Real Property - 2 records found

1: Assessment Record for TAYLOR County, TX

Owner Information

Name: TAYLOR KENT
Address: 5102 BULL RUN CIR AUSTIN, TX 78727
County/FIPS: TRAVIS

Property Information

Address: CEDAR ST
Data Source: B

Legal Information

Assessor's Parcel Number: 80100079200
Recording Date: 09/13/2006
Book/Page: 3278/126

Assessment Information

Assessed Value: $84
Market Land Value: $84
Total Market Value: $84

2: Deed Record for TAYLOR County

Buyer Information

Name: TAYLOR , KENT
Address: 5102 BULL RUN CIR AUSTIN, TX 78727
County/FIPS: TRAVIS

Seller Information

Name: GILBRETH , BOBBY
Name: GILBRETH , JANICE

Property Information

Data Source: B

Legal Information

Contract Date: 09/05/2006
Recording Date: 09/13/2006
Document Number: 6017773
Document Type: SHERIFF'S DEED
Book/Page: 3278/126

Mortgage Information

Loan Type: THIS CODE IS USED ONLY FOR BKFS LEGACY
Title Company: NONE AVAILABLE

Motor Vehicle Registrations - 14 records found

1: TX MVR

Registrant Information

Registrant: TAYLOR, KENT STUART
DOB: 9/1961
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

Registration Information

Original Registration Date: 6/29/2016
Registration Date: 6/1/2017
Registration Expiration Date: 5/31/2018

Vehicle Information

VIN: 2C3CDXCT0EH165716
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2014
Make: Dodge
Model: Charger
Series: R/T
Body Style: Sedan 4 Door
Color: Gray

Plate Information

License Plate Type: Private
Previous Plate Number: HLZ4420
Previous Plate State: TX
License Plate Number: HLZ4420
Plate State: TX

Source Information

Data Source: GOVERNMENTAL

2: TX MVR

Vehicle Information

VIN: 2C3CDXCT0EH165716
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2014
Make: Dodge
Model: Charger
Series: R/T
Body Style: Sedan 4 Door
Color: Gray

Owner Information

Name: TAYLOR, KENT STUART
DOB: 9/1961
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

Lienholder Information

Lienholder 1

Name: JPMORGAN CHASE BANK N A
Address: PO BOX 901098
FORT WORTH, TX 76101-2098
TARRANT COUNTY

Lienholder 2

Name: JPMORGAN CHASE BANK N. A
Address: PO BOX 901098

FORT WORTH, TX 76101-2098
TARRANT COUNTY

Lienholder 3

Name: JPMORGAN CHASE BANK NA
Address: PO BOX 901098
FORT WORTH, TX 76101-2098
TARRANT COUNTY

Title Information

Title Number: 24625042556250010
Title Transfer Date: 7/15/2016
Title Issue Date: 7/15/2016

Source Information

Data Source: GOVERNMENTAL

3: TX MVR

Registrant Information

Registrant: TAYLOR, KENT
DOB: 9/1961
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

Registration Information

Original Registration Date: 3/10/2017
Registration Date: 3/10/2017
Registration Expiration Date: 2/28/2019

Vehicle Information

VIN: JM1NDAM73H0101195
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2017
Make: Mazda
Model: MX-5
Series: MIATA GRAND TOURING
Body Style: Convertible
Color: Gray

Plate Information

License Plate Type: Private
License Plate Number: JJF6406
Plate State: TX

Source Information

Data Source: GOVERNMENTAL

4: TX MVR

Vehicle Information

VIN: JM1NDAM73H0101195
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2017
Make: Mazda
Model: MX-5
Series: MIATA GRAND TOURING
Body Style: Convertible
Color: Gray

Owner Information

Name: TAYLOR, KENT
DOB: 9/1961
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

Lienholder Information

Name: SECURITY SERVICE FCU
Address: 16211 LA CANTERA PKWY
SAN ANTONIO, TX 78256-2419
BEXAR COUNTY

Title Information

Title Number: 22731642808250285
Title Transfer Date: 3/24/2017
Title Issue Date: 3/24/2017

Source Information

Data Source: GOVERNMENTAL

5: TX MVR

Registrant Information

Registrant: TAYLOR, KENT
DOB: 9/1961
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

Registration Information

Original Registration Date: 10/1/2012
Registration Date: 10/13/2016
Registration Expiration Date: 9/30/2017

Vehicle Information

VIN: JM1BK34L881177846
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2008
Make: Mazda
Model: MAZDASPEED3
Series: MAZDASPEED
Body Style: Hatchback 4 Door
Color: Red

Plate Information

License Plate Type: Private
Previous Plate Number: SLAYER
Previous Plate State: TX
License Plate Number: SLAYER
Plate State: TX

Source Information

Data Source: GOVERNMENTAL

6: TX MVR

Vehicle Information

VIN: JM1BK34L881177846
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2008
Make: Mazda
Model: MAZDASPEED3
Series: MAZDASPEED
Body Style: Hatchback 4 Door
Color: Red

Owner Information

Name: TAYLOR, KENT
DOB: 9/1961
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

Lienholder Information

Lienholder 1

Name: WACHOVIA DEALER SERVICE INC.
Address: PO BOX 168048
IRVING, TX 75016-8048
DALLAS COUNTY

Lienholder 2

Name: WACHOVIA DEALER SERVICES INC.
Address: PO BOX 168048
IRVING, TX 75016-8048
DALLAS COUNTY

Lienholder 3

Name: WACHOVIA DEALER SVC.
Address: PO BOX 168048
IRVING, TX 75016-8048
DALLAS COUNTY

Lienholder 4

Name: WACHOVIA DEALER SVC. INC.
Address: PO BOX 168048
IRVING, TX 75016-8048
DALLAS COUNTY

Lienholder 5

Name: WACHOVIA DEALER SVCS.
Address: PO BOX 168048
IRVING, TX 75016-8048
DALLAS COUNTY

Lienholder 6

Name: WACHOVIA DEALRE SERVICES INC.
Address: PO BOX 168048
IRVING, TX 75016-8048
DALLAS COUNTY

Lienholder 7

Name: WACHOVIADEALER SERVICES INC.
Address: PO BOX 168048
IRVING, TX 75016-8048
DALLAS COUNTY

Title Information

Title Number: 22731839755111625
Title Transfer Date: 11/19/2008
Title Issue Date: 11/19/2008

Source Information

Data Source: GOVERNMENTAL

7: TX MVR

Registrant Information

Registrant: TAYLOR, KENT
DOB: 9/1961
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

Registration Information

Original Registration Date: 9/16/2015
Registration Date: 9/16/2015
Registration Expiration Date: 8/31/2016

Vehicle Information

VIN: 1JCCM87A9FT094738
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1985
Make: American Motors
Model: CJ7
Series: BASE~LAREDO~RENEGADE

Body Style: 2 Dr Wagon Sport Utility
Color: Red
Secondary Colo: Black

Plate Information

License Plate Type: Private
Previous Plate Number: DMT1414
Previous Plate State: TX
License Plate Number: DMT1414
Plate State: TX

Source Information

Data Source: GOVERNMENTAL

8: TX MVR

Vehicle Information

VIN: 1JCCM87A9FT094738
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1985
Make: American Motors
Model: CJ7
Series: BASE~LAREDO~RENEGADE
Body Style: 2 Dr Wagon Sport Utility
Color: Red
Secondary Colo: Black

Owner Information

Name: TAYLOR, KENT
DOB: 9/1961
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

Lienholder Information

Lienholder 1

Name: G M A C
Address: PO BOX 8104
COCKEYSVILLE, MD 21030-8104
BALTIMORE COUNTY

Lienholder 2

Name: GMAC
Address: PO BOX 8104
COCKEYSVILLE, MD 21030-8104
BALTIMORE COUNTY

Title Information

Title Number: 00000000015249801
Title Transfer Date: 3/27/1987
Title Issue Date: 3/27/1987

Source Information

Data Source: GOVERNMENTAL

9: TX MVR

Registrant Information

Registrant: TAYLOR, KENT STUART
DOB: 9/1961
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

Registration Information

Original Registration Date: 5/2/2014
Registration Date: 6/23/2015
Registration Expiration Date: 5/31/2016

Vehicle Information

VIN: KNDJT2A23A7079552
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2010
Make: KIA
Model: Soul
Series: +/!/SPORT
Body Style: 4 Dr Wagon Sport Utility
Color: Black

Plate Information

License Plate Type: Private
Previous Plate Number: DHY6821
Previous Plate State: TX
License Plate Number: DHY6821
Plate State: TX

Source Information

Data Source: GOVERNMENTAL

10: TX MVR

Vehicle Information

VIN: KNDJT2A23A7079552
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2010
Make: KIA
Model: Soul
Series: +/!/SPORT
Body Style: 4 Dr Wagon Sport Utility
Color: Black

Owner Information

Name: TAYLOR, KENT STUART
DOB: 9/1961
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

Title Information

Title Number: 28695342543005192
Title Transfer Date: 6/25/2016
Title Issue Date: 6/25/2016

Source Information

Data Source: GOVERNMENTAL

11: TX MVR

Registrant Information

Registrant: TAYLOR, KENT
DOB: 9/1961
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

Registration Information

Original Registration Date: 5/1/2007
Registration Date: 5/1/2008
Registration Expiration Date: 4/30/2009

Vehicle Information

VIN: JM1FE173650154754
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2005
Make: Mazda
Model: RX8

Series: BASE~SHINKA
Body Style: Coupe 4 Door
Weight: 3800

Plate Information

License Plate Type: Private
Previous Plate Number: SLAYER
Previous Plate State: TX
License Plate Number: SLAYER
Plate State: TX

Source Information

Data Source: GOVERNMENTAL

12: TX MVR

Vehicle Information

VIN: JM1FE173650154754
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2005
Make: Mazda
Model: RX8
Series: BASE~SHINKA
Body Style: Coupe 4 Door
Weight: 3800

Owner Information

Name: TAYLOR, KENT
DOB: 9/1961
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

Title Information

Title Number: 22720638545124031
Title Transfer Date: 7/25/2005
Title Issue Date: 7/25/2005

Source Information

Data Source: GOVERNMENTAL

13: TX MVR

Registrant Information

Registrant 1

Registrant: TAYLOR, KENT S
DOB: 9/1961
Address: 5402 BULL RUN CIR
AUSTIN, TX 78727-6501
TRAVIS COUNTY

Registrant 2

Registrant: TAYLOR, VIRGINIA B
DOB: 5/1940
Address: 5402 BULL RUN CIR
AUSTIN, TX 78727-6501
TRAVIS COUNTY

Registration Information

Original Registration Date: 5/1/2005
Registration Date: 5/1/2005
Registration Expiration Date: 4/30/2006

Vehicle Information

VIN: 4A3CF44EXRE097651
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1994
Make: Mitsubishi

Model: Eclipse
Series: GS
Body Style: Hatchback 2 Door
Weight: 2800

Plate Information

License Plate Type: Private
Previous Plate Number: SLAYER
Previous Plate State: TX
License Plate Number: SLAYER
Plate State: TX

Source Information

Data Source: GOVERNMENTAL

14: TX MVR

Vehicle Information

VIN: 4A3CF44EXRE097651
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1994
Make: Mitsubishi
Model: Eclipse
Series: GS
Body Style: Hatchback 2 Door
Weight: 2800

Owner Information

Owner 1

Name: TAYLOR, KENT S
DOB: 9/1961
Address: 5402 BULL RUN CIR
AUSTIN, TX 78727-6501
TRAVIS COUNTY

Owner 2

Name: TAYLOR, VIRGINIA B
DOB: 5/1940
Address: 5402 BULL RUN CIR
AUSTIN, TX 78727-6501
TRAVIS COUNTY

Title Information

Title Number: 22731536949095837
Title Transfer Date: 3/10/2001
Title Issue Date: 3/10/2001

Source Information

Data Source: GOVERNMENTAL

Boats - 0 records found

Aircraft - 0 records found

Bankruptcy Information - 0 records found

Judgments/Liens - 13 records found

1: TX Judgments and Liens Filings

Debtor Information

Name: TAYLOR, KENT S
SSN:
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

Creditor Information

Name: INTERNAL REVENUE SERVICE

Filing Information

Jurisdiction: TX
Amount: $192,398

Filing Date: 6/11/2010

Filing 1

Number: 201005542
Type: FEDERAL TAX LIEN
Book: 1992
Page: 461
Agency: BASTROP COUNTY CLERK - BASTROP
Agency State: TX
Agency County: BASTROP

2: TX Judgments and Liens Filings

Debtor Information

Name: TAYLOR, KENT S
SSN: 453-98-XXXX
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

Creditor Information

Name: INTERNAL REVENUE SERVICE

Filing Information

Jurisdiction: TX
Amount: $192,398
Filing Date: 5/11/2010

Filing 1

Number: 2010066323
Type: FEDERAL TAX LIEN
Agency: TRAVIS COUNTY CLERK-AUSTIN
Agency State: TX
Agency County: TRAVIS

3: TX Judgments and Liens Filings

Debtor Information

Name: TAYLOR, KENT S
SSN:
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

Creditor Information

Name: INTERNAL REVENUE SERVICE

Filing Information

Jurisdiction: TX
Amount: $192,398
Original Filing Number: 201000006476
Filing Date: 5/10/2010
Release Date: 1/23/2012

Filing 1

Number: 201200000885
Type: FEDERAL TAX LIEN RELEASE
Agency: TAYLOR COUNTY CLERK-ABILENE
Agency State: TX
Agency County: TAYLOR

Filing 2

Number: 201000006476
Type: FEDERAL TAX LIEN
Agency: TAYLOR COUNTY CLERK-ABILENE
Agency State: TX
Agency County: TAYLOR

4: CO Judgments and Liens Filings

Debtor Information

Name: TAYLOR, KENT S
SSN:
Address: 2318 ARNIE LN
ROUND ROCK, TX 78664-6122
WILLIAMSON COUNTY

Creditor Information

Name: INTERNAL REVENUE SERVICE

Filing Information

Jurisdiction: CO
Amount: $192,398
Filing Date: 5/10/2010

Filing 1

Number: 98175
Type: FEDERAL TAX LIEN
Agency: HINSDALE COUNTY RECORDER
Agency State: CO
Agency County: HINSDALE

5: CA Judgments and Liens Filings

Debtor Information

Name: TAYLOR, KENT
SSN: 453-98-XXXX
Address: 505 CAMBRIDGE DR
ROUND ROCK, TX 78664-7602
WILLIAMSON COUNTY

Creditor Information

Name: COUNTY OF SHASTA

Filing Information

Jurisdiction: CA
Amount: $101
Filing Date: 10/6/2005

Filing 1

Number: 20050059520
Type: COUNTY TAX LIEN
Agency: SHASTA COUNTY COURT (RD)
Agency State: CA
Agency County: SHASTA

6: CA Judgments and Liens Filings

Debtor Information

Name: TAYLOR, KENT
SSN: 453-98-XXXX
Address: 505 CAMBRIDGE DR
ROUND ROCK, TX 78664-7602
WILLIAMSON COUNTY

Creditor Information

Name: COUNTY OF SHASTA

Filing Information

Jurisdiction: CA
Amount: $101
Original Filing Number: 200559520
Filing Date: 10/6/2005
Release Date: 11/24/2008

Filing 1

Number: 20080040239
Type: COUNTY TAX LIEN RELEASE

Agency: SHASTA COUNTY COURT (RD)
Agency State: CA
Agency County: SHASTA

7: CA Judgments and Liens Filings

Debtor Information

Name: TAYLOR, KENT
SSN: 453-98-XXXX
Address: 505 CAMBRIDGE DR
ROUND ROCK, TX 78664-7602
WILLIAMSON COUNTY

Creditor Information

Name: COUNTY OF SHASTA

Filing Information

Jurisdiction: CA
Amount: $153
Filing Date: 9/21/2005

Filing 1

Number: 20050055798
Type: COUNTY TAX LIEN
Agency: SHASTA COUNTY COURT (RD)
Agency State: CA
Agency County: SHASTA

8: CA Judgments and Liens Filings

Debtor Information

Name: TAYLOR, KENT
SSN: 453-98-XXXX
Address: 505 CAMBRIDGE DR
ROUND ROCK, TX 78664-7602
WILLIAMSON COUNTY

Creditor Information

Name: COUNTY OF SHASTA

Filing Information

Jurisdiction: CA
Amount: $156
Filing Date: 9/21/2005

Filing 1

Number: 20050055799
Type: COUNTY TAX LIEN
Agency: SHASTA COUNTY COURT (RD)
Agency State: CA
Agency County: SHASTA

9: CA Judgments and Liens Filings

Debtor Information

Name: TAYLOR, KENT
SSN: 453-98-XXXX
Address: 505 CAMBRIDGE DR
ROUND ROCK, TX 78664-7602
WILLIAMSON COUNTY

Creditor Information

Name: COUNTY OF SHASTA

Filing Information

Jurisdiction: CA
Amount: $163
Filing Date: 9/21/2005

Filing 1

Number: 20050055800
Type: COUNTY TAX LIEN
Agency: SHASTA COUNTY COURT (RD)
Agency State: CA
Agency County: SHASTA

10: CA Judgments and Liens Filings

Debtor Information

Name: TAYLOR, KENT
SSN: 453-98-XXXX
Address: 505 CAMBRIDGE DR
ROUND ROCK, TX 78664-7602
WILLIAMSON COUNTY

Creditor Information

Name: COUNTY OF SHASTA

Filing Information

Jurisdiction: CA
Amount: $165
Filing Date: 9/21/2005

Filing 1

Number: 20050055801
Type: COUNTY TAX LIEN
Agency: SHASTA COUNTY COURT (RD)
Agency State: CA
Agency County: SHASTA

11: TX Judgments and Liens Filings

Debtor Information

Name: TAYLOR, KENT
SSN: 453-98-XXXX
Address: 5402 BULL RUN CIR
AUSTIN, TX 78727-6501
TRAVIS COUNTY

Creditor Information

Name: TRAVIS COUNTY

Filing Information

Jurisdiction: TX
Amount: $2,220
Filing Date: 6/14/2001
Eviction N

Filing 1

Number: 167293
Type: CIVIL JUDGMENT
Agency: TRAVIS JP CT 5 - AUSTIN
Agency State: TX
Agency County: TRAVIS

12: TX Judgments and Liens Filings

Debtor Information

Debtor 1

Name: TAYLOR, KENT S
SSN: 453-98-XXXX
Address: 503 W 15TH ST
AUSTIN, TX 78701-1511
TRAVIS COUNTY

Debtor 2

Name: FREY, GLENN S
SSN: 451-37-XXXX

Address: 503 W 15TH ST
AUSTIN, TX 78701-1511
TRAVIS COUNTY

Creditor Information

Name: STATE OF TEXAS

Filing Information

Jurisdiction: TX
Amount: $1,056
Filing Date: 3/27/1995

Filing 1

Number: 9509892
Type: STATE TAX LIEN
Book: 802
Page: 147
Agency: TRAVIS COUNTY CLERK-AUSTIN
Agency State: TX
Agency County: TRAVIS

13: TX Judgments and Liens Filings

Debtor Information

Debtor 1

Name: TAYLOR, KENT S
SSN: 453-98-XXXX
Address: 503 W 15TH ST
AUSTIN, TX 78701-1511
TRAVIS COUNTY

Debtor 2

Name: FREY, GLENN S
SSN: 451-37-XXXX
Address: 503 W 15TH ST
AUSTIN, TX 78701-1511
TRAVIS COUNTY

Creditor Information

Name: STATE OF TEXAS

Filing Information

Jurisdiction: TX
Amount: $1,056
Filing Date: 3/23/1995
Release Date: 4/10/1995

Filing 1

Number: 9511300
Type: STATE TAX LIEN RELEASE
Book: 803
Page: 104
Agency: TRAVIS COUNTY CLERK-AUSTIN
Agency State: TX
Agency County: TRAVIS

UCC Liens - 0 records found

Fictitious Businesses - 4 records found

1: Fictitious Businesses

Business Information

Name: SHOWTIME TICKETS
Mailing Address: 815 BRAZOS ST STE 809
AUSTIN, TX 78701-2562
Jurisdiction: TX
Phone: (512) 478-9999
Type: BUSINESS LICENSE
Filing Number: 24539826453

Filing Date: 11/01/2001
SIC: 5999

Contact Information

Name: KENT TAYLOR
Address: BRAZOS 81 ST STE 809
TX, AU 78701-2562
Contact Type: CONTACT

2: Fictitious Businesses

Business Information

Name: SHOWTIME TICKETS
Office Address: BRAZOS 81 ST
TX, AU 78701-2562
Jurisdiction: TX
Phone: 478-9999
Type: DBA
Filing Number: 24539826453
Filing Date: 11/01/2001

Contact Information

Owner 1

Name: KENT TAYLOR
Address: MEDICAL AR 30 ST
TX, AU 78705-3305
Phone: 478-9999
Contact Type: OWNER

Owner 2

Name: KENT TAYLOR
Address: BRAZOS 81 ST
TX, AU 78701-2562
Contact Type: OWNER

3: Fictitious Businesses

Business Information

Name: SHOWTIME TICKETS
Office Address: 15TH 50 W ST
TX, AU 78701-1511
Mailing Address: 503 W 15TH ST
AUSTIN, TX 78701-1511
Jurisdiction: TX
Filing Date: 05/31/1994
Business Description: ENTERTAINER/ENTERTAINMENT
SIC: 792903

Contact Information

Name: KENT TAYLOR
Address: 15TH 50 W ST
TX, AU 78701-1511
Contact Type: CONTACT

4: Fictitious Businesses

Business Information

Name: BEANIE BOUNTY HUNTERS
Office Address: 15TH 50 W ST
TX, AU 78701-1511
Mailing Address: 503 W 15TH ST
AUSTIN, TX 78701-1511
Jurisdiction: TX
Phone: None Listed
Filing Date: 04/03/1998
Business Description: COLLECTIBLES
SIC: 594705

Contact Information

Name: KENT TAYLOR
Address: 15TH 50 W ST
TX, AU 78701-1511
Phone: (512) 258-5694
Contact Type: CONTACT

Notice Of Defaults - 0 records found

Potential Relatives - 10 records found

1st Degree: 10

No.	Full Name	Address/Phone
1.	TAYLOR, KENT	PO BOX 579 BASTROP, TX 78602-0579
2.	MORRISS, MELISSA M • AKA REIMUND, MELISSA M • AKA TAYLOR, MELISSA • AKA MORRISMACIS, MELISSA M • AKA MORRIS-REIMUND, MELISSA • AKA MORRISSREIMUND, MELISSA M • AKA MORRISSTAYLOR, MELISSA • AKA MORRISS, REIMUND MELISSA • AKA MACIS, MELISSA • AKA MORRISS, M • AKA MORRIS, MACIS MELISSA • AKA MORRIS, MELISSA • AKA MORRIS MACIS, MELISSA • AKA MORRIS-MACIS, MELISSA • AKA MORRISS-TAYLOR, MELISSA • AKA REIMUND, MELISSA M SSN:465-49-XXXX DOB:1964 (Age: 53)	2318 ARNIE LN ROUND ROCK, TX 78664-6122 505 CAMBRIDGE DR ROUND ROCK, TX 78664-7602 (512) 310-9148 104 CARSON AVE LIBERTY HILL, TX 78642-4221 2111 PARKPLACE APT # GEORGETOWN, TX 78626 1700 BROWN BEAR LN MANCHACA, TX 78652-3516
3.	TAYLOR, CHEYENNE AURORA BODIE SSN:630-52-XXXX DOB:2/1996 (Age: 21)	2318 ARNIE LN ROUND ROCK, TX 78664-6122 20511 DRY CREEK DR NEW CANEY, TX 77357-3211 505 CAMBRIDGE DR ROUND ROCK, TX 78664-7602 (512) 258-5694 5402 BULL RUN CIR AUSTIN, TX 78727-6501 (512) 258-5694 (512) 258-3293
4.	TAYLOR, VIRGINIA BARBARA • AKA ZAYLOR, VIRGINIA B • AKA TAYLOR, VIRGINIA SCHEERBAUM • AKA TAYLOR, VIRGINA B • AKA SCHEERBAUM TAYLOR, VIRGINIA SSN:455-66-XXXX DOB:5/1940 (Age: 77)	5402 BULL RUN CIR CI AUSTIN, TX 78727-6501 (512) 258-5694 18398 UNION SCHOOL HOUSE R MASON, TX 76856 PO BOX 202012 AUSTIN, TX 78720-2012 1200 S MAYS ST APT ROUND ROCK, TX 78664-6737

		5402 BULL AUSTIN, TX 78727
5.	TAYLOR, CHARLES W ⚠ Deceased SSN:462-24-XXXX DOB:6/1925 (Age: 92)	5402 BULL RUN CIR CI AUSTIN, TX 78727-6501 (512) 258-5694 5401 BULL RUN CIR AUSTIN, TX 78727-6501 (512) 258-5694 5402 BULL CIR AUSTIN, TX 78756
6.	TAYLOR, KEVIN DUANE • AKA TAYLOR, DUANE K • AKA TAYLER, KEVIN SSN:453-98-XXXX DOB:9/1963 (Age: 54)	5402 BULL RUN CIR CI AUSTIN, TX 78727-6501 (512) 258-5694 145 W FM 468 APT 19 COTULLA, TX 78014-5117 5402 BULL CIR AUSTIN, TX 78727 7905 SAN FELIPE BLVD APT 118 AUSTIN, TX 78729-7639 (512) 258-5694 1200 S MAYS ST APT ROUND ROCK, TX 78664-6737 (512) 258-5694
7.	TAYLOR, KENT • AKA KENT, TAYLOR	4941 WOODCASTLE DR CHANDLER, TX 75758-8661
8.	TAYLOR, KENT • AKA KENT, TAYLOR	22151 BRIERWOOD DR FRANKSTON, TX 75763-3111 (512) 258-5694
9.	TAYLOR, KENT • AKA KENT, TAYLOR	226 KEAWAKAPU DR BASTROP, TX 78602
10.	TAYLOR, KENT	8115 BRIARWOOD LN AUSTIN, TX 78757-8113

Business Associates - 0 records found

Person Associates - 5 records found

No.	Full Name	Address	SSN	Phone	DOB
1:	FREY, GLENN STEWART FREY, GLENN FREY FREY, GLEN S FRAIE, GLENN S STEWART FREY, GLENN	9005 PARKFIELD DR APT B AUSTIN, TX 78758-6613 1200 S MAYS ST APT 179 ROUND ROCK, TX 78664-6749 9005B PARKFIELD DR AUSTIN, TX 78758-6613 503 W 15TH ST AUSTIN, TX 78701-1511	451-37-XXXX		9/1960

		706 MLK AUSTIN, TX 73301-0001			
2:	REIMUND, SHAWN MICHAEL	9610 NIGHTJAR DR UNIT B AUSTIN, TX 78748-5822 3464 WILLOWRUN DR APT B AUSTIN, TX 78704-7382 403 KREBS LN AUSTIN, TX 78704-7070 2114 DEER CREEK TRL ROUND ROCK, TX 78665-2386 13020 TAMAYO DR AUSTIN, TX 78729-7380	638-46-XXXX		5/1983
3:	RUSSELL, WILLIAM J RUSSELL, WILLIAM JOSEPH RUSSELL, WM J JR RUSSELL, BILL RUSSELL, W J RUSSELL, WILLIE J RUSSELL, WILLIAM J SR RUSSELL, BILL JOSEPH JR WILLIAM, RUSSELL SR RUSSEL, WILLIAM SR	2502 W RIVIERA DR CEDAR PARK, TX 78613-4602 1131 IRON HORSE APT 1131 LEANDER, TX 78641-2380 13117 POLLARD DR AUSTIN, TX 78727-7022 80 HUNTERS POINTE CT SIMPSONVILLE, KY 40067-6698 603 SEMINOLE RD LEANDER, TX 78641-2327	303-34-XXXX	(502) 205-0004 (512) 258-3190 (512) 258-3190 (512) 258-3190 (512) 259-4277	9/1933 8/1933 9/1933
4:	RUSSELL, WILLIAM JOSEPH RUSSELL, BILL J WILLIAM, RUSSELL J RUSSEL, WILLIAM JR RUSSELL, W J RUSSELL, WILLLIAM J	1131 IRON HORSE 1131 LEANDER, TX 78641-2380 2502 W RIVIERA DR CEDAR PARK, TX 78613-4602 1800 SOUTHCREEK DR LEANDER, TX 78641-7941 603 SEMINOLE RD LEANDER, TX 78641-2327 18026 VALLEY VISTA RD LA VETA, CO 81055-9500	333-56-XXXX	(512) 258-3190 (512) 258-3190 (512) 259-4277 (512) 259-4277 (512) 259-4277	5/1961
5:	REIMUND, STEPHEN THOMAS REINUND, STEPHEN T	2114 DEER CREEK TRL ROUND ROCK, TX 78665-2386 9730 MOORBERRY ST 209 AUSTIN, TX 78729-2733 2114 DEER CREEK TRL ROUND AUSTIN, TX 78729 6409 CROWLEY TRL AUSTIN, TX 78729-7563 1105 SAM BASS CIR APT 209	638-46-XXXX		4/1986

ROUND ROCK, TX 78681-4174

Neighbors - 8 records found

5402 BULL RUN CIR 2 AUSTIN, TX 78727-6501

Name	Address	Phone
LASATER, SHANNON	5300 BULL RUN CIR AUSTIN, TX 78727	
	5401 BULL RUN CIR AUSTIN, TX 78727-6501	
TAYLOR, CHEYENNE	5402 BULL RUN CIR AUSTIN, TX 78727-6501	(512) 258-5694 (512) 258-3293
BARNETT, KIMBERLY ALEXANDRA BARNETT, MARK JAMES FRY, EDMUND HEINATZ FRY, VIRGINIA M	5404 BULL RUN CIR AUSTIN, TX 78727-6501	(512) 258-5739
HUNTER, CHRISTOPHER ALAN HUNTER, MELINDA BETH SCRIBNER, JOHN C	5405 BULL RUN CIR AUSTIN, TX 78727-6501	
GIESE, CALEB MATTHEW GIESE, CURTIS PAUL GIESE, NANCY ELLEN	5406 BULL RUN CIR AUSTIN, TX 78727-6501	(512) 331-7687
COWAN, ANN RUTH COWAN, THEODOCIA S COWAN, TOMMY NEAL NEAL, TOMMY	5407 BULL RUN CIR AUSTIN, TX 78727-6501	(512) 258-3306
WELLS, EDWARD M WELLS, VIRGINIA V	5408 BULL RUN CIR AUSTIN, TX 78727-6501	

Employment Locator - 12 records found

1:
Company Name: 1881.COM INVESTMENTS
Name: TAYLOR, KENT
SSN: 453-98-XXXX
Phone: (512) 478-9999
Confidence: Medium

2:
Company Name: BEANIE BOUNTY HUNTERS
Name: TAYLOR, KENT
Address: 503 W 15TH ST
AUSTIN, TX 78701-1511
SSN: 453-98-XXXX
Confidence: Medium

3:
Company Name: SHOWTIME TICKETS
Name: TAYLOR, KENT
Address: 503 W 15TH ST
AUSTIN, TX 78701-1511
SSN: 453-98-XXXX
Phone: (512) 478-9999
Confidence: Medium

4:
Company Name: SHOWTIME TICKETS

Name: TAYLOR, KENT
Title: CONTACT
Address: 815 BRAZOS ST STE 809
AUSTIN, TX 78701-2562
SSN: 453-98-XXXX
Phone: (512) 478-9999
Confidence: High

5:

Company Name: SHOWTIME TICKETS
Name: TAYLOR, KENT
Address: 815 BRAZOS ST
AUSTIN, TX 78701-2562
SSN: 453-98-XXXX
Phone: (512) 478-9999
Confidence: High

6:

Company Name: SHOWTIME TICKETS
Name: TAYLOR, KENT
Address: 815 BRAZOS ST
AUSTIN, TX 78701-2562
SSN: 453-98-XXXX
Phone: (512) 478-9999
Confidence: High

7:

Company Name: SHOWTIME TICKETS
Name: TAYLOR, KENT
Address: 815 BRAZOS ST
AUSTIN, TX 78701-2562
SSN: 453-98-XXXX
Phone: (512) 478-9999
Confidence: High

8:

Company Name: SHOWTIME TICKETS
Name: TAYLOR, KENT
Address: 3006 MEDICAL ARTS ST
AUSTIN, TX 78705-3305
SSN: 453-98-XXXX
Phone: (512) 478-9999
Confidence: High

9:

Company Name: SHOWTIME TICKETS
Name: TAYLOR, KENT
Address: 3006 MEDICAL ARTS ST
AUSTIN, TX 78705-3305
SSN: 453-98-XXXX
Phone: (512) 478-9999
Confidence: High

10:

Company Name: BEANIE BOUNTY HUNTERS
Name: TAYLOR, KENT
Address: 503 W 15TH ST
AUSTIN, TX 78701-1511
SSN: 453-98-XXXX
Confidence: Medium

11:

Company Name: SHOWTIME TICKETS
Name: TAYLOR, KENT
Address: 503 W 15TH ST

AUSTIN, TX 78701-1511
SSN: 453-98-XXXX
Phone: (512) 478-9999
Confidence: Medium

12:

Company Name: 1881.COM INVESTMENTS
Name: TAYLOR, KENT
Address: 5 PROPERTY IS ON THE W SIDE OF
OROGRANDE, NM 88342
SSN: 453-98-XXXX
Phone: (512) 478-9999
Confidence: Medium

Criminal Filings - 7 records found

1: Texas Court Report

Offender information

Name: TAYLOR, KENT STUART
Address: TX
Case Number: 08-00600-2
Case Filing Date: 01/28/2008
County: WILLIAMSON
DOB: 09/1961
SSN: 453-98-XXXX
Race: WHITE
Sex: Male
Eyes: HAZEL
Hair: BROWN
Height: 5'6"
Weight: 169 lbs.

Offenses

Case Filing Date: 01/28/2008
Offense Date: 01/09/2008
Arrest Date: 01/09/2008
Arresting Agency: ROUND ROCK POLICE DEPT
Court Description: 2
Court Case Number: 08-00600-2
Court Offense: ASSAULT CAUSES BODILY INJURY FAMILY VIOLENCE
Court Disposition: DISMISSED - OTHER
Court Disposition Date: 02/23/2009
Court Level/Degree: MISDEMEANOR CLASS A

Court Activity

[NONE FOUND]

2: Texas Court Report

Offender information

Name: TAYLOR, KENT STUART
Address: TX
Case Number: 04-3516-1
Case Filing Date: 07/13/2004
County: WILLIAMSON
DOB: 09/1961
SSN: 453-98-XXXX
Race: WHITE
Sex: Male
Eyes: HAZEL
Hair: BROWN
Height: 5'6"

Weight: 169 lbs.

Offenses

Case Filing Date: 07/13/2004
Offense Date: 06/04/2004
Arrest Date: 06/09/2004
Arresting Agency: WILLIAMSON COUNTY SHERIFF'S OFFICE
Court Description: 1
Court Case Number: 04-3516-1
Court Offense: HARRASSMENT/TELEPHONE
Court Disposition: FINAL CONVICTION - FINE ONLY
Court Disposition Date: 11/15/2004
Court Level/Degree: MISDEMEANOR

Court Activity

[NONE FOUND]

3: Texas Court Report

Offender information

Name: TAYLOR, KENT STUART
Address: TX
Case Number: 04-3517-1
Case Filing Date: 07/13/2004
County: WILLIAMSON
DOB: 09/1961
SSN: 453-98-XXXX
Race: WHITE
Sex: Male
Eyes: HAZEL
Hair: BROWN
Height: 5'6"
Weight: 169 lbs.

Offenses

Case Filing Date: 07/13/2004
Offense Date: 06/04/2004
Arrest Date: 06/09/2004
Arresting Agency: WILLIAMSON COUNTY SHERIFF'S OFFICE
Court Description: 1
Court Case Number: 04-3517-1
Court Offense: TELEPHONE HARASSMENT
Court Disposition: DISMISSED - OTHER
Court Disposition Date: 11/15/2004
Court Level/Degree: MISDEMEANOR

Court Activity

[NONE FOUND]

4: Texas Court Report

Offender information

Name: TAYLOR, KENT STUART
Address: 505 CAMBRIDGE DR
ROUND ROCK, TX 78664-7602
WILLIAMSON COUNTY
Case Number: C-1-CR-03-644471
Case Filing Date: 06/24/2003
County: TRAVIS
DOB: 09/1961
SSN: 453-98-XXXX

Race: WHITE
Sex: Male
Height: 5'6"
Weight: 152 lbs.

Offenses

Case Filing Date: 06/24/2003
Offense Date: 09/19/2002
Court Case Number: C-1-CR-03-644471
Court Offense: THEFT OF SERV >=$20<$500
Court Disposition: DISMISSED
Court Disposition Date: 08/08/2003

Court Activity

[NONE FOUND]

5: Texas Court Report

Offender information

Name: TAYLOR, KENT STUART
Address: 505 CAMBRIDGE DR
ROUND ROCK, TX 78664-7602
WILLIAMSON COUNTY
Case Number: C-1-CR-99-524736
Case Filing Date: 03/12/1999
County: TRAVIS
DOB: 09/1961
SSN: 453-98-XXXX
Race: WHITE
Sex: Male
Height: 5'6"
Weight: 152 lbs.

Offenses

Case Filing Date: 03/12/1999
Offense Date: 01/27/1999
Court Case Number: C-1-CR-99-524736
Court Offense: ASSAULT CAUSES BODILY INJURY FAMILY VIOLENCE
Court Disposition: DISMISSED
Court Disposition Date: 09/24/1999

Court Activity

[NONE FOUND]

6: Texas Court Report

Offender information

Name: TAYLOR, KENT STUART
Address: 505 CAMBRIDGE DR
ROUND ROCK, TX 78664-7602
WILLIAMSON COUNTY
Case Number: C-1-CR-90-332782
Case Filing Date: 02/01/1990
County: TRAVIS
DOB: 09/1961
SSN: 453-98-XXXX
Race: WHITE
Sex: Male
Height: 5'6"
Weight: 152 lbs.

Offenses

Case Filing Date: 02/01/1990
Offense Date: 12/04/1989
Court Case Number: C-1-CR-90-332782
Court Offense: ASSAULT CAUSES BODILY INJ
Court Disposition: DISMISSED
Court Disposition Date: 10/03/1990

Court Activity

[NONE FOUND]

7: Texas Court Report

Offender information

Name: TAYLOR, KENT STUART
Names Associated with Suspect: TAYLOR, KENT
Address: TX
Case Number: 0435161
DOB: 09/1961
SSN: 453-98-XXXX
Race: WHITE
Sex: Male
Eyes: HAZEL
Hair: BROWN
Height: 5'6"
Weight: 151 lbs.

Offenses

Arrest Date: 06/09/2004
Arresting Agency: WILLIAMSON CO SO GEORGETOWN
Court Description: TX246093J - COUNTY COURT AT LAW 1 GEORGE
Court Case Number: 0435161
Court Offense: NOT SPECIFIED
Court Disposition: CONVICTED
Court Disposition Date: 11/15/2004
Court Fine: $300
Court Level/Degree: MISDEMEANOR
Court Costs: $296

Court Activity

[NONE FOUND]

Cellular & Alternate Phones - 4 records found

1:

Personal Information

Name: TAYLOR, KENT
Address: 1842 N 6TH ST
ABILENE, TX 79603-6038
Phone Number: (512) 785-9022
Phone Type: Mobile

Carrier Information

Carrier: T-MOBILE USA, INC.
Carrier City: AUSTIN
Carrier State: TX

2:

Personal Information

Name: TAYLOR, KENT
Address: 5402 BULL RUN CIR
AUSTIN, TX 78727-6501
Phone Number: (512) 785-9022

Phone Type: Mobile

Carrier Information

Carrier: T-MOBILE USA, INC.
Carrier City: AUSTIN
Carrier State: TX

3:

Personal Information

Name: TAYLOR, KENT
Address: 1842 N 6TH ST
ABILENE, TX 79603-6038
Phone Number: (512) 825-0769
Phone Type: Mobile

Carrier Information

Carrier: T-MOBILE USA, INC.
Carrier City: AUSTIN
Carrier State: TX

4:

Personal Information

Name: TAYLOR, KENT
Address: 5402 BULL RUN CIR
AUSTIN, TX 78727-6501
Phone Number: (512) 825-0769
Phone Type: Mobile

Carrier Information

Carrier: T-MOBILE USA, INC.
Carrier City: AUSTIN
Carrier State: TX

Possible Education - 1 records found

1:

Student Information

Name: TAYLOR, KENT
SSN: 453-98-XXXX
DOB: 09/1961
LexID(sm): 002492670382
First Reported: 10/19/2005
Last Reported: 09/26/2012
High School Graduation Year: 1980
Phone: None Listed
Address: 5402 BULL RUN CIR
AUSTIN, TX 78727-6501
Currently a Student? YES
Attended High School: YES
Years Since High School Graduation: 37

Sources - 191 records found

All Sources	191 Source Document(s)
Criminal	7 Source Document(s)
Driver Licenses	7 Source Document(s)
Email addresses	2 Source Document(s)
Fictitious Business Names Records	4 Source Document(s)
Historical Person Locator	28 Source Document(s)
Liens and Judgments	14 Source Document(s)
Motor Vehicle Registrations	38 Source Document(s)
Person Locator 1	8 Source Document(s)
Person Locator 2	6 Source Document(s)
Person Locator 4	1 Source Document(s)
Person Locator 5	35 Source Document(s)
Person Locator 6	11 Source Document(s)

Phone	12 Source Document(s)
PhonesPlus Records	4 Source Document(s)
Utility Locator	8 Source Document(s)
Voter Registrations	6 Source Document(s)

Key

High Risk Indicator. These symbols may prompt you to investigate further.

Moderate Risk Indicator. These symbols may prompt you to investigate further.

General Information Indicator. These symbols inform you that additional information is provided.

✓ The most recent telephone listing as reported by the EDA source.

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1 OF 1 RECORD(S)

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Date:12/5/2017
Report processed by:
Toeroek Associates Inc||

Full Name	Address	County	Phone
CANDLER, ELIZABETH NAPIER	13254 NASHVILLE HWY LIBERTY, TN 37095-3551 DEKALB COUNTY	DEKALB	(615) 536-1976

ADDITIONAL PERSONAL INFORMATION

SSN	DOB	Gender	LexID(sm)
408-98-XXXX Deceased	7/1954 (Would be: 63) (Date of Death: 4/19/2009)	Female	000361802487

Subject Summary

Name Variations

1: CANDELER, ELIZABETH
2: CANDLER, ELIZABETH
3: CANDLER, ELIZABETH N
4: CANDLER, ELIZABETH NAPIER
5: CANDLER, ELIZABETH R
6: CHANDLER, ELIZABETH N
7: HERMAN, ELIZABETH
8: HERMAN, ELIZABETH N
9: HERMAN, ELIZABETH NAPIER
10: HERMAN, ELIZABETH RUSHTON
11: NAPIER HERMAN, ELIZABETH

SSNs Summary

No.	SSN	State Iss.	Date Iss.	Warnings
		Most frequent SSN attributed to subject:		
1:	408-98-XXXX	Tennessee	1970-1971	Deceased

DOBs

Reported DOBs:
7/1954

Others Using SSN - 1 records found

#	Full Name	SSN	DOB
1:	HAMILTON, SHARON	408-98-XXXX Deceased	12/1955

Address Summary - 16 records found

No.	Address
1:	13254 NASHVILLE HWY LIBERTY, TN 37095-3551 DEKALB COUNTY

2: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY

3: 205 CHAMBERLIN ST
NASHVILLE, TN 37209-4813
DAVIDSON COUNTY

4: 2100 KENDALL APT
SILVERTON, CO 81433
SAN JUAN COUNTY

5: PO BOX 342
WATERTOWN, TN 37184-0342
WILSON COUNTY

6: 344 TRAMMEL LN
WATERTOWN, TN 37184-4331
WILSON COUNTY

7: 623 EASTBORO DR
NASHVILLE, TN 37209-1839
DAVIDSON COUNTY

8: 1454 OLD HIGHWAY 53
LIBERTY, TN 37095-4216
DEKALB COUNTY

9: RR 2 BOX 55
LIBERTY, TN 37095-9802
DEKALB COUNTY

10: 1454 OLD HWY APT 53
LIBERTY, TN 37095
DEKALB COUNTY

11: RR 1 BOX 223
LIBERTY, TN 37095-9801
DEKALB COUNTY

12: 3603 NORMANDY PL S
NASHVILLE, TN 37209-4824
DAVIDSON COUNTY

13: PO BOX 223
LIBERTY, TN 37095-0223
DEKALB COUNTY

14: 201 SUSANNAH DR APT
NASHVILLE, TN 37209-4861
DAVIDSON COUNTY

15: 4807 NEVADA AVE
NASHVILLE, TN 37209-3428
DAVIDSON COUNTY

16: 1454 OLD 53
LIBERTY, TN 37095
DEKALB COUNTY

Address Details

1: 13254 NASHVILLE HWY LIBERTY, TN 37095-3551

Address	Dates	Phone
13254 NASHVILLE HWY LIBERTY, TN 37095-3551 DEKALB COUNTY	2/1997 - 11/2017	(615) 536-1976

Census Data for Geographical Region

Median Head of Household Age: 42
Median Income: $46,886
Median Home Value: $99,662
Median Education: 12 years

Household Members

HERMAN, KAYLA MICHELLE
HERMAN, SAMUAL LOUIS

Other Associates

YOUGA, CYNTHIA LYNN

2: PO BOX 822 SILVERTON, CO 81433-0822

Address	Dates	Phone
PO BOX 822 SILVERTON, CO 81433-0822 SAN JUAN COUNTY	1/2001 - 11/2017	

Census Data for Geographical Region

Median Head of Household Age: 42
Median Income: $51,299
Median Home Value: $291,250
Median Education: 14 years

Household Members

HERMAN, SAMUEL RICHARD

Other Associates

None Listed

3: 205 CHAMBERLIN ST NASHVILLE, TN 37209-4813

Address	Dates	Phone
205 CHAMBERLIN ST NASHVILLE, TN 37209-4813 DAVIDSON COUNTY	2/2001 - 3/2015	

Census Data for Geographical Region

Median Head of Household Age: 32
Median Income: $31,864
Median Home Value: $170,127

Median Education: 14 years
Household Members
CANDLER, CHARLES RONALD
CANDLER, CHRISTOPHER RYAN
Other Associates
NICHOLSON, STANLEY E

4: 2100 KENDALL APT SILVERTON, CO 81433

Address	Dates	Phone
2100 KENDALL APT SILVERTON, CO 81433 SAN JUAN COUNTY	11/2007 - 4/2012	(970) 387-9888

Census Data for Geographical Region
Median Head of Household Age: 42
Median Income: $51,299
Median Home Value: $291,250
Median Education: 14 years
Household Members
None Listed
Other Associates
None Listed

5: PO BOX 342 WATERTOWN, TN 37184-0342

Address	Dates	Phone
PO BOX 342 WATERTOWN, TN 37184-0342 WILSON COUNTY	4/2009 - 12/2010	

Census Data for Geographical Region
Median Head of Household Age: 37
Median Income: $50,753
Median Home Value: $134,601
Median Education: 13 years
Household Members
ASHFORD, SARAH LYNN
CANDLER, CHRISTOPHER RYAN
CANDLER, MICHAEL BRANDON
Other Associates
None Listed

6: 344 TRAMMEL LN WATERTOWN, TN 37184-4331

Address	Dates	Phone
344 TRAMMEL LN WATERTOWN, TN 37184-4331 WILSON COUNTY	2/2004 - 2/2009	

Census Data for Geographical Region
Median Head of Household Age: 37
Median Income: $50,753
Median Home Value: $134,601
Median Education: 13 years
Household Members
ASHFORD, SARAH LYNN

CANDLER, CHRISTOPHER RYAN
CANDLER, MICHAEL BRANDON
Other Associates
None Listed

7: 623 EASTBORO DR NASHVILLE, TN 37209-1839

Address	Dates	Phone
623 EASTBORO DR NASHVILLE, TN 37209-1839 DAVIDSON COUNTY	4/2006 - 2/2007	

Census Data for Geographical Region
Median Head of Household Age: 37
Median Income: $45,925
Median Home Value: $101,750
Median Education: 12 years
Household Members
CANDLER, CHARLES RONALD
CANDLER, CHRISTOPHER RYAN
Other Associates
NICHOLSON, STANLEY E

8: 1454 OLD HIGHWAY 53 LIBERTY, TN 37095-4216

Address	Dates	Phone
1454 OLD HIGHWAY 53 LIBERTY, TN 37095-4216 DEKALB COUNTY	8/1994 - 4/1997	(615) 536-1025

Census Data for Geographical Region
Median Head of Household Age: 42
Median Income: $46,886
Median Home Value: $99,662
Median Education: 12 years
Household Members
None Listed
Other Associates
None Listed

9: RR 2 BOX 55 LIBERTY, TN 37095-9802

Address	Dates	Phone
RR 2 BOX 55 LIBERTY, TN 37095-9802 DEKALB COUNTY	11/1996 - 11/1996	

Census Data for Geographical Region
Median Head of Household Age: 42
Median Income: $46,886
Median Home Value: $99,662
Median Education: 12 years
Household Members
None Listed
Other Associates
HERMAN, RICHARD ALIVE

10: 1454 OLD HWY APT 53 LIBERTY, TN 37095

Address	Dates	Phone
1454 OLD HWY APT 53 LIBERTY, TN 37095 DEKALB COUNTY	7/1987 - 10/1996	

Household Members

None Listed

Other Associates

None Listed

11: RR 1 BOX 223 LIBERTY, TN 37095-9801

Address	Dates	Phone
RR 1 BOX 223 LIBERTY, TN 37095-9801 DEKALB COUNTY	9/1992 - 11/1994	

Census Data for Geographical Region

Median Head of Household Age: 38
Median Income: $41,884
Median Home Value: $93,430
Median Education: 12 years

Household Members

None Listed

Other Associates

None Listed

12: 3603 NORMANDY PL S NASHVILLE, TN 37209-4824

Address	Dates	Phone
3603 NORMANDY PL S NASHVILLE, TN 37209-4824 DAVIDSON COUNTY	7/1987 - 12/1992	

Census Data for Geographical Region

Median Head of Household Age: 36
Median Income: $55,035
Median Home Value: $196,795
Median Education: 14 years

Household Members

CANDLER, CHARLES RONALD

Other Associates

None Listed

13: PO BOX 223 LIBERTY, TN 37095-0223

Address	Dates	Phone
PO BOX 223 LIBERTY, TN 37095-0223 DEKALB COUNTY	3/1992 - 3/1992	

Census Data for Geographical Region

Median Head of Household Age: 38
Median Income: $41,884
Median Home Value: $93,430
Median Education: 12 years

Household Members

None Listed
Other Associates
None Listed

14: 201 SUSANNAH DR APT NASHVILLE, TN 37209-4861

Address	Dates	Phone
201 SUSANNAH DR APT NASHVILLE, TN 37209-4861 DAVIDSON COUNTY	1/1990 - 1/1990	

Census Data for Geographical Region
Median Head of Household Age: 32
Median Income: $31,864
Median Home Value: $170,127
Median Education: 14 years
Household Members
None Listed
Other Associates
None Listed

15: 4807 NEVADA AVE NASHVILLE, TN 37209-3428

Address	Dates	Phone
4807 NEVADA AVE NASHVILLE, TN 37209-3428 DAVIDSON COUNTY	7/1987 - 7/1987	(615) 297-3727

Census Data for Geographical Region
Median Head of Household Age: 32
Median Income: $61,822
Median Home Value: $281,311
Median Education: 15 years
Household Members
CANDLER, CHARLES C
CANDLER, ROBERTA LOUISE
Other Associates
None Listed

16: 1454 OLD 53 LIBERTY, TN 37095

Address	Dates	Phone
1454 OLD 53 LIBERTY, TN 37095 DEKALB COUNTY		

Household Members
None Listed
Other Associates
None Listed

Voter Registrations - 0 records found
Driver Licenses - 3 records found

1: Tennessee Driver License

Driver Information
Name: HERMAN, ELIZABETH NAPIER

Address: 13254NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY
Data source: Governmental: TN

Personal Information

SSN: 408-98-XXXX
DOB: 07/1954
Gender: Female
Height: 5'05"
Weight: 140 lbs.
Hair: Brown
Eyes: Blue

License Information

Issue Date: 09/20/2002
Expiration Date: 07/2009

Additional Driver Information

DOB: 07/1954
Gender: Female
History: Historical
Height: 5'05"
Weight: 140 lbs.
Hair: Brown
Eyes: Blue

2: Tennessee Driver License

Driver Information

Name: HERMAN, ELIZABETH NAPIER
Address: 205 CHAMBERLIN ST
NASHVILLE, TN 37209-4813
DAVIDSON COUNTY
Data source: Governmental: TN

Personal Information

SSN: 408-98-XXXX
DOB: 07/1954
Gender: Female
Height: 5'05"
Weight: 140 lbs.
Hair: Brown
Eyes: Blue

License Information

License Class: Class D Only

Issue Date: 09/20/2002
Expiration Date: 07/2009

Additional Driver Information

DOB: 07/1954
Gender: Female
History: Historical
Height: 5'05"

Weight: 140 lbs.
Hair: Brown
Eyes: Blue

3: Tennessee Driver License

Driver Information

Name: HERMAN, ELIZABETH NAPIER
Address: 205 CHAMBERLIN ST
NASHVILLE, TN 37209-4813
DAVIDSON COUNTY
Data source: Governmental: TN

Personal Information

SSN: 408-98-XXXX
DOB: 07/1954
Gender: Female
Height: 5'05"
Weight: 140 lbs.
Hair: Brown
Eyes: Blue

License Information

License Class: Class D Only

Issue Date: 09/20/2002
Expiration Date: 07/2009

Additional Driver Information

DOB: 07/1954
Gender: Female
History: Historical
Height: 5'05"
Weight: 140 lbs.
Hair: Brown
Eyes: Blue

Professional Licenses - 4 records found

1: Professional License

Licensee Information

Name: HERMAN, ELIZABETH NAPIER
SSN: 408-98-XXXX
Address: PO BOX 822 SILVERTON, CO 81433-0822
County: SAN JUAN
Phone: (970) 387-0227
Date of Birth: 07/1954
Gender: F

License Information

Profession or Board: NURSING
License Type: NURSING
License Number: 126322
Issue Date: 08/23/2000
Expiration Date: 09/30/2008
Status: ACTIVE
State: Colorado

2: Professional License

Licensee Information

Name: HERMAN, ELIZABETH NAPIER
SSN: 408-98-XXXX
Address: PO BOX 822 SILVERTON, CO 81433-0822
County: SAN JUAN

License Information

Profession or Board: REGISTERED NURSE
License Type: REGISTERED NURSE
License Number: 126322
Issue Date: 08/23/2000
Expiration Date: 04/09/2008
Last Renewal Date: 10/01/2006
Status: EXPIRED
State: Colorado

3: Professional License

Licensee Information

Name: HERMAN, ELIZABETH NAPIER
SSN: 408-98-XXXX
Address: PO BOX 822 SILVERTON, CO 81433-0822
County: SAN JUAN

License Information

Profession or Board: NURSING
License Type: REGISTERED NURSE
License Number: RN.0126322
Issue Date: 08/23/2000
Expiration Date: 04/09/2008
Status: EXPIRED
State: Colorado

4: Professional License

Licensee Information

Name: HERMAN, ELIZABETH NAPIER
SSN: 408-98-XXXX
Address: PO BOX 822 SILVERTON, CO 81433-0822
County: SAN JUAN

License Information

Profession or Board: NURSING
License Type: REGISTERED NURSE
License Number: RN.126322
Issue Date: 08/23/2000
Expiration Date: 04/09/2008
Status: EXPIRED
State: Colorado

Health Care Providers - 1 records found

1: Health Care Providers

Name(s): HERMAN, ELIZABETH NAPIER
HERMAN, ELIZABETH NAPIER
RUSHTON, HERMAN ELIZABETH
DOB(s): 07/1954
Business Addresses: PO BOX 822
SILVERTON, CO 81433-0822

327 SIX MILE RD 2100 KENDALL
SILVERTON, CO 81433

License Number/State: RN.0126322 / CO

Health Care Sanctions - 0 records found

Pilot Licenses - 0 records found

Sport Licenses - 0 records found

Real Property - 1 records found

1: Deed Record for SAN JUAN County

Buyer Information

Name: HERMAN , SAMUEL R

Name: HERMAN , ELIZABETH N

Address: PO BOX 822 SILVERTON, CO 81433-0822

County/FIPS: SAN JUAN

Seller Information

Name: MELCHER , NORMA B

Name: ESTATE OF DOUGLAS WARREN MELCHER

Name: MELCHER , DOUGLAS W

Name: MELCHER , D W

Property Information

Data Source: B

Legal Information

Contract Date: 09/19/2007

Recording Date: 09/28/2007

Document Number: 146026

Document Type: PERSONAL REPRESENTATIVES DEED

Sale Information

Sale Price: $7500

Mortgage Information

Loan Type: THIS CODE IS USED ONLY FOR BKFS LEGACY

Title Company: NONE AVAILABLE

Motor Vehicle Registrations - 2 records found

1: TN MVR

Registrant Information

Registrant: HERMAN, ELIZABETH

DOB: 7/1954

Address: 344 TRAMMEL LN
WATERTOWN, TN 37184-4331
WILSON COUNTY

Registration Information

Original Registration Date: 2/20/2004

Registration Date: 2/20/2004

Registration Expiration Date: 2/28/2005

Vehicle Information

VIN: 1FALP4047VF177318

Class: PASSENGER CAR/LIGHT TRUCK

Model Year: 1997

Make: Ford
Model: Mustang
Series: BASE
Body Style: Coupe

Plate Information

License Plate Type: Private
Previous Plate Number: AVA334
Previous Plate State: TN
License Plate Number: QGD588
Plate State: TN

Source Information

Data Source: GOVERNMENTAL

2: TN MVR

Vehicle Information

VIN: 1FALP4047VF177318
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1997
Make: Ford
Model: Mustang
Series: BASE
Body Style: Coupe

Owner Information

Name: HERMAN, ELIZABETH
DOB: 7/1954
Address: 344 TRAMMEL LN
WATERTOWN, TN 37184-4331
WILSON COUNTY

Title Information

Title Number: 68059539
Title Transfer Date: 2/20/2004
Title Issue Date: 2/20/2004

Source Information

Data Source: GOVERNMENTAL

Boats - 0 records found
Aircraft - 0 records found
Bankruptcy Information - 0 records found
Judgments/Liens - 0 records found
UCC Liens - 0 records found
Fictitious Businesses - 0 records found
Notice Of Defaults - 0 records found
Potential Relatives - 10 records found

1st Degree: 9, 2nd Degree: 1

No.	Full Name	Address/Phone
1.	CANDLER, CHRISTOPHER RYAN • AKA CANDLER, CHRISTOP • AKA CANDLER, CHRIS R • AKA CANDLER, CHRISTOPHE RYAN • AKA CANDLER, CHARLES R	623 EASTBORO DR NASHVILLE, TN 37209-1839 (615) 352-7338 344 TRAMMEL LN WATERTOWN, TN 37184-4331 (615) 292-1871

• AKA HERMAN, CHRISTOPHER R
• AKA CHANDLER, CHARLES R
• AKA CANPLER, CHRIS
• AKA CANDLER, CHRISTO

SSN:415-53-XXXX
DOB:6/1983
(Age: 34)

PO BOX 342
WATERTOWN, TN 37184-0342

205 CHAMBERLIN ST
NASHVILLE, TN 37209-4813
(615) 298-1209

2. HERMAN, SAMUEL RICHARD

• AKA HERMAN, SAMUEL K
• AKA HEIMAN, SAMUEL R
• AKA SAMUEL, HERMAN R
• AKA HERMAN, SAM R
• AKA HERMAN, SAMMY R
• AKA RICHARD, HERMAN SAMUEL
• AKA HERMAN, RICHARD
• AKA HERMAN, SAMEL R
• AKA HERMAN, SANUEL R
• AKA HERMAN, SMAUEL R

SSN:380-42-XXXX
DOB:1/1943
(Age: 74)

PO BOX 822
SILVERTON, CO 81433-0822

13255 NASHVILLE HWY
LIBERTY, TN 37095-3552

13254 NASHVILLE HWY 1
LIBERTY, TN 37095-3551
(615) 536-5120

1200 KENDAL
SILVERTON, CO 81433

2100 KENDALL MTN APT
SILVERTON, CO 81433
(970) 387-9888

3. CANDLER, MICHAEL BRANDON

• AKA CHANDLER, MICHAEL B
• AKA CANDLER, MICHAEL R
• AKA CANDLER, CHRISTOPHER R

SSN:415-53-XXXX
DOB:10/1981
(Age: 36)

344 TRAMMEL LN
WATERTOWN, TN 37184-4331

460 CEDAR PARK CIR
LA VERGNE, TN 37086-2096

3361 MARRAST DR
CLARKSVILLE, TN 37043-7834

PO BOX 342
WATERTOWN, TN 37184-0342

106 PIONEER LN
LA VERGNE, TN 37086-2037

4. CANDLER, CHARLES RONALD

• AKA CANDLER, RONNIE M
• AKA CANDLER, CHARLES RONNIE
• AKA CADLER, CHARLES R
• AKA CHANDLER, CHARLES
• AKA CANDLER CHRISTOPHER, R
• AKA CANDLER, RONNIE R
• AKA CHANDLER, RONNIE C

SSN:409-84-XXXX
DOB:10/1949
(Age: 68)

623 EASTBORO DR
NASHVILLE, TN 37209-1839

6665 BEACON LN
NASHVILLE, TN 37209-4306

205 CHAMBERLIN ST
NASHVILLE, TN 37209-4813
(615) 297-3727

3603 NORMANDY PL S
NASHVILLE, TN 37209-4824

203 CHAMBERLIN ST

		NASHVILLE, TN 37209-4813 (615) 297-3727
5.	ASHFORD, SARAH LYNN • AKA CANDLER, SARAH LYNN • AKA CANDLER, SARAH ASHFORD • AKA ASHFORD, CANDLER SARAH • AKA CHANLER, SARAH • AKA ASHFORDCANDLER, SARAH • AKA ASHFORD CANDLER, SARAH • AKA CANDLER SARAH, LYNN • AKA CHANDLER, SARA DOB:9/1986 (Age: 31)	344 TRAMMEL LN WATERTOWN, TN 37184-4331 (615) 237-3048 3361 MARRAST DR CLARKSVILLE, TN 37043-7834 PO BOX 342 WATERTOWN, TN 37184-0342 460 CEDAR PARK CIR LA VERGNE, TN 37086-2096 106 PIONEER LN LA VERGNE, TN 37086-2037
5.A.	ASHFORD, GERALD R • AKA ASHFORD, GERALD RAY • AKA ASHFORD, G RAY • AKA ASHFORD, RAY • AKA ASHFORD, G R • AKA ASHFORD, GEARLDR • AKA ASHFOD, RAY SSN:413-04-XXXX	114 LEDBETTER LN CLARKSVILLE, TN 37043-5429 3361 MARRAST DR CLARKSVILLE, TN 37043-7834 355 S TELLER ST STE 200 LAKEWOOD, CO 80226-7391 (303) 233-7558 (303) 551-1217 (303) 214-9044 262 STERLING RD HENDERSONVILLE, TN 37075-5372 (615) 264-0923 5353 CANE RIDGE RD APT 102 ANTIOCH, TN 37013-3819
6.	CANDLER, ROBERTA LOUISE ⚠ Deceased • AKA CANDLER, ROBERTA • AKA CANDLER, RABERTA L • AKA CANDLER, ROBERTA L SSN:408-40-XXXX DOB:9/1919 (Age: 98)	6665 BEACON LN NASHVILLE, TN 37209-4306 (615) 353-1935 8017 BOONE TRCE NASHVILLE, TN 37221-6521 4807 NEVADA AVE NASHVILLE, TN 37209-3428 (615) 297-3727
7.	HERMAN, KAYLA MICHELLE • AKA GASPAR, KAYLA M • AKA HERMAN, KAYLA K • AKA	4638 51ST ST DETROIT, MI 48210-2725 7059 GARTNER ST DETROIT, MI 48209-1540 (313) 849-3665

DOB:2/1988
(Age: 29)

13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
(615) 536-1976

4636 51ST ST
DETROIT, MI 48210-2725

1516 VINEWOOD ST APT 306
DETROIT, MI 48216-1488

8. HERMAN, SAMUAL LOUIS

• AKA HERMAN, SAMUEL L
• AKA SAMMY, HERMAN
• AKA HERMAN, SAMMY

DOB:7/1991
(Age: 26)

PO BOX 91
HOWE, IN 46746-0091

223 CUSTER AVE RM 201A
FORT RILEY, KS 66442-4019

195 INDIANA AVE
FORT LEONARD WOOD, MO 65473-1068

5755 N STATE ROAD 9
HOWE, IN 46746-9228
(260) 562-9289

13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
(615) 536-1976
(615) 536-5120

9. CANDLER, CHARLES C

Deceased
• AKA CHARLES, C CHANDLER
• AKA CHANDLER, CHARLES C

SSN:411-26-XXXX
DOB:8/1921
(Age: 96)

4807 NEVADA AVE
NASHVILLE, TN 37209-3428
(615) 297-3727

2204 AMBERWOOD CIR
NASHVILLE, TN 37221-1369

Business Associates - 0 records found

Person Associates - 5 records found

No.	Full Name	Address	SSN	Phone	DOB
1:	AVERITTE, NICOLE ANN SHUBERT, NICOLE ANN DUBOISE, NICOLE ANN HENDERSON, NICOLE ANN SHUBERT, NICOLE A DUBOIS, NICOLE SHUBERT, NICLOE A AVERITT, NICOLE	105 EAST DR HENDERSONVILLE, TN 37075-4504 13254 NASHVILLE HWY APT F LIBERTY, TN 37095-3551 321 KEETON AVE OLD HICKORY, TN 37138-3807 116 BUFFALO ST OLD HICKORY, TN 37138-3438	423-17-XXXX	(615) 894-7042	1/1984

		820 DOUGLAS AVE NASHVILLE, TN 37206-3333			
2:	YOUGA, CYNTHIA LYNN DUBOISE, CYNTHIA L GOAD, CYNTHIA LYNN GOAD, CINDY L YOUGA, CINDY L GOAD, CYTHNIA YOUGA, CYTHINA HERMAN, CYNTHIA LYNN	13254 NASHVILLE HWY LIBERTY, TN 37095-3551 231 HICKORY OAK DR SE CLEVELAND, TN 37323-7313 9057 HOOPER HOLW HARRISON, TN 37341-8601 6614 HARRISON HEIGHTS DR HARRISON, TN 37341-7600 13255 NASHVILLE HWY LIBERTY, TN 37095-3552	373-88-XXXX	(423) 473-6107 (615) 536-1976	6/1965
3:	HERMAN, RICHARD ALIVE HERMAN, RICHARD ALVIE HERMAN, RICHAR A ALIVE, RICHARD HERMAN, RICHARD ALVZE	RR 2 BOX 55 LIBERTY, TN 37095-9802 5550 TARNOW ST DETROIT, MI 48210-2256 13225 NASHVILLE HWY LIBERTY, TN 37095-3552 13254 NASHVILLE HWY LIBERTY, TN 37095-3551 RT BOX 55OLD LIBERTY, TN 37095	373-88-XXXX	(615) 536-1976 (615) 536-5691	1966 11/1966
4:	NICHOLSON, STANLEY E NICHOLSON, STANLEY EARL NICHOLSON, STAWLEY	623 EASTBORO DR NASHVILLE, TN 37209-1839 5210 DAKOTA AVE NASHVILLE, TN 37209-3325 205 CHAMBERLIN ST NASHVILLE, TN 37209-4813 1055 PAULA LN PEGRAM, TN 37143-5056 205 NASHVILLE, TN 37209	410-90-XXXX	(615) 269-5458	1955 5/1953
5:	YOUGA, LOUIS ROY YOUGA, LEWIS	44 CLARK RD APT 213 BATTLE CREEK, MI 49037-7353 1165 N SOLVAY ST DETROIT, MI 48209-1910 13254 HWY 70 LIBERTY, TN 37095 1678 S MERRIMAN RD WESTLAND, MI 48186-5355	372-80-XXXX	(313) 554-1795 (734) 589-6025 (734) 721-0011 (734) 721-1221	2/1962

Neighbors - 7 records found

13254 NASHVILLE HWY LIBERTY, TN 37095-3551

Name	Address	Phone
BRASWELL, BILLY STEPHEN VANDERGRIFF, LEANN G	12885 NASHVILLE HWY LIBERTY, TN 37095-3550	(615) 536-5604
GRIFFITH, WAYNE REED	12931 NASHVILLE HWY LIBERTY, TN 37095-3552	(615) 536-5134
TRIPP, ANGELA GEORGETTE TRIPP, CASSIE LEIGH TRIPP, GEORGE D TRIPP, LINDA SUE	13206 NASHVILLE HWY LIBERTY, TN 37095-3551	(615) 536-5735
	13225 NASHVILLE HWY LIBERTY, TN 37095-3552	(615) 536-5691
	13255 NASHVILLE HWY LIBERTY, TN 37095-3552	
SULLIVAN, KRISTI JO SULLIVAN, RICKY LEN	14120 NASHVILLE HWY LIBERTY, TN 37095-3560	(615) 529-2379
CORSO, KAREN M KINGREY, LOIS LYNNE KINGREY, TIM LILLIE, STEVEN MICHAEL	14175 NASHVILLE HWY LIBERTY, TN 37095-3566	(615) 536-0366

Employment Locator - 1 records found

1:

Company Name: BAPTIST HOSPITAL, INC.
Name: CANDLER, ELIZABETH
Title: NURSE
SSN: 408-98-XXXX
Confidence: Medium

Criminal Filings - 0 records found

Cellular & Alternate Phones - 0 records found

Possible Education - 0 records found

Sources - 91 records found

All Sources	91 Source Document(s)
Deceased	2 Source Document(s)
Deed Transfers	1 Source Document(s)
Driver Licenses	3 Source Document(s)
Historical Person Locator	26 Source Document(s)
Motor Vehicle Registrations	3 Source Document(s)
Person Locator 1	8 Source Document(s)
Person Locator 2	11 Source Document(s)
Person Locator 5	23 Source Document(s)
Person Locator 6	5 Source Document(s)
Professional Licenses	8 Source Document(s)
Utility Locator	1 Source Document(s)

Key
High Risk Indicator. These symbols may prompt you to investigate further.
Moderate Risk Indicator. These symbols may prompt you to investigate further.
General Information Indicator. These symbols inform you that additional information is provided.
The most recent telephone listing as reported by the EDA source.

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1 OF 1 RECORD(S)

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Date:12/5/2017
Report processed by:
Toeroek Associates Inc||

Full Name	Address	County	Phone
HERMAN, SAM R	13254 NASHVILLE HWY 1 LIBERTY, TN 37095-3551 DEKALB COUNTY	DEKALB	(615) 536-1976

ADDITIONAL PERSONAL INFORMATION

SSN	DOB	Gender	LexID(sm)
380-42-XXXX	1/1943 (Age:74)	Male	001111075028

Subject Summary

Name Variations

1: HEIMAN, SAMUEL R
2: HERMAN, RICHARD
3: HERMAN, SAM
4: HERMAN, SAM R
5: HERMAN, SAMEL R
6: HERMAN, SAMMY R
7: HERMAN, SAMUEL
8: HERMAN, SAMUEL K
9: HERMAN, SAMUEL R
10: HERMAN, SAMUEL RICHARD
11: HERMAN, SMAUEL R
12: RICHARD, HERMAN SAMUEL
13: SAMUEL, HERMAN R

SSNs Summary

No.	SSN	State Iss.	Date Iss.	Warnings
		Most frequent SSN attributed to subject:		
1:	380-42-XXXX	Michigan	1959-1961	

Possible E-Mail Addresses

HERMANS43@HOTMAIL.COM
HERMANS1243@HOTMAIL.COM

Others Using SSN - 0 records found

Address Summary - 15 records found

No.	Address
1:	13254 NASHVILLE HWY 1 LIBERTY, TN 37095-3551 DEKALB COUNTY
2:	13255 NASHVILLE HWY

LIBERTY, TN 37095-3552
DEKALB COUNTY

3: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY

4: 1200 KENDAL
SILVERTON, CO 81433
SAN JUAN COUNTY

5: 2100 KENDALL MTN APT
SILVERTON, CO 81433
SAN JUAN COUNTY

6: 1458 OLD HWY APT 53
LIBERTY, TN 37095
DEKALB COUNTY

7: 1578 OLD HIGHWAY 53
LIBERTY, TN 37095-4149
DEKALB COUNTY

8: 3130 SOUTHFIELD FWY # FY
DEARBORN, MI 48124-4349
WAYNE COUNTY

9: 123 MAIN ST
LIBERTY, TN 37095-2126
DEKALB COUNTY

10: RR 2 BOX 55
LIBERTY, TN 37095-9802
DEKALB COUNTY

11: 1458 OLD HIGHWAY 53
LIBERTY, TN 37095-4216
DEKALB COUNTY

12: 55 RURAL RD
LIBERTY, TN 37095
DEKALB COUNTY

13: 1454 OLD HWY APT 53
LIBERTY, TN 37095
DEKALB COUNTY

14: PO BOX 55
LIBERTY, TN 37095-0055
DEKALB COUNTY

15: 2 RT

LIBERTY, TN 37095
DEKALB COUNTY

Address Details

1: 13254 NASHVILLE HWY 1 LIBERTY, TN 37095-3551

Address	Dates	Phone
13254 NASHVILLE HWY 1 LIBERTY, TN 37095-3551 DEKALB COUNTY	12/1987 - 11/2017	(615) 536-1976

Census Data for Geographical Region

Median Head of Household Age: 42
Median Income: $46,886
Median Home Value: $99,662
Median Education: 12 years

Household Members

None Listed

Other Associates

None Listed

2: 13255 NASHVILLE HWY LIBERTY, TN 37095-3552

Address	Dates	Phone
13255 NASHVILLE HWY LIBERTY, TN 37095-3552 DEKALB COUNTY	4/2009 - 11/2017	

Census Data for Geographical Region

Median Head of Household Age: 42
Median Income: $46,886
Median Home Value: $99,662
Median Education: 12 years

Household Members

None Listed

Other Associates

YOUGA, CYNTHIA LYNN

3: PO BOX 822 SILVERTON, CO 81433-0822

Address	Dates	Phone
PO BOX 822 SILVERTON, CO 81433-0822 SAN JUAN COUNTY	11/1996 - 11/2017	

Census Data for Geographical Region

Median Head of Household Age: 42
Median Income: $51,299
Median Home Value: $291,250
Median Education: 14 years

Household Members

HERMAN, ELIZABETH NAPIER

Other Associates

None Listed

4: 1200 KENDAL SILVERTON, CO 81433

Address	Dates	Phone
1200 KENDAL SILVERTON, CO 81433 SAN JUAN COUNTY	2/2008 - 2/2008	

Census Data for Geographical Region
Median Head of Household Age: 42
Median Income: $51,299
Median Home Value: $291,250
Median Education: 14 years

Household Members
None Listed

Other Associates
None Listed

5: 2100 KENDALL MTN APT SILVERTON, CO 81433

Address	Dates	Phone
2100 KENDALL MTN APT SILVERTON, CO 81433 SAN JUAN COUNTY	4/2001 - 5/2007	

Census Data for Geographical Region
Median Head of Household Age: 42
Median Income: $51,299
Median Home Value: $291,250
Median Education: 14 years

Household Members
None Listed

Other Associates
None Listed

6: 1458 OLD HWY APT 53 LIBERTY, TN 37095

Address	Dates	Phone
1458 OLD HWY APT 53 LIBERTY, TN 37095 DEKALB COUNTY	1/1994 - 1/2003	

Household Members
None Listed

Other Associates
None Listed

7: 1578 OLD HIGHWAY 53 LIBERTY, TN 37095-4149

Address	Dates	Phone
1578 OLD HIGHWAY 53 LIBERTY, TN 37095-4149 DEKALB COUNTY	5/1994 - 2/2002	

Census Data for Geographical Region
Median Head of Household Age: 42
Median Income: $46,886
Median Home Value: $99,662
Median Education: 12 years

Household Members
None Listed

Other Associates
None Listed

8: 3130 SOUTHFIELD FWY # FY DEARBORN, MI 48124-4349

Address	Dates	Phone
3130 SOUTHFIELD FWY # FY DEARBORN, MI 48124-4349 WAYNE COUNTY	6/1998 - 4/2001	

Census Data for Geographical Region
Median Head of Household Age: 37
Median Income: $74,342
Median Home Value: $158,662
Median Education: 14 years
Household Members
None Listed
Other Associates
None Listed

9: 123 MAIN ST LIBERTY, TN 37095-2126

Address	Dates	Phone
123 MAIN ST LIBERTY, TN 37095-2126 DEKALB COUNTY	6/1999 - 1/2000	

Census Data for Geographical Region
Median Head of Household Age: 42
Median Income: $46,886
Median Home Value: $99,662
Median Education: 12 years
Household Members
None Listed
Other Associates
None Listed

10: RR 2 BOX 55 LIBERTY, TN 37095-9802

Address	Dates	Phone
RR 2 BOX 55 LIBERTY, TN 37095-9802 DEKALB COUNTY	9/1989 - 12/1999	

Census Data for Geographical Region
Median Head of Household Age: 42
Median Income: $46,886
Median Home Value: $99,662
Median Education: 12 years
Household Members
HERMAN, RICHARD ALIVE
Other Associates
None Listed

11: 1458 OLD HIGHWAY 53 LIBERTY, TN 37095-4216

Address	Dates	Phone
1458 OLD HIGHWAY 53	4/1995 - 4/1995	

LIBERTY, TN 37095-4216
DEKALB COUNTY
Census Data for Geographical Region
Median Head of Household Age: 42
Median Income: $46,886
Median Home Value: $99,662
Median Education: 12 years
Household Members
None Listed
Other Associates
None Listed

12: 55 RURAL RD LIBERTY, TN 37095

Address	Dates	Phone
55 RURAL RD LIBERTY, TN 37095 DEKALB COUNTY	2/1991 - 12/1991	

Household Members
None Listed
Other Associates
None Listed

13: 1454 OLD HWY APT 53 LIBERTY, TN 37095

Address	Dates	Phone
1454 OLD HWY APT 53 LIBERTY, TN 37095 DEKALB COUNTY	12/1987 - 12/1987	

Household Members
None Listed
Other Associates
None Listed

14: PO BOX 55 LIBERTY, TN 37095-0055

Address	Dates	Phone
PO BOX 55 LIBERTY, TN 37095-0055 DEKALB COUNTY	6/1986 - 6/1986	

Census Data for Geographical Region
Median Head of Household Age: 38
Median Income: $41,884
Median Home Value: $93,430
Median Education: 12 years
Household Members
None Listed
Other Associates
None Listed

15: 2 RT LIBERTY, TN 37095

Address	Dates	Phone
2 RT LIBERTY, TN 37095	1/1986 - 4/1986	

DEKALB COUNTY

Household Members

None Listed

Other Associates

None Listed

Voter Registrations - 0 records found

Driver Licenses - 3 records found

1: Tennessee Driver License

Driver Information

Name: HERMAN, SAMUEL RICHARD
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY
Data source: Governmental: TN

Personal Information

SSN: 380-42-XXXX
DOB: 01/1943
Gender: Male
Height: 5'09"
Weight: 172 lbs.
Hair: Brown
Eyes: Brown

License Information

License Type: CLASS D LICENSE

Issue Date: 07/21/2016
Expiration Date: 07/2024

Additional Driver Information

DOB: 01/1943
Gender: Male
Race: WHITE
History: Current
Height: 5'09"
Weight: 172 lbs.
Hair: Brown
Eyes: Brown

2: Tennessee Driver License

Driver Information

Name: HERMAN, SAMUEL RICHARD
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY
Data source: Governmental: TN

Personal Information

SSN: 380-42-XXXX
DOB: 01/1943
Gender: Male
Height: 5'09"

Weight: 170 lbs.
Hair: Brown
Eyes: Brown

License Information

License Class: Class D With Motorcycle

Issue Date: 11/19/1997
Expiration Date: 01/2003

Additional Driver Information

DOB: 01/1943
Gender: Male
History: Historical
Height: 5'09"
Weight: 170 lbs.
Hair: Brown
Eyes: Brown

3: Tennessee Driver License

Driver Information

Name: HERMAN, SAMUEL RICHARD
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY
Data source: Governmental: TN

Personal Information

SSN: 380-42-XXXX
DOB: 01/1943
Gender: Male
Height: 5'09"
Weight: 170 lbs.
Hair: Brown
Eyes: Brown

Additional Driver Information

DOB: 01/1943
Gender: Male
Race: WHITE
History: Historical
Height: 5'09"
Weight: 170 lbs.
Hair: Brown
Eyes: Brown

Professional Licenses - 0 records found
Health Care Providers - 0 records found
Health Care Sanctions - 0 records found
Pilot Licenses - 0 records found
Sport Licenses - 0 records found
Real Property - 6 records found

1: Assessment Record for DEKALB County, TN

Owner Information

Name: HERMAN SAMUEL R
Address: 237 ROSEWOOD LN SMITHVILLE, TN 37166-6090
County/FIPS: DEKALB

Property Information

Address: 13254 NASHVILLE HWY LIBERTY, TN 37095-3551
County/FIPS: DEKALB
Data Source: B

Legal Information

Assessor's Parcel Number: 021041 01104
Recording Date: 05/08/2010
Book/Page: 318/513

Assessment Information

Assessed Value: $17775
Market Land Value: $40600
Market Improvement Value: $30500
Total Market Value: $71100

2: Assessment Record for SAN JUAN County, CO

Owner Information

Name: HERMAN SAMUEL R
Address: 13255 NASHVILLE HWY LIBERTY, TN 37095-3552
County/FIPS: DEKALB

Property Information

Address: EUREKA MNG DISTRICT
Data Source: B

Legal Information

Assessor's Parcel Number: 47750210050220
Recording Date: 04/19/2009

Assessment Information

Assessed Value: $1946
Market Land Value: $6710
Total Market Value: $6710

3: Assessment Record for SAN JUAN County, CO

Owner Information

Name: HERMAN SAMUEL R
Address: 13255 NASHVILLE HWY LIBERTY, TN 37095-3552
County/FIPS: DEKALB

Property Information

Address: EUREKA MNG DISTRICT
Data Source: B

Legal Information

Assessor's Parcel Number: 47750210050220
Recording Date: 04/19/2009

Assessment Information

Assessed Value: $1946

Market Land Value: $6710
Total Market Value: $6710

4: Assessment Record for SAN JUAN County, CO

Owner Information

Name: HERMAN, SAMUEL R
Address: PO BOX 822 SILVERTON, CO 81433-0822
County/FIPS: SAN JUAN

Property Information

Address: EUREKA MNG DISTRICT
Data Source: B

Legal Information

Assessor's Parcel Number: 47750210050220
Recording Date: 04/19/2009

Assessment Information

Assessed Value: $1869
Market Land Value: $6446
Total Market Value: $6446

5: Deed Record for SAN JUAN County

Buyer Information

Name: HERMAN , SAMUEL R
Name: HERMAN , ELIZABETH N
Address: PO BOX 822 SILVERTON, CO 81433-0822
County/FIPS: SAN JUAN

Seller Information

Name: MELCHER , NORMA B
Name: ESTATE OF DOUGLAS WARREN MELCHER
Name: MELCHER , DOUGLAS W
Name: MELCHER , D W

Property Information

Data Source: B

Legal Information

Contract Date: 09/19/2007
Recording Date: 09/28/2007
Document Number: 146026
Document Type: PERSONAL REPRESENTATIVES DEED

Sale Information

Sale Price: $7500

Mortgage Information

Loan Type: THIS CODE IS USED ONLY FOR BKFS LEGACY
Title Company: NONE AVAILABLE

6: Deed Record for DE KALB County

Buyer Information

Name: HERMAN SAMUEL R
Address: 13254 NASHVILLE HWY LIBERTY, TN 37095-3551

County/FIPS: DEKALB

Seller Information

Name: MATHIS DON & DEANNA

Property Information

Address: 26 TENN

Data Source: B

Legal Information

Assessor's Parcel Number: 021041 01100

Recording Date: 11/22/1996

Book/Page: 69/640

Sale Information

Sale Price: $6068

Motor Vehicle Registrations - 32 records found

1: TN MVR

Registrant Information

Registrant: HERMAN, SAMUEL

DOB: 1/1943

Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Registration Information

Original Registration Date: 2/21/2017

Registration Date: 2/21/2017

Registration Expiration Date: 2/28/2018

Vehicle Information

VIN: 1N6DD26Y9WC359737

Class: PASSENGER CAR/LIGHT TRUCK

Model Year: 1998

Make: Nissan

Model: Frontier

Series: XE/SE

Body Style: Club Cab Pickup

Color: Red

Plate Information

License Plate Type: Private

Previous Plate Number: 3D91N5

Previous Plate State: TN

License Plate Number: 2E56J9

Plate State: TN

Source Information

Data Source: GOVERNMENTAL

2: TN MVR

Vehicle Information

VIN: 1N6DD26Y9WC359737

Class: PASSENGER CAR/LIGHT TRUCK

Model Year: 1998

Make: Nissan

Model: Frontier

Series: XE/SE
Body Style: Club Cab Pickup
Color: Red

Owner Information

Name: HERMAN, SAMUEL
DOB: 1/1943
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Title Information

Title Number: 96411582
Title Transfer Date: 2/23/2017
Title Issue Date: 2/23/2017

Source Information

Data Source: GOVERNMENTAL

3: TN MVR

Registrant Information

Registrant: HERMAN, SAMUEL
DOB: 1/1943
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Registration Information

Original Registration Date: 4/28/2014
Registration Date: 1/5/2017
Registration Expiration Date: 1/31/2018

Vehicle Information

VIN: 1N6ED26T34C425785
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2004
Make: Nissan
Model: Frontier
Series: XE
Body Style: Club Cab Pickup
Color: Red

Plate Information

License Plate Type: Private
Previous Plate Number: 096VLD
Previous Plate State: TN
License Plate Number: 096VLD
Plate State: TN

Source Information

Data Source: GOVERNMENTAL

4: TN MVR

Vehicle Information

VIN: 1N6ED26T34C425785
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2004
Make: Nissan

Model: Frontier
Series: XE
Body Style: Club Cab Pickup
Color: Red

Owner Information

Name: HERMAN, SAMUEL
DOB: 1/1943
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Title Information

Title Number: 93500012
Title Transfer Date: 4/28/2014
Title Issue Date: 4/30/2014

Source Information

Data Source: GOVERNMENTAL

5: TN MVR

Registrant Information

Registrant: HERMAN, SAMUEL
DOB: 1/1943
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Registration Information

Original Registration Date: 1/15/2015
Registration Date: 1/5/2017
Registration Expiration Date: 1/31/2018

Vehicle Information

VIN: JN8HD17Y3RW322140
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1994
Make: Nissan
Model: Pathfinder
Series: LE/SE/XE
Body Style: 4 Dr Wagon Sport Utility
Color: Red

Plate Information

License Plate Type: Private
Previous Plate Number: S6296S
Previous Plate State: TN
License Plate Number: S6296S
Plate State: TN

Source Information

Data Source: GOVERNMENTAL

6: TN MVR

Vehicle Information

VIN: JN8HD17Y3RW322140
Class: PASSENGER CAR/LIGHT TRUCK

Model Year: 1994
Make: Nissan
Model: Pathfinder
Series: LE/SE/XE
Body Style: 4 Dr Wagon Sport Utility
Color: Red

Owner Information

Name: HERMAN, SAMUEL
DOB: 1/1943
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Title Information

Title Number: 92379209
Title Transfer Date: 1/22/2015
Title Issue Date: 1/22/2015

Source Information

Data Source: GOVERNMENTAL

7: CO MVR

Registrant Information

Registrant: HERMAN, SAMUEL R
DOB: 1/1943
Address: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY

Registration Information

Original Registration Date: 6/30/2014
Registration Date: 6/30/2014
Registration Expiration Date: 6/30/2015

Vehicle Information

VIN: 1FTHF26G2JKB33995
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1988
Make: Ford
Model: F250
Series: CUSTOM~XL~XLT LARIAT
Body Style: Pickup

Plate Information

License Plate Type: Private
Previous Plate Number: 692YMF
Previous Plate State: CO
License Plate Number: 809MQA
Plate State: CO

Source Information

Data Source: GOVERNMENTAL

8: CO MVR

Vehicle Information

VIN: 1FTHF26G2JKB33995
Class: PASSENGER CAR/LIGHT TRUCK

Model Year: 1988
Make: Ford
Model: F250
Series: CUSTOM~XL~XLT LARIAT
Body Style: Pickup

Owner Information

Name: HERMAN, SAMUEL R
DOB: 1/1943
Address: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY

Title Information

Title Number: 55E016375
Title Transfer Date: 12/27/2013
Title Issue Date: 12/27/2013

Source Information

Data Source: GOVERNMENTAL

9: TN MVR

Registrant Information

Registrant: HERMAN, SAMUEL R
DOB: 1/1943
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Registration Information

Original Registration Date: 1/8/2009
Registration Date: 1/3/2014
Registration Expiration Date: 1/31/2015

Vehicle Information

VIN: 5TEPX42N19Z639818
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2009
Make: Toyota
Model: Tacoma
Series: BASE
Body Style: Pickup

Plate Information

License Plate Type: Private
Previous Plate Number: 096VLD
Previous Plate State: TN
License Plate Number: 096VLD
Plate State: TN

Source Information

Data Source: GOVERNMENTAL

10: TN MVR

Vehicle Information

VIN: 5TEPX42N19Z639818
Class: PASSENGER CAR/LIGHT TRUCK

Model Year: 2009
Make: Toyota
Model: Tacoma
Series: BASE
Body Style: Pickup

Owner Information

Name: HERMAN, SAMUEL R
DOB: 1/1943
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Title Information

Title Number: 92374981
Title Transfer Date: 4/3/2014
Title Issue Date: 4/3/2014

Source Information

Data Source: GOVERNMENTAL

11: CO MVR

Registrant Information

Registrant: RICHARD, HERMAN SAMUEL
DOB: 1/1943
Address: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY

Registration Information

Original Registration Date: 3/15/2013
Registration Date: 3/15/2013
Registration Expiration Date: 3/31/2014

Vehicle Information

VIN: 1FTEF14N0KKB11624
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1989
Make: Ford
Model: F150
Series: CUSTOM~XL~XLT LARIAT
Body Style: Pickup

Plate Information

License Plate Type: Private
Previous Plate Number: 270DCY
Previous Plate State: CO
License Plate Number: 692YMF
Plate State: CO

Source Information

Data Source: GOVERNMENTAL

12: CO MVR

Vehicle Information

VIN: 1FTEF14N0KKB11624
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1989

Make: Ford
Model: F150
Series: CUSTOM~XL~XLT LARIAT
Body Style: Pickup

Owner Information

Name: RICHARD, HERMAN SAMUEL
DOB: 1/1943
Address: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY

Title Information

Title Number: 55E016169
Title Transfer Date: 3/15/2013
Title Issue Date: 3/15/2013

Source Information

Data Source: GOVERNMENTAL

13: TN MVR

Registrant Information

Registrant: HERMAN, SAMUEL R
DOB: 1/1943
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Registration Information

Original Registration Date: 3/12/2010
Registration Date: 3/12/2010
Registration Expiration Date: 3/31/2011

Vehicle Information

VIN: 2GBJG31MXE4103170
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1984
Make: Chevrolet
Model: G30
Series: BASE
Body Style: Cutaway
Color: White

Plate Information

License Plate Type: Private
Previous Plate Number: 914NWT
Previous Plate State: TN
License Plate Number: 632XKM
Plate State: TN

Source Information

Data Source: GOVERNMENTAL

14: TN MVR

Vehicle Information

VIN: 2GBJG31MXE4103170
Class: PASSENGER CAR/LIGHT TRUCK

Model Year: 1984
Make: Chevrolet
Model: G30
Series: BASE
Body Style: Cutaway
Color: White

Owner Information

Name: HERMAN, SAMUEL R
DOB: 1/1943
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Title Information

Title Number: 86880781
Title Transfer Date: 3/12/2010
Title Issue Date: 3/12/2010

Source Information

Data Source: GOVERNMENTAL

15: TN MVR

Registrant Information

Registrant: HERMAN, SAMUEL R
DOB: 1/1943
Address: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY

Registration Information

Original Registration Date: 12/15/2008
Registration Date: 11/3/2009
Registration Expiration Date: 11/30/2010

Vehicle Information

VIN: 1G2NE54UXMC583140
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1991
Make: Pontiac
Model: Grand Am
Series: LE
Body Style: Sedan 4 Door
Color: White

Plate Information

License Plate Type: Private
Previous Plate Number: 315RRX
Previous Plate State: TN
License Plate Number: 315RRX
Plate State: TN

Source Information

Data Source: GOVERNMENTAL

16: TN MVR

Vehicle Information

VIN: 1G2NE54UXMC583140

Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1991
Make: Pontiac
Model: Grand Am
Series: LE
Body Style: Sedan 4 Door
Color: White

Owner Information

Name: HERMAN, SAMUEL R
DOB: 1/1943
Address: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY

Title Information

Title Number: 86440080
Title Transfer Date: 12/15/2008
Title Issue Date: 12/15/2008

Source Information

Data Source: GOVERNMENTAL

17: CO MVR

Registrant Information

Registrant: HERMAN, SAMUEL R
DOB: 1/1943
Address: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY

Registration Information

Original Registration Date: 9/21/2004
Registration Date: 8/26/2008
Registration Expiration Date: 9/30/2009

Vehicle Information

VIN: 1N6DD21Y2WC336761
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1998
Make: Nissan
Model: Frontier
Series: XE
Body Style: Pickup
Color: Green

Plate Information

License Plate Type: Private
Previous Plate Number: 759KPW
Previous Plate State: CO
License Plate Number: 759KPW
Plate State: CO

Source Information

Data Source: GOVERNMENTAL

18: TN MVR

Vehicle Information

VIN: 1N6DD21Y2WC336761
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1998
Make: Nissan
Model: Frontier
Series: XE
Body Style: Pickup
Color: Green

Owner Information

Name: HERMAN, SAMUEL R
DOB: 1/1943
Address: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY

Lienholder Information

Name: CU, TENN TEACHERS
Address: PO BOX 22881
NASHVILLE, TN 37202-2881
DAVIDSON COUNTY

Title Information

Title Number: 61193929
Title Transfer Date: 2/7/2003
Title Issue Date: 2/7/2003

Source Information

Data Source: GOVERNMENTAL

19: CO MVR

Registrant Information

Registrant: HERMAN, SAMUEL R
DOB: 1/1943
Address: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY

Registration Information

Original Registration Date: 10/18/2006
Registration Date: 3/27/2008
Registration Expiration Date: 10/31/2008

Vehicle Information

VIN: WV2ZA0251CH094913
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1982
Make: Volkswagen
Model: Vanagon
Series: CAMPMOBILE
Body Style: Sport Van

Plate Information

License Plate Type: Private
Previous Plate Number: 649ORF
Previous Plate State: CO
License Plate Number: 649ORF

Plate State: CO

Source Information

Data Source: GOVERNMENTAL

20: CO MVR

Vehicle Information

VIN: WV2ZA0251CH094913
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1982
Make: Volkswagen
Model: Vanagon
Series: CAMPMOBILE
Body Style: Sport Van

Owner Information

Name: HERMAN, SAMUEL R
DOB: 1/1943
Address: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY

Title Information

Title Number: 55E014551
Title Transfer Date: 10/18/2006
Title Issue Date: 10/18/2006

Source Information

Data Source: GOVERNMENTAL

21: TN MVR

Registrant Information

Registrant: HERMAN, SAMUEL R
DOB: 1/1943
Address: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY

Registration Information

Original Registration Date: 10/5/2007
Registration Date: 10/5/2007
Registration Expiration Date: 10/31/2008

Vehicle Information

VIN: 2C3HC56F1VH539902
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1997
Make: Chrysler
Model: LHS
Series: BASE
Body Style: Sedan 4 Door

Plate Information

License Plate Type: Private
Previous Plate Number: 113RRX
Previous Plate State: TN
License Plate Number: 315RRX
Plate State: TN

Source Information

Data Source: GOVERNMENTAL

22: TN MVR

Vehicle Information

VIN: 2C3HC56F1VH539902
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1997
Make: Chrysler
Model: LHS
Series: BASE
Body Style: Sedan 4 Door

Owner Information

Name: HERMAN, SAMUEL R
DOB: 1/1943
Address: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY

Title Information

Title Number: 85967174
Title Transfer Date: 10/5/2007
Title Issue Date: 10/5/2007

Source Information

Data Source: GOVERNMENTAL

23: TN MVR

Registrant Information

Registrant: HERMAN, SAM
DOB: 1/1943
Address: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY

Registration Information

Original Registration Date: 7/31/2002
Registration Date: 7/31/2002
Registration Expiration Date: 7/31/2003

Vehicle Information

VIN: 1GBJP37J4D3316168
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1983
Make: Chevrolet
Model: P30
Series: BASE
Body Style: Motorized Home

Plate Information

License Plate Type: Private
Previous Plate Number: 423ENK
Previous Plate State: TN
License Plate Number: LUT513
Plate State: TN

Source Information

Data Source: GOVERNMENTAL

24: TN MVR

Vehicle Information

VIN: 1GBJP37J4D3316168
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1983
Make: Chevrolet
Model: P30
Series: BASE
Body Style: Motorized Home

Owner Information

Name: HERMAN, SAM
DOB: 1/1943
Address: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY

Title Information

Title Number: 57248760
Title Transfer Date: 5/6/2003
Title Issue Date: 5/6/2003

Source Information

Data Source: GOVERNMENTAL

25: TN MVR

Registrant Information

Registrant: HERMAN, SAMUEL R
DOB: 1/1943
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Registration Information

Original Registration Date: 2/27/1999
Registration Date: 2/27/1999
Registration Expiration Date: 1/31/2000

Vehicle Information

VIN: JT2MA70JXG0014121
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1986
Make: Toyota
Model: Supra
Series: BASE
Body Style: Hatchback 2 Door

Plate Information

License Plate Type: Private
Previous Plate Number: 847XQC
Previous Plate State: TN
License Plate Number: 565PGG
Plate State: TN

Source Information

Data Source: GOVERNMENTAL

26: TN MVR

Vehicle Information

VIN: JT2MA70JXG0014121
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1986
Make: Toyota
Model: Supra
Series: BASE
Body Style: Hatchback 2 Door

Owner Information

Name: HERMAN, SAMUEL R
DOB: 1/1943
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Title Information

Title Number: 57777976
Title Transfer Date: 1/29/1999
Title Issue Date: 1/29/1999

Source Information

Data Source: GOVERNMENTAL

27: TN MVR

Registrant Information

Registrant: HERMAN, SAM
DOB: 1/1943
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Registration Information

Original Registration Date: 10/28/1998
Registration Date: 10/28/1998
Registration Expiration Date: 10/31/1999

Vehicle Information

VIN: JT4RN66D3E5011946
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1984
Make: Toyota
Model: Xtracab
Series: DELUXE
Body Style: Pickup

Plate Information

License Plate Type: Private
Previous Plate Number: 564NPD
Previous Plate State: TN
License Plate Number: 564NPD
Plate State: TN

Source Information

Data Source: GOVERNMENTAL

28: TN MVR

Registrant Information

Registrant: HERMAN, SAMUEL R
DOB: 1/1943
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Registration Information

Original Registration Date: 8/31/1998
Registration Date: 8/31/1998
Registration Expiration Date: 8/31/1999

Vehicle Information

VIN: JT4RN65S4E5012913
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1984
Make: Toyota
Model: Long
Series: BED SR5 1/2 TON
Body Style: Pickup

Plate Information

License Plate Type: Private
Previous Plate Number: 102NWC
Previous Plate State: TN
License Plate Number: 668ASM
Plate State: TN

Source Information

Data Source: GOVERNMENTAL

29: TN MVR

Vehicle Information

VIN: JT4RN65S4E5012913
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1984
Make: Toyota
Model: Long
Series: BED SR5 1/2 TON
Body Style: Pickup

Owner Information

Name: HERMAN, SAMUEL R
DOB: 1/1943
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Title Information

Title Number: 57020003
Title Transfer Date: 8/17/1998
Title Issue Date: 8/17/1998

Source Information

Data Source: GOVERNMENTAL

30: TN MVR

Registrant Information

Registrant: HERMAN, SMAUEL R
DOB: 1/1943
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Registration Information

Original Registration Date: 12/12/1997
Registration Date: 12/12/1997
Registration Expiration Date: 11/30/1998

Vehicle Information

VIN: 2G3AM51WXH9358393
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1987
Make: Oldsmobile
Model: Cutlass Ciera
Series: BROUGHAM
Body Style: Sedan 4 Door
Color: Silver

Plate Information

License Plate Type: Private
Previous Plate Number: 649VQK
Previous Plate State: TN
License Plate Number: 649VQK
Plate State: TN

Source Information

Data Source: GOVERNMENTAL

31: TN MVR

Registrant Information

Registrant 1

Registrant: HERMAN, ELIZABETH C
Address:

Registrant 2

Registrant: HERMAN, SAMEL R
DOB: 1/1943
Address: 13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
DEKALB COUNTY

Registration Information

Original Registration Date: 5/9/1997
Registration Date: 5/9/1997
Registration Expiration Date: 4/30/1998

Vehicle Information

VIN: F34CF5V029776
Class: UNKNOWN
Model Year: 1975
Make: DODGE

Series: F34
Body Style: MOTORIZED HOME
Color: White

Plate Information

License Plate Type: Private
Previous Plate Number: 677NPF
Previous Plate State: TN
License Plate Number: 677NPF
Plate State: TN

Source Information

Data Source: GOVERNMENTAL

32: Non-Governmental Vehicle Record

Vehicle Information

VIN: 1FALP5243PA201827
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1993
Make: Ford
Model: Taurus
Series: GL
Body Style: Sedan 4 Door

Owner Information

Name: HERMAN, SAMUEL
DOB: 1/1943
Address: PO BOX 822
SILVERTON, CO 81433-0822
SAN JUAN COUNTY
Source Date First Seen: 12/1/2008
Source Date Last Seen: 12/4/2012

Source Information

Data Source: NON-GOVERNMENTAL

Boats - 0 records found
Aircraft - 0 records found
Bankruptcy Information - 0 records found
Judgments/Liens - 0 records found
UCC Liens - 0 records found
Fictitious Businesses - 0 records found
Notice Of Defaults - 0 records found
Potential Relatives - 10 records found

1st Degree: 4, 2nd Degree: 6

No.	Full Name	Address/Phone
1.	HERMAN, ELIZABETH NAPIER ⚠ Deceased • AKA CANDLER, ELIZABETH NAPIER • AKA CANDLER, ELIZABETH R • AKA CANDLER, ELIZABETH R • AKA CANDELER, ELIZABETH • AKA CANDLER, ELIZABETH • AKA CANDLER, ELIZABETH N • AKA NAPIER HERMAN, ELIZABETH	PO BOX 822 SILVERTON, CO 81433-0822 13254 NASHVILLE HWY LIBERTY, TN 37095-3551 (615) 536-1976 205 CHAMBERLIN ST NASHVILLE, TN 37209-4813

	• AKA CHANDLER, ELIZABETH N • AKA HERMAN, ELIZABETH RUSHTON • AKA HERMAN, ELIZABETH RUSHTON SSN:408-98-XXXX DOB:7/1954 (Age: 63)	2100 KENDALL APT SILVERTON, CO 81433 PO BOX 342 WATERTOWN, TN 37184-0342
1.A.	CANDLER, CHRISTOPHER RYAN • AKA CANDLER, CHRISTOP • AKA CANDLER, CHRIS R • AKA CANDLER, CHRISTOPHE RYAN • AKA CANDLER, CHARLES R • AKA HERMAN, CHRISTOPHER R • AKA CHANDLER, CHARLES R • AKA CANPLER, CHRIS • AKA CANDLER, CHRISTO SSN:415-53-XXXX DOB:6/1983 (Age: 34)	623 EASTBORO DR NASHVILLE, TN 37209-1839 (615) 352-7338 344 TRAMMEL LN WATERTOWN, TN 37184-4331 (615) 292-1871 PO BOX 342 WATERTOWN, TN 37184-0342 205 CHAMBERLIN ST NASHVILLE, TN 37209-4813 (615) 298-1209
1.B.	CANDLER, MICHAEL BRANDON • AKA CHANDLER, MICHAEL B • AKA CANDLER, MICHAEL R • AKA CANDLER, CHRISTOPHER R SSN:415-53-XXXX DOB:10/1981 (Age: 36)	460 CEDAR PARK CIR LA VERGNE, TN 37086-2096 344 TRAMMEL LN WATERTOWN, TN 37184-4331 3361 MARRAST DR CLARKSVILLE, TN 37043-7834 PO BOX 342 WATERTOWN, TN 37184-0342 106 PIONEER LN LA VERGNE, TN 37086-2037
1.C.	CANDLER, CHARLES RONALD • AKA CANDLER, RONNIE M • AKA CANDLER, CHARLES RONNIE • AKA CADLER, CHARLES R • AKA CHANDLER, CHARLES • AKA CANDLER CHRISTOPHER, R • AKA CANDLER, RONNIE R • AKA CHANDLER, RONNIE C SSN:409-84-XXXX DOB:10/1949 (Age: 68)	623 EASTBORO DR NASHVILLE, TN 37209-1839 6665 BEACON LN NASHVILLE, TN 37209-4306 205 CHAMBERLIN ST NASHVILLE, TN 37209-4813 (615) 297-3727 203 CHAMBERLIN ST NASHVILLE, TN 37209-4813 (615) 297-3727 3603 NORMANDY PL S NASHVILLE, TN 37209-4824

1.D. ASHFORD, SARAH LYNN

• AKA CANDLER, SARAH LYNN
• AKA CANDLER, SARAH ASHFORD
• AKA ASHFORD, CANDLER SARAH
• AKA CHANLER, SARAH
• AKA ASHFORDCANDLER, SARAH
• AKA ASHFORD CANDLER, SARAH
• AKA CANDLER SARAH, LYNN
• AKA CHANDLER, SARA

DOB:9/1986
(Age: 31)

344 TRAMMEL LN
WATERTOWN, TN 37184-4331
(615) 237-3048

3361 MARRAST DR
CLARKSVILLE, TN 37043-7834

PO BOX 342
WATERTOWN, TN 37184-0342

460 CEDAR PARK CIR
LA VERGNE, TN 37086-2096

106 PIONEER LN
LA VERGNE, TN 37086-2037

1.E. CANDLER, ROBERTA LOUISE

Deceased
• AKA CANDLER, ROBERTA
• AKA CANDLER, RABERTA L
• AKA CANDLER, ROBERTA L

SSN:408-40-XXXX
DOB:9/1919
(Age: 98)

6665 BEACON LN
NASHVILLE, TN 37209-4306
(615) 353-1935

8017 BOONE TRCE
NASHVILLE, TN 37221-6521

4807 NEVADA AVE
NASHVILLE, TN 37209-3428
(615) 297-3727

2. HERMAN, RICHARD ALIVE

• AKA HERMAN, RICHARD ALVIE
• AKA HERMAN, RICHAR A
• AKA ALIVE, RICHARD
• AKA HERMAN, RICHARD ALVZE

SSN:373-88-XXXX
DOB:1966
(Age: 51)

RR 2 BOX 55
LIBERTY, TN 37095-9802

5550 TARNOW ST
DETROIT, MI 48210-2256

13225 NASHVILLE HWY
LIBERTY, TN 37095-3552
(615) 536-5691

13254 NASHVILLE HWY
LIBERTY, TN 37095-3551
(615) 536-1976

RT BOX 55OLD
LIBERTY, TN 37095

3. HERMAN, SAMUAL LOUIS

• AKA HERMAN, SAMUEL L
• AKA SAMMY, HERMAN
• AKA HERMAN, SAMMY

DOB:7/1991
(Age: 26)

PO BOX 91
HOWE, IN 46746-0091

223 CUSTER AVE RM 201A
FORT RILEY, KS 66442-4019

195 INDIANA AVE
FORT LEONARD WOOD, MO 65473-1068

5755 N STATE ROAD 9
HOWE, IN 46746-9228
(260) 562-9289

		13254 NASHVILLE HWY LIBERTY, TN 37095-3551 (615) 536-1976 (615) 536-5120
4.	HERMAN, KAYLA MICHELLE • AKA GASPAR, KAYLA M • AKA HERMAN, KAYLA K • AKA DOB:2/1988 (Age: 29)	4638 51ST ST DETROIT, MI 48210-2725 7059 GARTNER ST DETROIT, MI 48209-1540 (313) 849-3665 13254 NASHVILLE HWY LIBERTY, TN 37095-3551 (615) 536-1976 4636 51ST ST DETROIT, MI 48210-2725 1516 VINEWOOD ST APT 306 DETROIT, MI 48216-1488
4.A.	YOUGA, CYNTHIA LYNN • AKA DUBOISE, CYNTHIA L • AKA GOAD, CYNTHIA LYNN • AKA GOAD, CINDY L • AKA YOUGA, CINDY L • AKA GOAD, CYTHNIA • AKA YOUGA, CYTHINA • AKA HERMAN, CYNTHIA LYNN SSN:373-88-XXXX DOB:6/1965 (Age: 52)	231 HICKORY OAK DR SE CLEVELAND, TN 37323-7313 (423) 473-6107 9057 HOOPER HOLW HARRISON, TN 37341-8601 6614 HARRISON HEIGHTS DR HARRISON, TN 37341-7600 13254 NASHVILLE HWY LIBERTY, TN 37095-3551 (615) 536-1976 13255 NASHVILLE HWY LIBERTY, TN 37095-3552

Business Associates - 0 records found

Person Associates - 4 records found

No.	Full Name	Address	SSN	Phone	DOB
1:	AVERITTE, NICOLE ANN SHUBERT, NICOLE ANN DUBOISE, NICOLE ANN HENDERSON, NICOLE ANN SHUBERT, NICOLE A DUBOIS, NICOLE SHUBERT, NICLOE A AVERITT, NICOLE	105 EAST DR HENDERSONVILLE, TN 37075-4504 13254 NASHVILLE HWY APT F LIBERTY, TN 37095-3551 321 KEETON AVE OLD HICKORY, TN 37138-3807 116 BUFFALO ST OLD HICKORY, TN 37138-3438	423-17-XXXX	(615) 894-7042	1/1984

		820 DOUGLAS AVE NASHVILLE, TN 37206-3333			
2:	YOUGA, CYNTHIA LYNN DUBOISE, CYNTHIA L GOAD, CYNTHIA LYNN GOAD, CINDY L YOUGA, CINDY L GOAD, CYTHNIA YOUGA, CYTHINA HERMAN, CYNTHIA LYNN	231 HICKORY OAK DR SE CLEVELAND, TN 37323-7313 9057 HOOPER HOLW HARRISON, TN 37341-8601 6614 HARRISON HEIGHTS DR HARRISON, TN 37341-7600 13254 NASHVILLE HWY LIBERTY, TN 37095-3551 13255 NASHVILLE HWY LIBERTY, TN 37095-3552	373-88-XXXX	(423) 473-6107 (615) 536-1976	6/1965
3:	GOAD, STEVEN BLAKE GOAD, BLAKE S GOOD, STEVEN BLAKE GOAD, STEPHEN B BLAKE GOOD, STEVEN	PO BOX 241 LIBERTY, TN 37095-0241 142 E MAIN ST LIBERTY, TN 37095-2028 375 TOMMY HARRELL ST SMITHVILLE, TN 37166-1553 PO BOX 38 LIBERTY, TN 37095-0038 1226 BYRNE AVE COOKEVILLE, TN 38501-1207	412-37-XXXX	(615) 536-5470	8/1972
4:	YOUGA, LOUIS ROY YOUGA, LEWIS	44 CLARK RD APT 213 BATTLE CREEK, MI 49037-7353 1165 N SOLVAY ST DETROIT, MI 48209-1910 13254 HWY 70 LIBERTY, TN 37095 1678 S MERRIMAN RD WESTLAND, MI 48186-5355	372-80-XXXX	(313) 554-1795 (734) 589-6025 (734) 721-0011 (734) 721-1221	2/1962

Neighbors - 9 records found

13254 NASHVILLE HWY 1 LIBERTY, TN 37095-3551

Name	Address	Phone
BRASWELL, BILLY STEPHEN VANDERGRIFF, LEANN G	12885 NASHVILLE HWY LIBERTY, TN 37095-3550	(615) 536-5604
GRIFFITH, WAYNE REED	12931 NASHVILLE HWY LIBERTY, TN 37095-3552	(615) 536-5134
TRIPP, ANGELA GEORGETTE TRIPP, CASSIE LEIGH TRIPP, GEORGE D TRIPP, LINDA SUE	13206 NASHVILLE HWY LIBERTY, TN 37095-3551	(615) 536-5735

HERMAN, ELIZABETH HERMAN, RICHARD ALIVE	13225 NASHVILLE HWY LIBERTY, TN 37095-3552	(615) 536-5691
	13254 NASHVILLE HWY LIBERTY, TN 37095-3551	(615) 536-1976
	13255 NASHVILLE HWY LIBERTY, TN 37095-3552	
SULLIVAN, KRISTI JO SULLIVAN, RICKY LEN	14120 NASHVILLE HWY LIBERTY, TN 37095-3560	(615) 529-2379
CORSO, KAREN M KINGREY, LOIS LYNNE KINGREY, TIM LILLIE, STEVEN MICHAEL	14175 NASHVILLE HWY LIBERTY, TN 37095-3566	(615) 536-0366
FUSON, FRANCES DARLENE FUSON, RODGER LAYNE	14535 NASHVILLE HWY LIBERTY, TN 37095-3562	

Employment Locator - 7 records found

1:

Company Name: SILVERTON LAKES CAMPGROUND
Name: HERMAN, SAM
Title: MANAGER
Address: 2100 KENDALL ST
SILVERTON, CO 81433
SSN: 380-42-XXXX
Phone: (970) 387-9888
Confidence: High

2:

Company Name: SILVERTON LAKES CAMPGROUND
Name: HERMAN, SAM
Title: MANAGER
Address: PO BOX 126
SILVERTON, CO 81433-0126
SSN: 380-42-XXXX
Phone: (970) 387-5721
Confidence: High

3:

Company Name: SILVERTON LAKES CAMPGROUND
Name: HERMAN, SAM
Title: MANAGER
Address: 2100 KENDALL ST
SILVERTON, CO 81433
SSN: 380-42-XXXX
Phone: (970) 387-9888
Confidence: High

4:

Company Name: SILVERTON LAKES CAMPGROUND

Name: HERMAN, SAM
Title: MANAGER
Address: PO BOX 126
SILVERTON, CO 81433-0126
SSN: 380-42-XXXX
Phone: (970) 387-5721
Confidence: High

5:

Company Name: SILVERTON LAKES CAMPGROUND
Name: HERMAN, SAM
Title: MANAGER
Address: HIGHWAY 110
SILVERTON, CO 81433
SSN: 380-42-XXXX
Phone: (970) 387-5721
Confidence: High

6:

Company Name: SILVERTON LAKES CAMPGROUND
Name: HERMAN, SAM
Title: MANAGER
Address: PO BOX 126
SILVERTON, CO 81433-0126
SSN: 380-42-XXXX
Phone: (970) 387-5721
Confidence: High

7:

Company Name: SILVERTON LAKES CAMPGROUND
Name: HERMAN, SAM
Title: MANAGER
Address: HIGHWAY 110
SILVERTON, CO 81433
SSN: 380-42-XXXX
Phone: (970) 387-5721
Confidence: High

Criminal Filings - 0 records found

Cellular & Alternate Phones - 1 records found

1:

Personal Information

Name: HERMAN, SAMUEL
Address: 13254 NASHVILLE HWY 1
LIBERTY, TN 37095-3551
Phone Number: (615) 653-5454
Phone Type: Mobile

Carrier Information

Carrier: VERIZON WIRELESS-TN
Carrier City: MURFREESBORO
Carrier State: TN

Possible Education - 0 records found

Sources - 167 records found

All Sources	167 Source Document(s)
Deed Transfers	3 Source Document(s)

Driver Licenses	3 Source Document(s)
Email addresses	3 Source Document(s)
Historical Person Locator	33 Source Document(s)
Motor Vehicle Registrations	55 Source Document(s)
Person Locator 1	7 Source Document(s)
Person Locator 2	8 Source Document(s)
Person Locator 4	1 Source Document(s)
Person Locator 5	28 Source Document(s)
Person Locator 6	6 Source Document(s)
Phone	2 Source Document(s)
PhonesPlus Records	1 Source Document(s)
Tax Assessor Records	15 Source Document(s)
Utility Locator	2 Source Document(s)

Key

High Risk Indicator. These symbols may prompt you to investigate further.

Moderate Risk Indicator. These symbols may prompt you to investigate further.

General Information Indicator. These symbols inform you that additional information is provided.

✓ The most recent telephone listing as reported by the EDA source.

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1 OF 1 RECORD(S)

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Date:12/5/2017
Report processed by:
Toeroek Associates Inc||

Full Name	Address	County	Phone
BANGS, JANICE MARIE	2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640 SEWARD COUNTY	SEWARD	None Listed

ADDITIONAL PERSONAL INFORMATION

SSN	DOB	Gender	LexID(sm)
515-56-XXXX	9/1956 (Age:61)		000125585996

Subject Summary

Name Variations

1: BANGS, JANICE
2: BANGS, JANICE M
3: BANGS, JANICE MARIE
4: BANGS, JANIS
5: BANGS, JANIS M
6: BANGS, JANIS MARIE
7: BARGS, JANIS

SSNs Summary

No.	SSN	State Iss.	Date Iss.	Warnings
		Most frequent SSN attributed to subject:		
1:	515-56-XXXX	Kansas	1967-1969	

DOBs

Reported DOBs:
9/1956

Possible E-Mail Addresses

JMBANGS@YAHOO.COM
BANGER200067901@HOTMAIL.COM
TBANGS@ATT.NET

Others Using SSN - 0 records found

Address Summary - 10 records found

No.	Address
1:	2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640 SEWARD COUNTY
2:	RR 1 BOX 31 FORGAN, OK 73938-9719

BEAVER COUNTY

3: PO BOX 1424
BEAVER, OK 73932-1424
BEAVER COUNTY

4: 5 N DOUGLAS
BEAVER, OK 73932
BEAVER COUNTY

5: PO BOX 1411
BEAVER, OK 73932-1411
BEAVER COUNTY

6: 218 S CAIN AVE
LIBERAL, KS 67901-3518
SEWARD COUNTY

7: 515 W CENTRAL
LIBERAL, KS 67901
SEWARD COUNTY

8: MAIN DOUGLAS
BEAVER, OK 73932
BEAVER COUNTY

9: 212 S CAIN AVE
LIBERAL, KS 67901-3518
SEWARD COUNTY

10: PO BOX 246
LIBERAL, KS 67905-0246
SEWARD COUNTY

Address Details

1: 2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640

Address	Dates	Phone
2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640 SEWARD COUNTY	2/2001 - 11/2017	

Census Data for Geographical Region

Median Head of Household Age: 35
Median Income: $53,165
Median Home Value: $119,136
Median Education: 12 years

Household Members

BANGS, MIKE
BANGS, TROY SCOTT
BANGS, WILLIAM MICHAEL

Other Associates

None Listed

2: RR 1 BOX 31 FORGAN, OK 73938-9719

Address	Dates	Phone
RR 1 BOX 31 FORGAN, OK 73938-9719 BEAVER COUNTY	2/2001 - 11/2017	

Census Data for Geographical Region
Median Head of Household Age: 39
Median Income: $52,404
Median Home Value: $49,524
Median Education: 13 years

Household Members
BANGS, WILLIAM MICHAEL

Other Associates
None Listed

3: PO BOX 1424 BEAVER, OK 73932-1424

Address	Dates	Phone
PO BOX 1424 BEAVER, OK 73932-1424 BEAVER COUNTY	2/1995 - 11/2017	

Census Data for Geographical Region
Median Head of Household Age: 38
Median Income: $47,305
Median Home Value: $73,958
Median Education: 13 years

Household Members
BANGS, TROY SCOTT
BANGS, WILLIAM MICHAEL
BANGS, WILLIAM MICHAEL

Other Associates
None Listed

4: 5 N DOUGLAS BEAVER, OK 73932

Address	Dates	Phone
5 N DOUGLAS BEAVER, OK 73932 BEAVER COUNTY	2/1995 - 9/2013	(580) 625-2933

Census Data for Geographical Region
Median Head of Household Age: 38
Median Income: $47,305
Median Home Value: $73,958
Median Education: 13 years

Household Members
BANGS, WILLIAM MICHAEL

Other Associates
None Listed

5: PO BOX 1411 BEAVER, OK 73932-1411

Address	Dates	Phone
PO BOX 1411	11/2002 - 8/2012	

BEAVER, OK 73932-1411
BEAVER COUNTY
Census Data for Geographical Region
Median Head of Household Age: 38
Median Income: $47,305
Median Home Value: $73,958
Median Education: 13 years
Household Members
BANGS, WILLIAM MICHAEL
BANGS, WILLIAM MICHAEL
Other Associates
None Listed

6: 218 S CAIN AVE LIBERAL, KS 67901-3518

Address	Dates	Phone
218 S CAIN AVE LIBERAL, KS 67901-3518 SEWARD COUNTY	12/1989 - 11/2011	

Census Data for Geographical Region
Median Head of Household Age: 28
Median Income: $40,156
Median Home Value: $55,089
Median Education: 10 years
Household Members
BANGS, VICTORIA ZAMORA
BANGS, WILLIAM MICHAEL
Other Associates
ZAMORA, RAUL

7: 515 W CENTRAL LIBERAL, KS 67901

Address	Dates	Phone
515 W CENTRAL LIBERAL, KS 67901 SEWARD COUNTY	4/2004 - 4/2004	

Census Data for Geographical Region
Median Head of Household Age: 35
Median Income: $34,222
Median Home Value: $67,923
Median Education: 12 years
Household Members
None Listed
Other Associates
None Listed

8: MAIN DOUGLAS BEAVER, OK 73932

Address	Dates	Phone
MAIN DOUGLAS BEAVER, OK 73932 BEAVER COUNTY	5/2003 - 5/2003	

Census Data for Geographical Region
Median Head of Household Age: 38

Median Income: $47,305
Median Home Value: $73,958
Median Education: 13 years

Household Members

None Listed

Other Associates

None Listed

9: 212 S CAIN AVE LIBERAL, KS 67901-3518

Address	Dates	Phone
212 S CAIN AVE LIBERAL, KS 67901-3518 SEWARD COUNTY	3/1991 - 3/1991	(620) 624-2928

Census Data for Geographical Region

Median Head of Household Age: 28
Median Income: $40,156
Median Home Value: $55,089
Median Education: 10 years

Household Members

None Listed

Other Associates

None Listed

10: PO BOX 246 LIBERAL, KS 67905-0246

Address	Dates	Phone
PO BOX 246 LIBERAL, KS 67905-0246 SEWARD COUNTY		

Census Data for Geographical Region

Median Head of Household Age: 35
Median Income: $34,222
Median Home Value: $67,923
Median Education: 12 years

Household Members

None Listed

Other Associates

None Listed

Voter Registrations - 0 records found
Driver Licenses - 1 records found

1: Kansas Driver License

Driver Information

Name: BANGS, JANIS M
Address: 218 S CAIN AVE
LIBERAL, KS 67901-3518
SEWARD COUNTY
Data source: Non-Governmental: KS

Personal Information

SSN: 515-56-XXXX
DOB: 09/1956

Additional Driver Information

DOB: 09/1956

Professional Licenses - 0 records found
Health Care Providers - 0 records found
Health Care Sanctions - 0 records found
Pilot Licenses - 0 records found
Sport Licenses - 0 records found
Real Property - 9 records found

1: Assessment Record for LIPSCOMB County, TX

Owner Information

Name: MI-TOY CORP
Name: WILLIAM & JANIS BANGS
Address: 2330 SIERRA DR LIBERAL, KS 67901-5639
County/FIPS: SEWARD

Property Information

Address: 290 IVANHOE
Data Source: B

Legal Information

Assessor's Parcel Number: R000054034
Recording Date: 02/01/2001

Assessment Information

Assessed Value: $16110
Market Land Value: $1110
Market Improvement Value: $15000
Total Market Value: $16110

2: Assessment Record for LIPSCOMB County, TX

Owner Information

Name: MI-TOY CORP
Name: WILLIAM & JANIS BANGS
Address: 2330 SIERRA DR LIBERAL, KS 67901-5639
County/FIPS: SEWARD

Property Information

Address: 110 S NAGEL ST FOLLETT, TX 79034-2123
County/FIPS: LIPSCOMB
Data Source: B

Legal Information

Assessor's Parcel Number: R000054264

Assessment Information

Assessed Value: $1650
Market Land Value: $1000
Market Improvement Value: $650
Total Market Value: $1650

3: Assessment Record for LIPSCOMB County, TX

Owner Information

Name: MI-TOY CORP
Name: WILLIAM & JANIS BANGS
Address: 2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640
County/FIPS: SEWARD

Property Information

Address: W IVANHOE
Data Source: B

Legal Information

Assessor's Parcel Number: R000054034
Recording Date: 02/01/2001

Assessment Information

Assessed Value: $24210
Market Land Value: $1110
Market Improvement Value: $23100
Total Market Value: $24210

4: Assessment Record for BEAVER County, OK

Owner Information

Name: BANGS, WILLIAM M & JANIS M
Address: RR 1 BOX 31 FORGAN, OK 73938-9719
County/FIPS: BEAVER

Property Information

Address: RR 1 BOX 31 FORGAN, OK 73938-9719
County/FIPS: BEAVER
Data Source: B

Legal Information

Assessor's Parcel Number: 0000-18-06N-23E-0-004-00
Recording Date: 08/23/2011
Book/Page: 1253/47

Sale Information

Sale Price: $58000

Assessment Information

Assessed Value: $9191
Market Land Value: $11250
Market Improvement Value: $59443
Total Market Value: $70693

5: Assessment Record for BEAVER County, OK

Owner Information

Name: BANGS, WILLIAM M & JANIS M
Address: PO BOX 1424 BEAVER, OK 73932-1424
County/FIPS: BEAVER

Property Information

Address: 5 DOUGLAS N BEAVER, OK 73932
County/FIPS: BEAVER
Data Source: B

Legal Information

Assessor's Parcel Number: 0005-00-061-008-0-000-00
Recording Date: 02/24/1995
Book/Page: 947/47

Sale Information

Sale Price: $111335

Assessment Information

Assessed Value: $8997
Market Land Value: $17500
Market Improvement Value: $51702
Total Market Value: $69202

6: Assessment Record for LIPSCOMB County, TX

Owner Information

Name: MI-TOY CORP
Name: WILLIAM & JANIS BANGS
Address: PO BOX 1424 BEAVER, OK 73932-1424
County/FIPS: BEAVER

Property Information

Data Source: B

Legal Information

Assessor's Parcel Number: P000057347

Assessment Information

Total Market Value: $21450

7: Assessment Record for LIPSCOMB County, TX

Owner Information

Name: MI-TOY CORP
Name: WILLIAM & JANIS BANGS
Address: PO BOX 1424 BEAVER, OK 73932-1424
County/FIPS: BEAVER

Property Information

Address: 110 E NAGEL FOLLETT, TX 79034
County/FIPS: LIPSCOMB
Data Source: B

Legal Information

Assessor's Parcel Number: R000054264

Assessment Information

Assessed Value: $3590
Market Land Value: $1000
Market Improvement Value: $2590
Total Market Value: $3590

8: Assessment Record for SEWARD County, KS

Owner Information

Name: BANGS, WILLIAM MICHAEL & JANIS MARIE
Address: 218 S CAIN AVE LIBERAL, KS 67901-3518
County/FIPS: SEWARD

Property Information

Address: 218 S CAIN AVE LIBERAL, KS 67901-3518
County/FIPS: SEWARD
Data Source: B

Legal Information

Assessor's Parcel Number: 193-05-0-20-14-012.00-0
Book/Page: 321/621

Assessment Information

Market Land Value: $8530
Market Improvement Value: $82884
Total Market Value: $91414

9: Assessment Record for STEVENS County, KS

Owner Information

Name: BANGS, JANIS MARIE
Address: PO BOX 1424 BEAVER, OK 73932-1424
County/FIPS: BEAVER

Property Information

Address: SW 32-34-35 HUGOTON, KS 67951
County/FIPS: STEVENS
Data Source: B

Legal Information

Assessor's Parcel Number: 209-32-0-00-00-003.00
Recording Date: 04/2008
Book/Page: 98PR/57

Sale Information

Sale Price: $85000

Assessment Information

Assessed Value: $831

Motor Vehicle Registrations - 4 records found

1: KS MVR

Registrant Information

Registrant 1

Registrant: BANGS, JANIS M
DOB: 9/1956
Address: 2330 SIERRA DR APT 102
LIBERAL, KS 67901-5640
SEWARD COUNTY

Registrant 2

Registrant: BANGS, MIKE
Address: 2330 SIERRA DR APT 102
LIBERAL, KS 67901-5640
SEWARD COUNTY

Registration Information

Original Registration Date: 3/26/2015
Registration Date: 3/27/2017
Registration Expiration Date: 3/31/2018

Vehicle Information

VIN: 1FAFP52U4WG259728
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1998
Make: Ford
Model: Taurus
Series: LX/SE/SPORT
Body Style: Sedan 4 Door

Plate Information

License Plate Type: Other
Previous Plate Number: 428FXZ
Previous Plate State: KS
License Plate Number: 428FXZ
Plate State: KS

Source Information

Data Source: GOVERNMENTAL

2: KS MVR

Vehicle Information

VIN: 1FAFP52U4WG259728
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1998
Make: Ford
Model: Taurus
Series: LX/SE/SPORT
Body Style: Sedan 4 Door

Owner Information

Owner 1

Name: BANGS, JANIS M
DOB: 9/1956
Address: 2330 SIERRA DR APT 102
LIBERAL, KS 67901-5640
SEWARD COUNTY

Owner 2

Name: BANGS, MIKE
Address: 2330 SIERRA DR APT 102
LIBERAL, KS 67901-5640
SEWARD COUNTY

Title Information

Title Number: AA6386216
Title Transfer Date: 3/27/2017
Title Issue Date: 3/27/2017

Source Information

Data Source: GOVERNMENTAL

3: KS MVR

Registrant Information

Registrant 1

Registrant: BANGS, JANIS
DOB: 9/1956
Address: 2330 SIERRA DR APT 102
LIBERAL, KS 67901-5640

SEWARD COUNTY

Registrant 2

Registrant: BANGS, MIKE
Address: 2330 SIERRA DR APT 102
LIBERAL, KS 67901-5640
SEWARD COUNTY

Registration Information

Original Registration Date: 3/26/2015
Registration Date: 3/27/2017
Registration Expiration Date: 3/31/2018

Vehicle Information

VIN: 1FAFP6638WK229944
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1998
Make: Ford
Model: Contour
Series: LX/SPORT/SE
Body Style: Sedan 4 Door

Plate Information

License Plate Type: Other
Previous Plate Number: 666FXX
Previous Plate State: KS
License Plate Number: 666FXX
Plate State: KS

Source Information

Data Source: GOVERNMENTAL

4: KS MVR

Vehicle Information

VIN: 1FAFP6638WK229944
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1998
Make: Ford
Model: Contour
Series: LX/SPORT/SE
Body Style: Sedan 4 Door

Owner Information

Owner 1

Name: BANGS, JANIS
DOB: 9/1956
Address: 2330 SIERRA DR APT 102
LIBERAL, KS 67901-5640
SEWARD COUNTY

Owner 2

Name: BANGS, MIKE
Address: 2330 SIERRA DR APT 102
LIBERAL, KS 67901-5640
SEWARD COUNTY

Title Information

Title Number: AA2052647
Title Transfer Date: 3/18/2014

Title Issue Date: 3/18/2014

Source Information

Data Source: GOVERNMENTAL

Boats - 0 records found

Aircraft - 0 records found

Bankruptcy Information - 1 records found

1: OKLAHOMA WESTERN - OKLAHOMA CITY

Petitioner Information

Petitioner 1

Name: BANGS, WILLIAM MICHAEL
Address: RR 1 BOX 31 FORGAN, OK 73938-9719
SSN:
Type: INDIVIDUAL - JOINT

Petitioner 2

Name: BANGS, JANIS MARIE
Address: RR 1 BOX 31 FORGAN, OK 73938-9719
SSN:
Type: INDIVIDUAL - JOINT

Bankruptcy Information

Case Number: 1213853
Court: OKLAHOMA WESTERN - OKLAHOMA CITY
Filing Date: 08/02/2012
Filing Type: CHAPTER 7
Meeting Date:
Meeting Time: 1030

Status Information

Status: CLOSED
Status: DISCHARGED
Status Date: 09/24/2014
Status Date: 03/01/2013

Trustee Information

Name: MANCHESTER, SUSAN J
Address: 1100 N SHARTEL AVE OKLAHOMA CITY, OK 73103-2602

Attorney Information

Attorney 1

Name:
TERRELL MONKS ATT AT LAW
Address: 1840 S DOUGLAS BLVD MIDWEST CITY, OK 73130-6224

Attorney 2

Name: MONKS, TERRELL
Address: 1840 S DOUGLAS BLVD MIDWEST CITY, OK 73130-6224

Judgments/Liens - 3 records found

1: KS Judgments and Liens Filings

Debtor Information

Debtor 1

Name: BANGS, JANIS M
SSN: 515-56-XXXX
Address: 2330 SIERRA DR APT 102
LIBERAL, KS 67901-5640
SEWARD COUNTY

Debtor 2

Name: BANGS, WILLIAM M
SSN: 513-52-XXXX
Address: 2330 SIERRA DR APT 102
LIBERAL, KS 67901-5640
SEWARD COUNTY

Creditor Information

Name: STATE OF KANSAS

Filing Information

Jurisdiction: KS
Amount: $15,683
Filing Date: 4/28/2015

Filing 1

Number: 15ST53
Type: STATE TAX WARRANT
Agency: SEWARD COUNTY DISTRICT COURT
Agency State: KS
Agency County: SEWARD

2: TX Judgments and Liens Filings

Debtor Information

Debtor 1

Name: BANGS, JANIS MARIE
SSN: 515-56-XXXX
Address: PO BOX 1424
BEAVER, OK 73932-1424
BEAVER COUNTY

Debtor 2

Name: BANGS, WILLIAM MICHAEL
SSN: 513-52-XXXX
Address: PO BOX 1424
BEAVER, OK 73932-1424
BEAVER COUNTY

Debtor 3

Company Name: JANIS MARIE BANGS AND WILLIAM MI
Address: PO BOX 1424
BEAVER, OK 73932-1424
BEAVER COUNTY

Creditor Information

Name: STATE OF TEXAS

Filing Information

Jurisdiction: TX
Amount: $11,534
Filing Date: 8/4/2011

Filing 1

Number: 32044450339261001
Type: STATE TAX LIEN
Agency: LIPSCOMB COUNTY CLERK-LIPSCOMB
Agency State: TX
Agency County: LIPSCOMB

3: KS Judgments and Liens Filings

Debtor Information

Debtor 1

Name: BANGS, JANIS
SSN: 515-56-XXXX
Address: 218 S CAIN AVE
LIBERAL, KS 67901-3518
SEWARD COUNTY

Debtor 2

Name: BANGS, WILLIAM M
SSN: 513-52-XXXX
Address: 218 S CAIN AVE
LIBERAL, KS 67901-3518
SEWARD COUNTY

Creditor Information

Name: IRS

Filing Information

Jurisdiction: KS
Amount: $21,794
Original Filing Number: BK481PG1072
Filing Date: 5/19/1997
Release Date: 8/13/1998

Filing 1

Number: BK496PG812
Type: FEDERAL TAX LIEN RELEASE
Book: 496
Page: 812
Agency: SEWARD COUNTY CLERK
Agency State: KS
Agency County: SEWARD

Filing 2

Number: BK481PG1072
Type: FEDERAL TAX LIEN
Book: 481
Page: 1072
Agency: SEWARD COUNTY CLERK
Agency State: KS
Agency County: SEWARD

UCC Liens - 7 records found

1:KS UCC LIEN FILING

Debtor Information

Debtor 1

Name: BANGS, JANIS M
SSN: 515-56-XXXX
Address: 23 N DOUGLAS
BEAVER, OK 73932

Debtor 2

Name: BANGS, WILLIAM M
SSN: 513-52-XXXX
Address: 23 N DOUGLAS
BEAVER, OK 73932

Secured Party Information

Name: BUSINESS LOAN CENTER INC

Address: 645 MADISON AVE FL 19
NEW YORK, NY 10022-1010

Filing Information

Filing Jurisdiction: KANSAS
Original Filing Number: 4408134
Original Filing Date: 2/5/2001
Type: INITIAL FILING
Pages: 4
Number: 4408134
Date: 2/5/2001
Expiration Date: 2/5/2006

Filing Office Information

Filing Agency: SECRETARY OF STATE/UCC DIVISION
Address: 301 SW 10TH AVE
TOPEKA, KS 66612

Collateral Information

Description: 02/05/2001 4408134 - ACCOUNTS RECEIVABLE INCLUDING PROCEEDS AND PRODUCTS;INVENTORY INCLUDING PROCEEDS AND PRODUCTS;GENERAL INTANGIBLE(S) INCLUDING PROCEEDS AND PRODUCTS;BUSINESS MACHINERY/EQUIPMENT INCLUDING PROCEEDS AND PRODUCTS;ACCOUNT(S) INCLUDING PROCEEDS AND PRODUCTS;VEHICLES INCLUDING PROCEEDS AND PRODUCTS;EQUIPMENT INCLUDING PROCEEDS AND PRODUCTS;FIXTURES INCLUDING PROCEEDS AND PRODUCTS;MACHINERY INCLUDING PROCEEDS AND PRODUCTS

2:OK UCC LIEN FILING

Debtor Information

Debtor 1

Name: BANGS, JANIS
SSN: 515-56-XXXX
Address: PO BOX 1411
BEAVER, OK 73932-1411

Debtor 2

Name: BANGS, WILLIAM MICHEAL
SSN: 513-52-XXXX
Address: 5 N DOUGLES
BEAVER, OK 73932

Debtor 3

Name: MI TOY CORP
Address: 5 N DOUGLES
BEAVER, OK 73932

Secured Party Information

Name: FUNDING FOR MERCHANT LLC
Address: 4053 MAPLE RD STE 199
AMHERST, NY 14226-1058

Filing Information

Filing Jurisdiction: OKLAHOMA
Original Filing Number: 11031420228590
Original Filing Date: 3/14/2011
Type: INITIAL FILING
Date: 3/14/2011

Number: 11031420228590

Filing Office Information

Filing Agency: OKLAHOMA CENTRAL FILING OFFICE/UCC DIVISION

Address: 3201 W PARK PL
OKLAHOMA CITY, OK 73107

Collateral Information

Description: 03/14/2011 11031420228590 - CONTRACT RIGHTS INCLUDING PROCEEDS AND PRODUCTS;CHATTEL PAPER INCLUDING PROCEEDS AND PRODUCTS;ACCOUNT(S) INCLUDING PROCEEDS AND PRODUCTS;GENERAL INTANGIBLE(S) INCLUDING PROCEEDS AND PRODUCTS

3:OK UCC LIEN FILING

Debtor Information

Debtor 1

Name: BANGS, JANIS

SSN: 515-56-XXXX

Address: PO BOX 1424
BEAVER, OK 73932-1424

Debtor 2

Name: TJS CONVENIENCE STORE

Address: PO BOX 1424
BEAVER, OK 73932-1424

Secured Party Information

Name: FIRST SECURITY BANK

Address: PO BOX 947
BEAVER, OK 73932-0947

Filing Information

Filing Jurisdiction: OKLAHOMA

Original Filing Number: 2005011909431

Original Filing Date: 9/28/2005

Type: INITIAL FILING

Date: 9/28/2005

Number: 2005011909431

Filing Office Information

Filing Agency: OKLAHOMA CENTRAL FILING OFFICE/UCC DIVISION

Address: 3201 W PARK PL
OKLAHOMA CITY, OK 73107

Collateral Information

Description: 09/28/2005 2005011909431 - FARM PRODUCTS/CROPS

4:OK UCC LIEN FILING

Debtor Information

Debtor 1

Name: BANGS, JANIS

SSN: 515-56-XXXX

Address: 23 N DOUGLAS
BEAVER, OK 73932

Debtor 2

Name: BANGS, JANIS M

SSN: 515-56-XXXX

Address: 23 N DOUGLAS
BEAVER, OK 73932

Debtor 3

Name: BANGS, WILLIAM
SSN: 513-52-XXXX
Address: 23 N DOUGLAS
BEAVER, OK 73932

Debtor 4

Name: BANGS, WILLIAM M
SSN: 513-52-XXXX
Address: 23 N DOUGLAS
BEAVER, OK 73932

Secured Party Information

Secured 1

Name: BUSINESS LOAN CENTER INC
Address: 645 MADISON AVE
NEW YORK, NY 10022-1010

Secured 2

Name: BUSINESS LOAN CENTER INC
Address: 645 MADISON AVE FL 19
NEW YORK, NY 10022-1010

Secured 3

Name: BUSINESS LOAN CENTER INC
Address: 1 INDEPENDENCE PT STE 102
GREENVILLE, SC 29615-4545

Filing Information

Filing Jurisdiction: OKLAHOMA
Original Filing Number: 0000694
Original Filing Date: 2/16/2001

Filing 1

Type: CONTINUATION
Date: 1/3/2011
Number: 11010320009400

Filing 2

Type: AMENDMENT
Date: 12/13/2005
Number: 2005014834633

Filing 3

Type: CONTINUATION
Date: 12/13/2005
Number: 2005014834532

Filing 4

Type: INITIAL FILING
Date: 2/16/2001
Number: 0000694

Filing Office Information

Filing Agency: OKLAHOMA CENTRAL FILING OFFICE/UCC DIVISION
Address: 3201 W PARK PL
OKLAHOMA CITY, OK 73107

Collateral Information

Collateral 1

Description: 12/13/2005 2005014834633 - EQUIPMENT LEASED;FIXTURES LEASED

Collateral 2

Description: 02/16/2001 0000694 - MACHINERY INCLUDING PROCEEDS AND PRODUCTS;EQUIPMENT INCLUDING PROCEEDS AND PRODUCTS;FIXTURES INCLUDING PROCEEDS AND PRODUCTS;ACCOUNT(S) INCLUDING PROCEEDS AND PRODUCTS;ACCOUNTS RECEIVABLE INCLUDING PROCEEDS AND PRODUCTS;INVENTORY INCLUDING PROCEEDS AND PRODUCTS;GENERAL INTANGIBLE(S) INCLUDING PROCEEDS AND PRODUCTS;BUSINESS MACHINERY/EQUIPMENT INCLUDING PROCEEDS AND PRODUCTS;VEHICLES INCLUDING PROCEEDS AND PRODUCTS

5:OK UCC LIEN FILING

Debtor Information

Debtor 1

Name: BANGS, JANIS M
SSN: 515-56-XXXX
Address: 23 N DOUGLAS
BEAVER, OK 73932

Debtor 2

Name: BANGS, WILLIAM M
SSN: 513-52-XXXX
Address: 23 N DOUGLAS
BEAVER, OK 73932

Secured Party Information

Secured 1

Name: BUSINESS LOAN CENTER INC
Address: 645 MADISON AVE FL 19
NEW YORK, NY 10022-1010

Secured 2

Name: BUSINESS LOAN CENTER INC
Address: 1 INDEPENDENCE PT STE 102
GREENVILLE, SC 29615-4545

Filing Information

Filing Jurisdiction: OKLAHOMA
Original Filing Number: N0000694
Original Filing Date: 2/16/2001

Filing 1

Type: AMENDMENT
Date: 12/13/2005
Number: 2005014834633

Filing 2

Type: CONTINUATION
Date: 12/13/2005
Number: 2005014834532

Filing 3

Type: INITIAL FILING
Date: 2/16/2001
Number: N0000694

Filing Office Information

Filing Agency: OKLAHOMA CENTRAL FILING OFFICE/UCC DIVISION
Address: 3201 W PARK PL
OKLAHOMA CITY, OK 73107

Collateral Information

Collateral 1

Description: 12/13/2005 2005014834633 - FIXTURES LEASED;EQUIPMENT LEASED

Collateral 2

Description: 02/16/2001 N0000694 - ACCOUNT(S) INCLUDING PROCEEDS AND PRODUCTS;ACCOUNTS RECEIVABLE INCLUDING PROCEEDS AND PRODUCTS;INVENTORY INCLUDING PROCEEDS AND PRODUCTS;GENERAL INTANGIBLE(S) INCLUDING PROCEEDS AND PRODUCTS;BUSINESS MACHINERY/EQUIPMENT INCLUDING PROCEEDS AND PRODUCTS;VEHICLES INCLUDING PROCEEDS AND PRODUCTS;MACHINERY INCLUDING PROCEEDS AND PRODUCTS;FIXTURES INCLUDING PROCEEDS AND PRODUCTS;EQUIPMENT INCLUDING PROCEEDS AND PRODUCTS

6:OK UCC LIEN FILING

Debtor Information

Debtor 1

Name: BANGS, JANIS MARIE
SSN: 515-56-XXXX
Address: 210 S CAIN AVE
LIBERAL, KS 67901-3518

Debtor 2

Name: BANGS, WILLIAM MICHAEL
SSN: 513-52-XXXX
Address: 210 S CAIN AVE
LIBERAL, KS 67901-3518

Secured Party Information

Secured 1

Name: MCFARLAND, JUSTINE
SSN: 442-70-XXXX
Address: PO BOX 1390
BEAVER, OK 73932-1390

Secured 2

Name: MCFARLAND, TIM D
SSN: 444-46-XXXX
Address: PO BOX 1390
BEAVER, OK 73932-1390

Filing Information

Filing Jurisdiction: OKLAHOMA
Original Filing Number: 0001899
Original Filing Date: 6/12/1995
Type: INITIAL FILING
Date: 6/12/1995
Number: 0001899

Filing Office Information

Filing Agency: OKLAHOMA CENTRAL FILING OFFICE/UCC DIVISION
Address: 3201 PARK AVE
OKLAHOMA CITY, OK 73119

7:OK UCC LIEN FILING

Debtor Information

Debtor 1

Name: BANGS, JANIS MARIE
SSN: 515-56-XXXX
Address: 210 S CAIN AVE

LIBERAL, KS 67901-3518

Debtor 2

Name: BANGS, WILLIAM MICHAEL
SSN: 513-52-XXXX
Address: 210 S CAIN AVE
LIBERAL, KS 67901-3518

Secured Party Information

Secured 1

Name: MCFARLAND, JUSTINE
SSN: 442-70-XXXX
Address: PO BOX 1390
BEAVER, OK 73932-1390

Secured 2

Name: MCFARLAND, TIM D
SSN: 444-46-XXXX
Address: PO BOX 1390
BEAVER, OK 73932-1390

Filing Information

Filing Jurisdiction: OKLAHOMA
Original Filing Number: N0001899
Original Filing Date: 6/12/1995
Type: INITIAL FILING
Date: 6/12/1995
Number: N0001899

Filing Office Information

Filing Agency: OKLAHOMA CENTRAL FILING OFFICE/UCC DIVISION
Address: 3201 PARK AVE
OKLAHOMA CITY, OK 73119

Fictitious Businesses - 0 records found

Notice Of Defaults - 0 records found

Potential Relatives - 6 records found

1st Degree: 5, 2nd Degree: 1

No.	Full Name	Address/Phone
1.	BANGS, WILLIAM MICHAEL • AKA BANGS, MIKE • AKA BANGS, WILLIAM K • AKA BANGS, MICHAEL W • AKA BAMAS, W M • AKA BANGS, W M • AKA BANG, WILLIAM M • AKA BANGS, WILLIAM L SSN:513-52-XXXX DOB:8/1949 (Age: 68)	RR 1 BOX 31 FORGAN, OK 73938-9719 PO BOX 1424 BEAVER, OK 73932-1424 2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640 5 N DOUGLAS BEAVER, OK 73932 (580) 625-2933 PO BOX 1411 BEAVER, OK 73932-1411
2.	BANGS, TROY SCOTT • AKA BAIER, TROY S	901 S GRANT AVE APT A LIBERAL, KS 67901-4539

	SSN:514-98-XXXX	2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640 PO BOX 31 FORGAN, OK 73938-0031 417 S PURDUE AVE LIBERAL, KS 67901-3546 PO BOX 1424 BEAVER, OK 73932-1424
3.	BANGS, MIKE	2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640
4.	BANGS, VICTORIA ZAMORA • AKA ZAMORA, VICTORIA • AKA ZAMORIA, VICTORIA • AKA ZAMORA, DEBANGS VICTORIA • AKA DEBANGS, VICTORIA ZAMORA • AKA DE, VICTORIA ZAMORA • AKA DE BANGS, VICTORIA Z • AKA DE BANGS, ZAMORA • AKA VICTORIA, ZAMORA DE	1209 N CARLTON AVE LIBERAL, KS 67901-2330 218 S CAIN AVE LIBERAL, KS 67901-3518
4.A.	ZAMORA, RAUL • AKA CAMARGO, RAUL ZAMORA • AKA ZAMORACAMARGO, RAUL • AKA ZAMORA CAMARGO, RAUL	2500 N WESTERN AVE LOT 148 LIBERAL, KS 67901-9765 2500 N WESTERN AVE LOT 97 LIBERAL, KS 67901-9764 2500 N WESTERN AVE LOT 14N LIBERAL, KS 67901-9763 2500 N WESTERN AVE LOT 14 LIBERAL, KS 67901-9763 218 S CAIN AVE LIBERAL, KS 67901-3518
5.	BANGS, WILLIAM MICHAEL • AKA BANGS, MICHAEL W • AKA BANGS, MIKE JR • AKA BANGS, WILLIMA M JR • AKA BANGS, WM M • AKA BANGS, WILLIAM MIKE JR • AKA DE BANGS, WILLIAM	1209 N CARLTON AVE LIBERAL, KS 67901-2330 218 S CAIN AVE LIBERAL, KS 67901-3518 PO BOX 1424 BEAVER, OK 73932-1424 PO BOX 1411 BEAVER, OK 73932-1411

Business Associates - 3 records found

1: GRANDPA'S QWIK STOP

Name: BANGS, JANIS

Status: ENTITY INACTIVE
State: TX
Corporation Number: 0013446906
Descriptive Status: ENTITY INACTIVE
Title: SECRETARY
Record Type: CURRENT
Record Date: 3/17/2017
Filing Date: 1/2/2001

2: MI-TOY CORP.

Name: BANGS, JANIS
Address: PO BOX 1411
BEAVER, OK 73932-1411
Status: FORFEITED EXISTENCE
State: TX
Corporation Number: 0013446906
Descriptive Status: FORFEITED EXISTENCE
Title: SECRETARY
Record Type: CURRENT
Record Date: 3/17/2017
Filing Date: 2/14/2003

3: MI-TOY CORP.

Name: BANGS, JANIS
Status: INACTIVE
State: TX
Corporation Number: 0013446906
Descriptive Status: INACTIVE
Title: SECRETARY
Record Type: CURRENT
Record Date: 3/17/2017
Filing Date: 9/11/2000

Person Associates - 1 records found

No.	Full Name	Address	SSN	Phone	DOB
1:	ZAMORA, RAUL CAMARGO, RAUL ZAMORA ZAMORACAMARGO, RAUL ZAMORA CAMARGO, RAUL	2500 N WESTERN AVE LOT 148 LIBERAL, KS 67901-9765 2500 N WESTERN AVE LOT 97 LIBERAL, KS 67901-9764 2500 N WESTERN AVE LOT 14N LIBERAL, KS 67901-9763 2500 N WESTERN AVE LOT 14 LIBERAL, KS 67901-9763 218 S CAIN AVE LIBERAL, KS 67901-3518	168-08-XXXX		5/1977

Neighbors - 10 records found

2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640

Name	Address	Phone
DODGE, JAMES CURTIS DODGE, JAMES K DODGE, NORMA JEAN	2321 SIERRA DR LIBERAL, KS 67901-5722	(620) 624-1977

CLINE, JOYCE LYNN LURCH, DEANNA GAIL MANCHESTER, J MANCHESTER, ROY A WILLIAMS, EVELYN T	2330 SIERRA DR APT 101 LIBERAL, KS 67901-5640	
CAIN, TRUTH LUVISA RIFE, JANE JANE SEABOLT, LEOLA R	2330 SIERRA DR APT 103 LIBERAL, KS 67901-5640	(620) 663-8850
JONES, JUDY D JONES, MARVIN WAYNEDBA SETH, ROBERT P SETH, RUTH M WILLIAMS, JESSIE L	2330 SIERRA DR APT 104 LIBERAL, KS 67901-5640	
KERTH, CHERYL LYNN OEHME, BARBARA ILENE	2330 SIERRA DR APT 105 LIBERAL, KS 67901-5640	
ARTURA, LINCOLN CRISWELL, LENNY GOWENS, JANICE A	2330 SIERRA DR APT 106 LIBERAL, KS 67901-5640	
WRISTON, LUELLA R	2330 SIERRA DR APT 107 LIBERAL, KS 67901-5640	(620) 624-6336
	2330 SIERRA DR APT 108 LIBERAL, KS 67901-5640	
COMBS, VENITA RUTH DURAN, LARINE MAY LUCERO, CATHERINE V	2330 SIERRA DR APT 109 LIBERAL, KS 67901-5640	
GRANGER, BENNY R WHITE, LLOYD E	2330 SIERRA DR APT 110 LIBERAL, KS 67901-5640	

Employment Locator - 2 records found

1:

Company Name: MI-TOY CORP.
Name: BANGS, JANIS
Title: SECRETARY
SSN: 515-56-XXXX
Confidence: Medium

2:

Company Name: MI-TOY CORP.
Name: BANGS, JANIS
Title: SECRETARY
Address: PO BOX 1411
BEAVER, OK 73932-1411
SSN: 515-56-XXXX
Phone: (580) 625-2298

Confidence: High

Criminal Filings - 0 records found
Cellular & Alternate Phones - 0 records found
Possible Education - 0 records found
Sources - 109 records found

All Sources	109 Source Document(s)
Bankruptcy Records	1 Source Document(s)
Corporate Affiliations	3 Source Document(s)
Deed Transfers	1 Source Document(s)
Driver Licenses	1 Source Document(s)
Email addresses	4 Source Document(s)
Historical Person Locator	8 Source Document(s)
Liens and Judgments	4 Source Document(s)
Motor Vehicle Registrations	5 Source Document(s)
Person Locator 1	3 Source Document(s)
Person Locator 2	4 Source Document(s)
Person Locator 5	14 Source Document(s)
Person Locator 6	10 Source Document(s)
Phone	2 Source Document(s)
Tax Assessor Records	40 Source Document(s)
UCC Lien Filings	7 Source Document(s)
Utility Locator	2 Source Document(s)

Key
High Risk Indicator. These symbols may prompt you to investigate further.
Moderate Risk Indicator. These symbols may prompt you to investigate further.
General Information Indicator. These symbols inform you that additional information is provided.
✓ The most recent telephone listing as reported by the EDA source.

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1 OF 1 RECORD(S)

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Date:12/5/2017
Report processed by:
Toeroek Associates Inc||

Full Name	Address	County	Phone
BANGS, WILLIAM M	RR 1 BOX 31 FORGAN, OK 73938-9719 BEAVER COUNTY	BEAVER	None Listed

ADDITIONAL PERSONAL INFORMATION

SSN	DOB	Gender	LexID(sm)
513-52-XXXX	8/1949 (Age:68)		000125450546

Subject Summary

Name Variations

1: BANG, WILLIAM M
2: BANGS, MICHAEL W
3: BANGS, MIKE
4: BANGS, WILLIAM
5: BANGS, WILLIAM K
6: BANGS, WILLIAM L
7: BANGS, WILLIAM M
8: BANGS, WILLIAM MICHAEL

SSNs Summary

No.	SSN	State Iss.	Date Iss.	Warnings
		Most frequent SSN attributed to subject:		
1:	513-52-XXXX	Kansas	1965-1966	

DOBs

Reported DOBs:
8/1949

Possible E-Mail Addresses

MIKEBANGS@AMERITECH.NET
BANGER200067901@HOTMAIL.COM

Others Using SSN - 0 records found

Address Summary - 15 records found

No.	Address
1:	RR 1 BOX 31 FORGAN, OK 73938-9719 BEAVER COUNTY
2:	PO BOX 1424 BEAVER, OK 73932-1424

BEAVER COUNTY

3: 2330 SIERRA DR APT 102
LIBERAL, KS 67901-5640
SEWARD COUNTY

4: 5 N DOUGLAS
BEAVER, OK 73932
BEAVER COUNTY

5: PO BOX 1411
BEAVER, OK 73932-1411
BEAVER COUNTY

6: 218 S CAIN AVE
LIBERAL, KS 67901-3518
SEWARD COUNTY

7: 2 N DOUGLES
BEAVER, OK 73932
BEAVER COUNTY

8: N DOUGLAS
FLORHAM PARK, NJ 07932
MORRIS COUNTY

9: N DOUGLAS
BEAVER, OK 73932
BEAVER COUNTY

10: 202 S BRUCE
FOLLETT, TX 79034
LIPSCOMB COUNTY

11: 23 N DOUGLAS AVE
BEAVER, OK 73932
BEAVER COUNTY

12: 515 W CENTRAL
LIBERAL, KS 67901
SEWARD COUNTY

13: MAIN DOUGLAS
BEAVER, OK 73932
BEAVER COUNTY

14: PO BOX 246
LIBERAL, KS 67905-0246
SEWARD COUNTY

15: PO BOX 31
FORGAN, OK 73938-0031

BEAVER COUNTY

Address Details

1: RR 1 BOX 31 FORGAN, OK 73938-9719

Address	Dates	Phone
RR 1 BOX 31 FORGAN, OK 73938-9719 BEAVER COUNTY	2/2001 - 11/2017	

Census Data for Geographical Region

Median Head of Household Age: 39
Median Income: $52,404
Median Home Value: $49,524
Median Education: 13 years

Household Members

BANGS, JANIS MARIE

Other Associates

None Listed

2: PO BOX 1424 BEAVER, OK 73932-1424

Address	Dates	Phone
PO BOX 1424 BEAVER, OK 73932-1424 BEAVER COUNTY	12/1989 - 11/2017	

Census Data for Geographical Region

Median Head of Household Age: 38
Median Income: $47,305
Median Home Value: $73,958
Median Education: 13 years

Household Members

BANGS, JANIS MARIE
BANGS, TROY SCOTT
BANGS, WILLIAM MICHAEL

Other Associates

None Listed

3: 2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640

Address	Dates	Phone
2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640 SEWARD COUNTY	2/2001 - 4/2016	

Census Data for Geographical Region

Median Head of Household Age: 35
Median Income: $53,165
Median Home Value: $119,136
Median Education: 12 years

Household Members

BANGS, JANIS MARIE
BANGS, MIKE
BANGS, TROY SCOTT

Other Associates

None Listed

4: 5 N DOUGLAS BEAVER, OK 73932

Address	Dates	Phone
5 N DOUGLAS BEAVER, OK 73932 BEAVER COUNTY	2/1995 - 9/2013	(580) 625-2933

Census Data for Geographical Region
Median Head of Household Age: 38
Median Income: $47,305
Median Home Value: $73,958
Median Education: 13 years
Household Members
BANGS, JANIS MARIE
Other Associates
None Listed

5: PO BOX 1411 BEAVER, OK 73932-1411

Address	Dates	Phone
PO BOX 1411 BEAVER, OK 73932-1411 BEAVER COUNTY	3/1995 - 9/2012	

Census Data for Geographical Region
Median Head of Household Age: 38
Median Income: $47,305
Median Home Value: $73,958
Median Education: 13 years
Household Members
BANGS, JANIS MARIE
BANGS, WILLIAM MICHAEL
Other Associates
None Listed

6: 218 S CAIN AVE LIBERAL, KS 67901-3518

Address	Dates	Phone
218 S CAIN AVE LIBERAL, KS 67901-3518 SEWARD COUNTY	10/1985 - 2012	(620) 624-2928

Census Data for Geographical Region
Median Head of Household Age: 28
Median Income: $40,156
Median Home Value: $55,089
Median Education: 10 years
Household Members
BANGS, VICTORIA ZAMORA
BANGS, WILLIAM MICHAEL
Other Associates
ZAMORA, RAUL

7: 2 N DOUGLES BEAVER, OK 73932

Address	Dates	Phone

2 N DOUGLES
BEAVER, OK 73932
BEAVER COUNTY

12/2010 - 6/2011

Census Data for Geographical Region
Median Head of Household Age: 38
Median Income: $47,305
Median Home Value: $73,958
Median Education: 13 years

Household Members
None Listed

Other Associates
None Listed

8: N DOUGLAS FLORHAM PARK, NJ 07932

Address	Dates	Phone
N DOUGLAS FLORHAM PARK, NJ 07932 MORRIS COUNTY	3/2011 - 4/2011	

Census Data for Geographical Region
Median Head of Household Age: 40
Median Income: $119,701
Median Home Value: $646,875
Median Education: 15 years

Household Members
None Listed

Other Associates
None Listed

9: N DOUGLAS BEAVER, OK 73932

Address	Dates	Phone
N DOUGLAS BEAVER, OK 73932 BEAVER COUNTY	3/2011 - 4/2011	

Census Data for Geographical Region
Median Head of Household Age: 38
Median Income: $47,305
Median Home Value: $73,958
Median Education: 13 years

Household Members
None Listed

Other Associates
None Listed

10: 202 S BRUCE FOLLETT, TX 79034

Address	Dates	Phone
202 S BRUCE FOLLETT, TX 79034 LIPSCOMB COUNTY	7/2009 - 7/2009	(806) 643-0140 (806) 643-0170

Census Data for Geographical Region
Median Head of Household Age: 46
Median Income: $54,167

Median Home Value: $63,000
Median Education: 13 years
Household Members
None Listed
Other Associates
None Listed

11: 23 N DOUGLAS AVE BEAVER, OK 73932

Address	Dates	Phone
23 N DOUGLAS AVE BEAVER, OK 73932 BEAVER COUNTY	7/1998 - 12/2006	

Census Data for Geographical Region
Median Head of Household Age: 38
Median Income: $47,305
Median Home Value: $73,958
Median Education: 13 years
Household Members
None Listed
Other Associates
None Listed

12: 515 W CENTRAL LIBERAL, KS 67901

Address	Dates	Phone
515 W CENTRAL LIBERAL, KS 67901 SEWARD COUNTY	4/2004 - 4/2004	

Census Data for Geographical Region
Median Head of Household Age: 35
Median Income: $34,222
Median Home Value: $67,923
Median Education: 12 years
Household Members
None Listed
Other Associates
None Listed

13: MAIN DOUGLAS BEAVER, OK 73932

Address	Dates	Phone
MAIN DOUGLAS BEAVER, OK 73932 BEAVER COUNTY	5/2003 - 5/2003	

Census Data for Geographical Region
Median Head of Household Age: 38
Median Income: $47,305
Median Home Value: $73,958
Median Education: 13 years
Household Members
None Listed
Other Associates
None Listed

14: PO BOX 246 LIBERAL, KS 67905-0246

Address	Dates	Phone

PO BOX 246
LIBERAL, KS 67905-0246
SEWARD COUNTY

Census Data for Geographical Region

Median Head of Household Age: 35
Median Income: $34,222
Median Home Value: $67,923
Median Education: 12 years

Household Members

None Listed

Other Associates

None Listed

15: PO BOX 31 FORGAN, OK 73938-0031

Address	Dates	Phone

PO BOX 31
FORGAN, OK 73938-0031
BEAVER COUNTY

Census Data for Geographical Region

Median Head of Household Age: 39
Median Income: $52,404
Median Home Value: $49,524
Median Education: 13 years

Household Members

BANGS, TROY SCOTT

Other Associates

None Listed

Voter Registrations - 3 records found

1: Oklahoma Voter Registration

Registrant Information

Name: BANGS, WILLIAM MICHAEL
Residential Address: 5 DOUGLAS AVE
BEAVER, OK 73932
BEAVER COUNTY
SSN: 513-52-XXXX
Date of Birth: 8/1949

Voter Information

Registration Date: 1/11/2008
Last Vote Date: 2/8/2011
Party Affiliation: DEMOCRAT
Active Status: ACTIVE

2: Oklahoma Voter Registration

Registrant Information

Name: BANGS, WILLIAM MICHAEL
Residential Address: 5 DOUGLAS
BEAVER, OK 73932

BEAVER COUNTY
SSN: 513-52-XXXX
Date of Birth: 8/1949
Age: 65+

Voter Information
Registration Date: 1/11/2008
Last Vote Date: 2/8/2011
Party Affiliation: DEMOCRAT
Active Status: INACTIVE

3: Oklahoma Voter Registration

Registrant Information
Name: BANGS, WILLIAM M
Residential Address: 5 DOUGLAS AVE
BEAVER, OK 73932
BEAVER COUNTY
SSN: 513-52-XXXX
Date of Birth: 8/1949
Gender: Male

Voter Information
Last Vote Date: 4/7/2009
Party Affiliation: DEMOCRAT

Driver Licenses - 1 records found

1: Kansas Driver License

Driver Information
Name: BANGS, WILLIAM M
Address: 218 S CAIN AVE
LIBERAL, KS 67901-3518
SEWARD COUNTY
Data source: Non-Governmental: KS

Personal Information
SSN: 513-52-XXXX
DOB: 08/1949

Additional Driver Information
DOB: 08/1949

Professional Licenses - 0 records found
Health Care Providers - 0 records found
Health Care Sanctions - 0 records found
Pilot Licenses - 0 records found
Sport Licenses - 0 records found
Real Property - 11 records found

1: Assessment Record for LIPSCOMB County, TX

Owner Information
Name: MI-TOY CORP
Name: WILLIAM & JANIS BANGS
Address: 2330 SIERRA DR LIBERAL, KS 67901-5639

County/FIPS: SEWARD

Property Information

Address: 290 IVANHOE

Data Source: B

Legal Information

Assessor's Parcel Number: R000054034

Recording Date: 02/01/2001

Assessment Information

Assessed Value: $16110

Market Land Value: $1110

Market Improvement Value: $15000

Total Market Value: $16110

2: Assessment Record for LIPSCOMB County, TX

Owner Information

Name: MI-TOY CORP

Name: WILLIAM & JANIS BANGS

Address: 2330 SIERRA DR LIBERAL, KS 67901-5639

County/FIPS: SEWARD

Property Information

Address: 110 S NAGEL ST FOLLETT, TX 79034-2123

County/FIPS: LIPSCOMB

Data Source: B

Legal Information

Assessor's Parcel Number: R000054264

Assessment Information

Assessed Value: $1650

Market Land Value: $1000

Market Improvement Value: $650

Total Market Value: $1650

3: Assessment Record for BEAVER County, OK

Owner Information

Name: BANGS, WILLIAM M & JANIS M

Address: RR 1 BOX 31 FORGAN, OK 73938-9719

County/FIPS: BEAVER

Property Information

Address: RR 1 BOX 31 FORGAN, OK 73938-9719

County/FIPS: BEAVER

Data Source: B

Legal Information

Assessor's Parcel Number: 0000-18-06N-23E-0-004-00

Recording Date: 08/23/2011

Book/Page: 1253/47

Sale Information

Sale Price: $58000

Assessment Information

Assessed Value: $9191
Market Land Value: $11250
Market Improvement Value: $59443
Total Market Value: $70693

4: Assessment Record for HUTCHINSON County, TX

Owner Information
Name: BANGS WILLIAM
Address: 218 S CAIN AVE LIBERAL, KS 67901-3518
County/FIPS: SEWARD

Property Information
Address: YUCCA LN FRITCH, TX 79036
County/FIPS: HUTCHINSON
Data Source: B

Legal Information
Assessor's Parcel Number: 6605

Assessment Information
Assessed Value: $210
Market Land Value: $210
Total Market Value: $210

5: Assessment Record for SAN JUAN County, CO

Owner Information
Name: BANGS WILLIAM M & WILLIAM L
Address: PO BOX 1424 BEAVER, OK 73932-1424
County/FIPS: BEAVER

Property Information
Address: EUREKA MNG DISTRICT
Data Source: B

Legal Information
Assessor's Parcel Number: 47730300050009
Recording Date: 12/07/1989

Assessment Information
Assessed Value: $3424
Market Land Value: $11804
Total Market Value: $11804

6: Assessment Record for SAN JUAN County, CO

Owner Information
Name: BANGS WILLIAM M
Address: PO BOX 1424 BEAVER, OK 73932-1424
County/FIPS: BEAVER

Property Information
Address: EUREKA MNG DISTRICT
Data Source: B

Legal Information
Assessor's Parcel Number: 47750210050021

Recording Date: 05/31/1994

Assessment Information

Assessed Value: $8978
Market Land Value: $30959
Total Market Value: $30959

7: Assessment Record for SAN JUAN County, CO

Owner Information

Name: BANGS WILLIAM M
Address: PO BOX 1424 BEAVER, OK 73932-1424
County/FIPS: BEAVER

Property Information

Address: EUREKA MNG DISTRICT
Data Source: B

Legal Information

Assessor's Parcel Number: 47750160050002
Recording Date: 12/07/1989

Assessment Information

Assessed Value: $1455
Market Land Value: $5022
Total Market Value: $5022

8: Assessment Record for SAN JUAN County, CO

Owner Information

Name: BANGS WILLIAM M
Address: PO BOX 1424 BEAVER, OK 73932-1424
County/FIPS: BEAVER

Property Information

Address: EUREKA MNG DISTRICT
Data Source: B

Legal Information

Assessor's Parcel Number: 47750280050002
Recording Date: 05/31/1994

Assessment Information

Assessed Value: $3368
Market Land Value: $11614
Total Market Value: $11614

9: Assessment Record for BEAVER County, OK

Owner Information

Name: BANGS, WILLIAM M & JANIS M
Address: PO BOX 1424 BEAVER, OK 73932-1424
County/FIPS: BEAVER

Property Information

Address: 5 DOUGLAS N BEAVER, OK 73932
County/FIPS: BEAVER
Data Source: B

Legal Information

Assessor's Parcel Number: 0005-00-061-008-0-000-00
Recording Date: 02/24/1995
Book/Page: 947/47

Sale Information

Sale Price: $111335

Assessment Information

Assessed Value: $8997
Market Land Value: $17500
Market Improvement Value: $51702
Total Market Value: $69202

10: Assessment Record for LIPSCOMB County, TX

Owner Information

Name: MI-TOY CORP
Name: WILLIAM & JANIS BANGS
Address: PO BOX 1424 BEAVER, OK 73932-1424
County/FIPS: BEAVER

Property Information

Data Source: B

Legal Information

Assessor's Parcel Number: P000057347

Assessment Information

Total Market Value: $21450

11: Assessment Record for SEWARD County, KS

Owner Information

Name: BANGS, WILLIAM MICHAEL & JANIS MARIE
Address: 218 S CAIN AVE LIBERAL, KS 67901-3518
County/FIPS: SEWARD

Property Information

Address: 218 S CAIN AVE LIBERAL, KS 67901-3518
County/FIPS: SEWARD
Data Source: B

Legal Information

Assessor's Parcel Number: 193-05-0-20-14-012.00-0
Book/Page: 321/621

Assessment Information

Market Land Value: $8530
Market Improvement Value: $82884
Total Market Value: $91414

Motor Vehicle Registrations - 1 records found

1: Non-Governmental Vehicle Record

Vehicle Information

VIN: KL1TG5DE9AB048458
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2010

Make: Chevrolet
Model: Aveo
Series: LT
Body Style: Sedan 4 Door

Owner Information

Name: BANGS, MIKE
DOB: 8/1949
Address: PO BOX 1411
BEAVER, OK 73932-1411
BEAVER COUNTY
Source Date First Seen: 11/19/2013
Source Date Last Seen: 4/6/2016

Source Information

Data Source: NON-GOVERNMENTAL

Boats - 0 records found

Aircraft - 0 records found

Bankruptcy Information - 1 records found

1: OKLAHOMA WESTERN - OKLAHOMA CITY

Petitioner Information

Petitioner 1

Name: BANGS, WILLIAM MICHAEL
Address: RR 1 BOX 31 FORGAN, OK 73938-9719
SSN:
Type: INDIVIDUAL - JOINT

Petitioner 2

Name: BANGS, JANIS MARIE
Address: RR 1 BOX 31 FORGAN, OK 73938-9719
SSN:
Type: INDIVIDUAL - JOINT

Bankruptcy Information

Case Number: 1213853
Court: OKLAHOMA WESTERN - OKLAHOMA CITY
Filing Date: 08/02/2012
Filing Type: CHAPTER 7
Meeting Date:
Meeting Time: 1030

Status Information

Status: CLOSED
Status: DISCHARGED
Status Date: 09/24/2014
Status Date: 03/01/2013

Trustee Information

Name: MANCHESTER, SUSAN J
Address: 1100 N SHARTEL AVE OKLAHOMA CITY, OK 73103-2602

Attorney Information

Attorney 1

Name:
TERRELL MONKS ATT AT LAW
Address: 1840 S DOUGLAS BLVD MIDWEST CITY, OK 73130-6224

Attorney 2

Name: MONKS, TERRELL
Address: 1840 S DOUGLAS BLVD MIDWEST CITY, OK 73130-6224

Judgments/Liens - 5 records found

1: KS Judgments and Liens Filings

Debtor Information

Debtor 1

Name: BANGS, WILLIAM M
SSN: 513-52-XXXX
Address: 2330 SIERRA DR APT 102
LIBERAL, KS 67901-5640
SEWARD COUNTY

Debtor 2

Name: BANGS, JANIS M
SSN: 515-56-XXXX
Address: 2330 SIERRA DR APT 102
LIBERAL, KS 67901-5640
SEWARD COUNTY

Creditor Information

Name: STATE OF KANSAS

Filing Information

Jurisdiction: KS
Amount: $15,683
Filing Date: 4/28/2015

Filing 1

Number: 15ST53
Type: STATE TAX WARRANT
Agency: SEWARD COUNTY DISTRICT COURT
Agency State: KS
Agency County: SEWARD

2: OK Judgments and Liens Filings

Debtor Information

Name: BANGS, WILLIAM M
SSN: 513-52-XXXX
Address: RR 1 BOX 31
FORGAN, OK 73938-9719
BEAVER COUNTY

Creditor Information

Name: STATE OF OKLAHOMA

Filing Information

Jurisdiction: OK
Amount: $394
Filing Date: 7/17/2014

Filing 1

Number: ITI1462000200
Type: STATE TAX WARRANT
Agency: BEAVER COUNTY CLERK
Agency State: OK
Agency County: BEAVER

3: TX Judgments and Liens Filings

Debtor Information

Debtor 1

Name: BANGS, WILLIAM MICHAEL
SSN: 513-52-XXXX
Address: PO BOX 1424
BEAVER, OK 73932-1424
BEAVER COUNTY

Debtor 2

Name: BANGS, JANIS MARIE
SSN: 515-56-XXXX
Address: PO BOX 1424
BEAVER, OK 73932-1424
BEAVER COUNTY

Debtor 3

Company Name: JANIS MARIE BANGS AND WILLIAM MI
Address: PO BOX 1424
BEAVER, OK 73932-1424
BEAVER COUNTY

Creditor Information

Name: STATE OF TEXAS

Filing Information

Jurisdiction: TX
Amount: $11,534
Filing Date: 8/4/2011

Filing 1

Number: 32044450339261001
Type: STATE TAX LIEN
Agency: LIPSCOMB COUNTY CLERK-LIPSCOMB
Agency State: TX
Agency County: LIPSCOMB

4: OK Judgments and Liens Filings

Debtor Information

Name: BANGS, WILLIAM M
SSN: 513-52-XXXX
Address: 218 S CAIN AVE
LIBERAL, KS 67901-3518
SEWARD COUNTY

Creditor Information

Name: STATE OF OKLAHOMA

Filing Information

Jurisdiction: OK
Amount: $89,389
Original Filing Number: STS1051147901
Filing Date: 3/22/2010
Release Date: 4/20/2010

Filing 1

Number: STS1051147901
Type: STATE TAX WARRANT
Agency: OKLAHOMA COUNTY CLERK
Agency State: OK

Agency County: OKLAHOMA

Filing 2

Number: STS1051147901
Type: STATE TAX WARRANT RELEASE
Agency: OKLAHOMA COUNTY CLERK
Agency State: OK
Agency County: OKLAHOMA

5: KS Judgments and Liens Filings

Debtor Information

Debtor 1

Name: BANGS, WILLIAM M
SSN: 513-52-XXXX
Address: 218 S CAIN AVE
LIBERAL, KS 67901-3518
SEWARD COUNTY

Debtor 2

Name: BANGS, JANIS
SSN: 515-56-XXXX
Address: 218 S CAIN AVE
LIBERAL, KS 67901-3518
SEWARD COUNTY

Creditor Information

Name: IRS

Filing Information

Jurisdiction: KS
Amount: $21,794
Original Filing Number: BK481PG1072
Filing Date: 5/19/1997
Release Date: 8/13/1998

Filing 1

Number: BK496PG812
Type: FEDERAL TAX LIEN RELEASE
Book: 496
Page: 812
Agency: SEWARD COUNTY CLERK
Agency State: KS
Agency County: SEWARD

Filing 2

Number: BK481PG1072
Type: FEDERAL TAX LIEN
Book: 481
Page: 1072
Agency: SEWARD COUNTY CLERK
Agency State: KS
Agency County: SEWARD

UCC Liens - 6 records found

1:KS UCC LIEN FILING

Debtor Information

Debtor 1

Name: BANGS, WILLIAM M

SSN: 513-52-XXXX
Address: 23 N DOUGLAS
BEAVER, OK 73932

Debtor 2

Name: BANGS, JANIS M
SSN: 515-56-XXXX
Address: 23 N DOUGLAS
BEAVER, OK 73932

Secured Party Information

Name: BUSINESS LOAN CENTER INC
Address: 645 MADISON AVE FL 19
NEW YORK, NY 10022-1010

Filing Information

Filing Jurisdiction: KANSAS
Original Filing Number: 4408134
Original Filing Date: 2/5/2001
Type: INITIAL FILING
Pages: 4
Number: 4408134
Date: 2/5/2001
Expiration Date: 2/5/2006

Filing Office Information

Filing Agency: SECRETARY OF STATE/UCC DIVISION
Address: 301 SW 10TH AVE
TOPEKA, KS 66612

Collateral Information

Description: 02/05/2001 4408134 - ACCOUNTS RECEIVABLE INCLUDING PROCEEDS AND PRODUCTS;INVENTORY INCLUDING PROCEEDS AND PRODUCTS;GENERAL INTANGIBLE(S) INCLUDING PROCEEDS AND PRODUCTS;BUSINESS MACHINERY/EQUIPMENT INCLUDING PROCEEDS AND PRODUCTS;ACCOUNT(S) INCLUDING PROCEEDS AND PRODUCTS;VEHICLES INCLUDING PROCEEDS AND PRODUCTS;EQUIPMENT INCLUDING PROCEEDS AND PRODUCTS;FIXTURES INCLUDING PROCEEDS AND PRODUCTS;MACHINERY INCLUDING PROCEEDS AND PRODUCTS

2:OK UCC LIEN FILING

Debtor Information

Debtor 1

Name: BANGS, WILLIAM MICHEAL
SSN: 513-52-XXXX
Address: 5 N DOUGLES
BEAVER, OK 73932

Debtor 2

Name: BANGS, JANIS
SSN: 515-56-XXXX
Address: PO BOX 1411
BEAVER, OK 73932-1411

Debtor 3

Name: MI TOY CORP
Address: 5 N DOUGLES
BEAVER, OK 73932

Secured Party Information

Name: FUNDING FOR MERCHANT LLC

Address: 4053 MAPLE RD STE 199
AMHERST, NY 14226-1058

Filing Information

Filing Jurisdiction: OKLAHOMA

Original Filing Number: 11031420228590

Original Filing Date: 3/14/2011

Type: INITIAL FILING

Date: 3/14/2011

Number: 11031420228590

Filing Office Information

Filing Agency: OKLAHOMA CENTRAL FILING OFFICE/UCC DIVISION

Address: 3201 W PARK PL
OKLAHOMA CITY, OK 73107

Collateral Information

Description: 03/14/2011 11031420228590 - CONTRACT RIGHTS INCLUDING PROCEEDS AND PRODUCTS;CHATTEL PAPER INCLUDING PROCEEDS AND PRODUCTS;ACCOUNT(S) INCLUDING PROCEEDS AND PRODUCTS;GENERAL INTANGIBLE(S) INCLUDING PROCEEDS AND PRODUCTS

3:OK UCC LIEN FILING

Debtor Information

Debtor 1

Name: BANGS, WILLIAM

SSN: 513-52-XXXX

Address: 23 N DOUGLAS
BEAVER, OK 73932

Debtor 2

Name: BANGS, WILLIAM M

SSN: 513-52-XXXX

Address: 23 N DOUGLAS
BEAVER, OK 73932

Debtor 3

Name: BANGS, JANIS

SSN: 515-56-XXXX

Address: 23 N DOUGLAS
BEAVER, OK 73932

Debtor 4

Name: BANGS, JANIS M

SSN: 515-56-XXXX

Address: 23 N DOUGLAS
BEAVER, OK 73932

Secured Party Information

Secured 1

Name: BUSINESS LOAN CENTER INC

Address: 645 MADISON AVE
NEW YORK, NY 10022-1010

Secured 2

Name: BUSINESS LOAN CENTER INC

Address: 645 MADISON AVE FL 19
NEW YORK, NY 10022-1010

Secured 3

Name: BUSINESS LOAN CENTER INC

Address: 1 INDEPENDENCE PT STE 102
GREENVILLE, SC 29615-4545

Filing Information

Filing Jurisdiction: OKLAHOMA
Original Filing Number: 0000694
Original Filing Date: 2/16/2001

Filing 1

Type: CONTINUATION
Date: 1/3/2011
Number: 11010320009400

Filing 2

Type: AMENDMENT
Date: 12/13/2005
Number: 2005014834633

Filing 3

Type: CONTINUATION
Date: 12/13/2005
Number: 2005014834532

Filing 4

Type: INITIAL FILING
Date: 2/16/2001
Number: 0000694

Filing Office Information

Filing Agency: OKLAHOMA CENTRAL FILING OFFICE/UCC DIVISION
Address: 3201 W PARK PL
OKLAHOMA CITY, OK 73107

Collateral Information

Collateral 1

Description: 12/13/2005 2005014834633 - EQUIPMENT LEASED;FIXTURES LEASED

Collateral 2

Description: 02/16/2001 0000694 - MACHINERY INCLUDING PROCEEDS AND PRODUCTS;EQUIPMENT INCLUDING PROCEEDS AND PRODUCTS;FIXTURES INCLUDING PROCEEDS AND PRODUCTS;ACCOUNT(S) INCLUDING PROCEEDS AND PRODUCTS;ACCOUNTS RECEIVABLE INCLUDING PROCEEDS AND PRODUCTS;INVENTORY INCLUDING PROCEEDS AND PRODUCTS;GENERAL INTANGIBLE(S) INCLUDING PROCEEDS AND PRODUCTS;BUSINESS MACHINERY/EQUIPMENT INCLUDING PROCEEDS AND PRODUCTS;VEHICLES INCLUDING PROCEEDS AND PRODUCTS

4:OK UCC LIEN FILING

Debtor Information

Debtor 1

Name: BANGS, WILLIAM M
SSN: 513-52-XXXX
Address: 23 N DOUGLAS
BEAVER, OK 73932

Debtor 2

Name: BANGS, JANIS M
SSN: 515-56-XXXX
Address: 23 N DOUGLAS

BEAVER, OK 73932

Secured Party Information

Secured 1

Name: BUSINESS LOAN CENTER INC

Address: 645 MADISON AVE FL 19
NEW YORK, NY 10022-1010

Secured 2

Name: BUSINESS LOAN CENTER INC

Address: 1 INDEPENDENCE PT STE 102
GREENVILLE, SC 29615-4545

Filing Information

Filing Jurisdiction: OKLAHOMA

Original Filing Number: N0000694

Original Filing Date: 2/16/2001

Filing 1

Type: AMENDMENT

Date: 12/13/2005

Number: 2005014834633

Filing 2

Type: CONTINUATION

Date: 12/13/2005

Number: 2005014834532

Filing 3

Type: INITIAL FILING

Date: 2/16/2001

Number: N0000694

Filing Office Information

Filing Agency: OKLAHOMA CENTRAL FILING OFFICE/UCC DIVISION

Address: 3201 W PARK PL
OKLAHOMA CITY, OK 73107

Collateral Information

Collateral 1

Description: 12/13/2005 2005014834633 - FIXTURES LEASED;EQUIPMENT LEASED

Collateral 2

Description: 02/16/2001 N0000694 - ACCOUNT(S) INCLUDING PROCEEDS AND PRODUCTS;ACCOUNTS RECEIVABLE INCLUDING PROCEEDS AND PRODUCTS;INVENTORY INCLUDING PROCEEDS AND PRODUCTS;GENERAL INTANGIBLE(S) INCLUDING PROCEEDS AND PRODUCTS;BUSINESS MACHINERY/EQUIPMENT INCLUDING PROCEEDS AND PRODUCTS;VEHICLES INCLUDING PROCEEDS AND PRODUCTS;MACHINERY INCLUDING PROCEEDS AND PRODUCTS;FIXTURES INCLUDING PROCEEDS AND PRODUCTS;EQUIPMENT INCLUDING PROCEEDS AND PRODUCTS

5:OK UCC LIEN FILING

Debtor Information

Debtor 1

Name: BANGS, WILLIAM MICHAEL

SSN: 513-52-XXXX

Address: 210 S CAIN AVE
LIBERAL, KS 67901-3518

Debtor 2

Name: BANGS, JANIS MARIE

SSN: 515-56-XXXX
Address: 210 S CAIN AVE
LIBERAL, KS 67901-3518

Secured Party Information

Secured 1

Name: MCFARLAND, JUSTINE
SSN: 442-70-XXXX
Address: PO BOX 1390
BEAVER, OK 73932-1390

Secured 2

Name: MCFARLAND, TIM D
SSN: 444-46-XXXX
Address: PO BOX 1390
BEAVER, OK 73932-1390

Filing Information

Filing Jurisdiction: OKLAHOMA
Original Filing Number: 0001899
Original Filing Date: 6/12/1995
Type: INITIAL FILING
Date: 6/12/1995
Number: 0001899

Filing Office Information

Filing Agency: OKLAHOMA CENTRAL FILING OFFICE/UCC DIVISION
Address: 3201 PARK AVE
OKLAHOMA CITY, OK 73119

6:OK UCC LIEN FILING

Debtor Information

Debtor 1

Name: BANGS, WILLIAM MICHAEL
SSN: 513-52-XXXX
Address: 210 S CAIN AVE
LIBERAL, KS 67901-3518

Debtor 2

Name: BANGS, JANIS MARIE
SSN: 515-56-XXXX
Address: 210 S CAIN AVE
LIBERAL, KS 67901-3518

Secured Party Information

Secured 1

Name: MCFARLAND, JUSTINE
SSN: 442-70-XXXX
Address: PO BOX 1390
BEAVER, OK 73932-1390

Secured 2

Name: MCFARLAND, TIM D
SSN: 444-46-XXXX
Address: PO BOX 1390
BEAVER, OK 73932-1390

Filing Information

Filing Jurisdiction: OKLAHOMA
Original Filing Number: N0001899

Original Filing Date: 6/12/1995
Type: INITIAL FILING
Date: 6/12/1995
Number: N0001899

Filing Office Information

Filing Agency: OKLAHOMA CENTRAL FILING OFFICE/UCC DIVISION
Address: 3201 PARK AVE
OKLAHOMA CITY, OK 73119

Fictitious Businesses - 0 records found

Notice Of Defaults - 0 records found

Potential Relatives - 6 records found

1st Degree: 5, 2nd Degree: 1

No.	Full Name	Address/Phone
1.	BANGS, JANIS MARIE • AKA BANGS, JANICE MARIE • AKA BARGS, JANIS SSN:515-56-XXXX DOB:9/1956 (Age: 61)	2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640 PO BOX 1424 BEAVER, OK 73932-1424 5 N DOUGLAS BEAVER, OK 73932 (580) 625-2933 RR 1 BOX 31 FORGAN, OK 73938-9719 PO BOX 1411 BEAVER, OK 73932-1411
2.	BANGS, TROY SCOTT • AKA BAIER, TROY S SSN:514-98-XXXX	901 S GRANT AVE APT A LIBERAL, KS 67901-4539 2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640 PO BOX 31 FORGAN, OK 73938-0031 417 S PURDUE AVE LIBERAL, KS 67901-3546 PO BOX 1424 BEAVER, OK 73932-1424
3.	BANGS, MIKE	2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640
4.	BANGS, VICTORIA ZAMORA • AKA ZAMORA, VICTORIA • AKA ZAMORIA, VICTORIA • AKA ZAMORA, DEBANGS VICTORIA • AKA DEBANGS, VICTORIA ZAMORA	1209 N CARLTON AVE LIBERAL, KS 67901-2330 218 S CAIN AVE LIBERAL, KS 67901-3518

• AKA DE, VICTORIA ZAMORA
• AKA DE BANGS, VICTORIA Z
• AKA DE BANGS, ZAMORA
• AKA VICTORIA, ZAMORA DE

4.A. ZAMORA, RAUL

• AKA CAMARGO, RAUL ZAMORA
• AKA ZAMORACAMARGO, RAUL
• AKA ZAMORA CAMARGO, RAUL

2500 N WESTERN AVE LOT 148
LIBERAL, KS 67901-9765

2500 N WESTERN AVE LOT 97
LIBERAL, KS 67901-9764

2500 N WESTERN AVE LOT 14N
LIBERAL, KS 67901-9763

2500 N WESTERN AVE LOT 14
LIBERAL, KS 67901-9763

218 S CAIN AVE
LIBERAL, KS 67901-3518

5. BANGS, WILLIAM MICHAEL

• AKA BANGS, MICHAEL W
• AKA BANGS, MIKE JR
• AKA BANGS, WILLIMA M JR
• AKA BANGS, WM M
• AKA BANGS, WILLIAM MIKE JR
• AKA DE BANGS, WILLIAM

1209 N CARLTON AVE
LIBERAL, KS 67901-2330

218 S CAIN AVE
LIBERAL, KS 67901-3518

PO BOX 1424
BEAVER, OK 73932-1424

PO BOX 1411
BEAVER, OK 73932-1411

Business Associates - 3 records found

1: GRANDPA'S QWIK STOP

Name: BANGS, WILLIAM M
Status: ENTITY INACTIVE
State: TX
Corporation Number: 0013446906
Descriptive Status: ENTITY INACTIVE
Title: PRESIDENT
Record Type: CURRENT
Record Date: 3/17/2017
Filing Date: 1/2/2001

2: MI-TOY CORP.

Name: BANGS, WILLIAM M
Address: PO BOX 1411
BEAVER, OK 73932-1411
Status: FORFEITED EXISTENCE
State: TX
Corporation Number: 0013446906
Descriptive Status: FORFEITED EXISTENCE
Title: PRESIDENT
Record Type: CURRENT
Record Date: 3/17/2017

Filing Date: 2/14/2003

3: MI-TOY CORP.

Name: BANGS, WILLIAM M
Status: INACTIVE
State: TX
Corporation Number: 0013446906
Descriptive Status: INACTIVE
Title: PRESIDENT
Record Type: CURRENT
Record Date: 3/17/2017
Filing Date: 9/11/2000

Person Associates - 1 records found

No.	Full Name	Address	SSN	Phone	DOB
1:	ZAMORA, RAUL CAMARGO, RAUL ZAMORA ZAMORACAMARGO, RAUL ZAMORA CAMARGO, RAUL	2500 N WESTERN AVE LOT 148 LIBERAL, KS 67901-9765 2500 N WESTERN AVE LOT 97 LIBERAL, KS 67901-9764 2500 N WESTERN AVE LOT 14N LIBERAL, KS 67901-9763 2500 N WESTERN AVE LOT 14 LIBERAL, KS 67901-9763 218 S CAIN AVE LIBERAL, KS 67901-3518	168-08-XXXX		5/1977

Neighbors - 7 records found

RR 1 BOX 31 FORGAN, OK 73938-9719

Name	Address	Phone
HARRIS, ALVIN EUGENE HARRIS, DAYLE S	RR 1 BOX 27 FORGAN, OK 73938-9719	
DENHAM, SHARON KAY	RR 1 BOX 28 FORGAN, OK 73938-9719	
HODGES, ESTELLA HODGES, ESTELLA L HODGES, LARRY T HODGES, LARRY	RR 1 BOX 3 FORGAN, OK 73938-9702	
BRYER, CAROL	RR 1 BOX 30B FORGAN, OK 73938-9719	
GRACE, TOM W	RR 1 BOX 32 FORGAN, OK 73938-9723	
ROBERTSON, STEPHANIE M TAYLOR, STEPHANIE TAYLOR, TRENT APRIL	RR 1 BOX 34 FORGAN, OK 73938-9723	
TAYLOR, WES	RR 1 BOX 35 FORGAN, OK 73938-9723	

Employment Locator - 15 records found

1:

Company Name: MI-TOY CORP.
Name: BANGS, WILLIAM M
Title: PRESIDENT
SSN: 513-52-XXXX
Confidence: Medium

2:

Company Name: T J'S TOTAL CONVENIENCE
Name: BANGS, MIKE
Title: MANAGER
Address: 23 N DOUGLAS
BEAVER, OK 73932
SSN: 513-52-XXXX
Phone: (580) 625-2298
Confidence: High

3:

Company Name: T J'S TOTAL CONVENIENCE
Name: BANGS, MIKE
Title: MANAGER
Address: 23 N DOUGLAS
BEAVER, OK 73932
SSN: 513-52-XXXX
Phone: (580) 625-2298
Confidence: High

4:

Company Name: T J'S TOTAL CONVENIENCE
Name: BANGS, MIKE
Title: MANAGER
Address: PO BOX 1411
BEAVER, OK 73932-1411
SSN: 513-52-XXXX
Phone: (580) 625-2298
Confidence: High

5:

Company Name: T J'S TOTAL CONVENIENCE
Name: BANGS, MIKE
Title: MANAGER
Address: PO BOX 1411
BEAVER, OK 73932-1411
SSN: 513-52-XXXX
Phone: (580) 625-2298
Confidence: High

6:

Company Name: MI-TOY CORP.
Name: BANGS, WILLIAM M
Title: PRESIDENT
Address: PO BOX 1411
BEAVER, OK 73932-1411
SSN: 513-52-XXXX

Phone: (580) 625-2298
Confidence: High

7:

Company Name: T J'S CONVENIENCE STORE
Name: BANGS, MIKE
Title: OWNER
Address: PO BOX 1411
BEAVER, OK 73932-1411
SSN: 513-52-XXXX
Phone: (580) 625-3120
Confidence: High

8:

Company Name: T J'S CONVENIENCE STORE
Name: BANGS, MIKE
Title: OWNER
Address: PO BOX 1411
BEAVER, OK 73932-1411
SSN: 513-52-XXXX
Phone: (580) 625-3120
Confidence: High

9:

Company Name: T J'S CONVENIENCE STORE
Name: BANGS, MIKE
Title: OWNER
Address: 23 N DOUGLAS AVE
BEAVER, OK 73932
SSN: 513-52-XXXX
Phone: (580) 625-3120
Confidence: High

10:

Company Name: T J'S CONVENIENCE STORE
Name: BANGS, MIKE
Title: OWNER
Address: 23 N DOUGLAS AVE
BEAVER, OK 73932
SSN: 513-52-XXXX
Phone: (580) 625-3120
Confidence: High

11:

Company Name: T J'S CONVENIENCE STORE
Name: BANGS, MIKE
Title: MANAGER
Address: PO BOX 1411
BEAVER, OK 73932-1411
SSN: 513-52-XXXX
Phone: (580) 625-3120
Confidence: High

12:

Company Name: T J'S CONVENIENCE STORE
Name: BANGS, MIKE
Title: MANAGER

Address: PO BOX 1411
BEAVER, OK 73932-1411
SSN: 513-52-XXXX
Phone: (580) 625-3120
Confidence: High

13:

Company Name: T J'S CONVENIENCE STORE
Name: BANGS, MIKE
Title: MANAGER
Address: 23 N DOUGLAS AVE
BEAVER, OK 73932
SSN: 513-52-XXXX
Phone: (580) 625-3120
Confidence: High

14:

Company Name: T J'S CONVENIENCE STORE
Name: BANGS, MIKE
Title: MANAGER
Address: 23 N DOUGLAS AVE
BEAVER, OK 73932
SSN: 513-52-XXXX
Phone: (580) 625-3120
Confidence: High

15:

Company Name: ENRON
Name: BANGS, WILLIAM MICHAEL
SSN: 513-52-XXXX
Confidence: Medium

Criminal Filings - 0 records found
Cellular & Alternate Phones - 0 records found
Possible Education - 0 records found
Sources - 149 records found

All Sources	149 Source Document(s)
Bankruptcy Records	1 Source Document(s)
Corporate Affiliations	3 Source Document(s)
Deed Transfers	1 Source Document(s)
Driver Licenses	1 Source Document(s)
Email addresses	2 Source Document(s)
Historical Person Locator	14 Source Document(s)
Liens and Judgments	7 Source Document(s)
Motor Vehicle Registrations	1 Source Document(s)
Person Locator 1	3 Source Document(s)
Person Locator 2	5 Source Document(s)
Person Locator 5	34 Source Document(s)
Person Locator 6	19 Source Document(s)
Phone	2 Source Document(s)
Tax Assessor Records	46 Source Document(s)
UCC Lien Filings	6 Source Document(s)
Utility Locator	1 Source Document(s)
Voter Registrations	3 Source Document(s)

Key
High Risk Indicator. These symbols may prompt you to investigate further.
Moderate Risk Indicator. These symbols may prompt you to investigate further.
General Information Indicator. These symbols inform you that additional information is provided.
The most recent telephone listing as reported by the EDA source.

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1 OF 1 RECORD(S)

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Date:12/5/2017
Report processed by:
Toeroek Associates Inc||

Full Name	Address	County	Phone
BANGS, WILLIAM JR	1209 N CARLTON AVE LIBERAL, KS 67901-2330 SEWARD COUNTY	SEWARD	None Listed

ADDITIONAL PERSONAL INFORMATION

SSN	DOB	Gender	LexID(sm)
515-94-XXXX	1980 (Age:37)		006187563488

Subject Summary

Name Variations

1: BANGS, MICHAEL W JR
2: BANGS, MICHAEL W
3: BANGS, MIKE JR
4: BANGS, MIKE
5: BANGS, WILLIAM JR
6: BANGS, WILLIAM M JR
7: BANGS, WILLIAM MICHAEL JR
8: BANGS, WILLIAM MICHAEL
9: BANGS, WILLIMA JR
10: BANGS, WILLIMA M JR
11: BANGS, WM M

SSNs Summary

No.	SSN	State Iss.	Date Iss.	Warnings
		Most frequent SSN attributed to subject:		
1:	515-94-XXXX	Kansas	1987-1988	

Others Using SSN - 0 records found

Address Summary - 4 records found

No.	Address
1:	1209 N CARLTON AVE LIBERAL, KS 67901-2330 SEWARD COUNTY
2:	218 S CAIN AVE LIBERAL, KS 67901-3518 SEWARD COUNTY
3:	PO BOX 1424 BEAVER, OK 73932-1424 BEAVER COUNTY

4: PO BOX 1411
BEAVER, OK 73932-1411
BEAVER COUNTY

Address Details

1: 1209 N CARLTON AVE LIBERAL, KS 67901-2330

Address	Dates	Phone
1209 N CARLTON AVE LIBERAL, KS 67901-2330 SEWARD COUNTY	5/2003 - 11/2017	

Census Data for Geographical Region

Median Head of Household Age: 23
Median Income: $45,699
Median Home Value: $105,556
Median Education: 13 years

Household Members

BANGS, VICTORIA ZAMORA

Other Associates

None Listed

2: 218 S CAIN AVE LIBERAL, KS 67901-3518

Address	Dates	Phone
218 S CAIN AVE LIBERAL, KS 67901-3518 SEWARD COUNTY	10/1998 - 1/2012	

Census Data for Geographical Region

Median Head of Household Age: 28
Median Income: $40,156
Median Home Value: $55,089
Median Education: 10 years

Household Members

BANGS, VICTORIA ZAMORA

Other Associates

ZAMORA, RAUL

3: PO BOX 1424 BEAVER, OK 73932-1424

Address	Dates	Phone
PO BOX 1424 BEAVER, OK 73932-1424 BEAVER COUNTY	9/2002 - 9/2002	

Census Data for Geographical Region

Median Head of Household Age: 39
Median Income: $44,878
Median Home Value: $61,053
Median Education: 12 years

Household Members

BANGS, JANIS MARIE
BANGS, TROY SCOTT
BANGS, WILLIAM MICHAEL

Other Associates
None Listed

4: PO BOX 1411 BEAVER, OK 73932-1411

Address	Dates	Phone

PO BOX 1411
BEAVER, OK 73932-1411
BEAVER COUNTY

Census Data for Geographical Region
Median Head of Household Age: 38
Median Income: $47,305
Median Home Value: $73,958
Median Education: 13 years

Household Members
BANGS, JANIS MARIE
BANGS, WILLIAM MICHAEL

Other Associates
None Listed

Voter Registrations - 0 records found
Driver Licenses - 0 records found
Professional Licenses - 0 records found
Health Care Providers - 0 records found
Health Care Sanctions - 0 records found
Pilot Licenses - 0 records found
Sport Licenses - 0 records found
Real Property - 3 records found

1: Assessment Record for SEWARD County, KS

Owner Information
Name: BANGS, WILLIAM MICHAEL JR & VICTORIA ZAMORA DE
Address: 1209 N CARLTON AVE LIBERAL, KS 67901-2330
County/FIPS: SEWARD

Property Information
Address: 1209 N CARLTON AVE LIBERAL, KS 67901-2330
County/FIPS: SEWARD
Data Source: B

Legal Information
Assessor's Parcel Number: 149-32-0-20-15-007.00-0

Assessment Information
Assessed Value: $14570
Market Land Value: $13830
Market Improvement Value: $112870
Total Market Value: $126700

2: Assessment Record for HUTCHINSON County, TX

Owner Information
Name: BANGS WILLIAM
Address: 1209 N CARLTON AVE LIBERAL, KS 67901-2330
County/FIPS: SEWARD

Property Information

Address: YUMA DR FRITCH, TX 79036
County/FIPS: HUTCHINSON
Data Source: B

Legal Information

Assessor's Parcel Number: 6605

Assessment Information

Assessed Value: $210
Market Land Value: $210
Total Market Value: $210

3: Assessment Record for SAN JUAN County, CO

Owner Information

Name: BANGS WILLIAM M JR; BANGS TROY S
Address: 1209 N CARLTON AVE LIBERAL, KS 67901-2330
County/FIPS: SEWARD

Property Information

Address: EUREKA MNG DISTRICT
Data Source: B

Legal Information

Assessor's Parcel Number: 47750210050021
Recording Date: 08/25/2011

Assessment Information

Assessed Value: $3871
Market Land Value: $13348
Total Market Value: $13348

Motor Vehicle Registrations - 14 records found

1: KS MVR

Registrant Information

Registrant: BANGS, WILLIAM M JR
DOB: 1980
Address: 1209 N CARLTON AVE
LIBERAL, KS 67901-2330
SEWARD COUNTY

Registration Information

Original Registration Date: 2/18/2015
Registration Date: 3/7/2017
Registration Expiration Date: 3/31/2018

Vehicle Information

VIN: 1FTWW32S23EA52052
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2003
Make: Ford
Model: F350
Series: SUPER DUTY
Body Style: Crew Pickup

Plate Information

License Plate Type: Other

Previous Plate Number: 191FST
Previous Plate State: KS
License Plate Number: 191FST
Plate State: KS

Source Information
Data Source: GOVERNMENTAL

2: KS MVR

Vehicle Information
VIN: 1FTWW32S23EA52052
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2003
Make: Ford
Model: F350
Series: SUPER DUTY
Body Style: Crew Pickup

Owner Information
Name: BANGS, WILLIAM M JR
DOB: 1980
Address: 1209 N CARLTON AVE
LIBERAL, KS 67901-2330
SEWARD COUNTY

Title Information
Title Number: AA4384611
Title Transfer Date: 6/18/2015
Title Issue Date: 6/18/2015

Source Information
Data Source: GOVERNMENTAL

3: KS MVR

Registrant Information

Registrant 1
Registrant: BANGS, VICTORIA
DOB: 4/1979
Address: 1209 N CARLTON AVE
LIBERAL, KS 67901-2330
SEWARD COUNTY

Registrant 2
Registrant: BANGS, WILLIAM M JR
DOB: 1980
Address: 1209 N CARLTON AVE
LIBERAL, KS 67901-2330
SEWARD COUNTY

Registration Information
Original Registration Date: 2/18/2015
Registration Date: 3/7/2017
Registration Expiration Date: 3/31/2018

Vehicle Information
VIN: 1GNDT13W512177168
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2001

Make: Chevrolet
Model: Blazer
Series: LS~LT~TRAILBLAZER
Body Style: 4 Dr Wagon Sport Utility
Color: Green

Plate Information

License Plate Type: Private
Previous Plate Number: 113BYI
Previous Plate State: KS
License Plate Number: 113BYI
Plate State: KS

Source Information

Data Source: GOVERNMENTAL

4: KS MVR

Vehicle Information

VIN: 1GNDT13W512177168
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2001
Make: Chevrolet
Model: Blazer
Series: LS~LT~TRAILBLAZER
Body Style: 4 Dr Wagon Sport Utility
Color: Green

Owner Information

Owner 1

Name: BANGS, VICTORIA
DOB: 4/1979
Address: 218 S CAIN AVE
LIBERAL, KS 67901-3518
SEWARD COUNTY

Owner 2

Name: BANGS, WILLIAM MIKE JR
DOB: 1980
Address: 218 S CAIN AVE
LIBERAL, KS 67901-3518
SEWARD COUNTY

Title Information

Title Number: R1386442
Title Transfer Date: 6/8/2009
Title Issue Date: 6/8/2009

Source Information

Data Source: GOVERNMENTAL

5: KS MVR

Registrant Information

Registrant: BANGS, WILLIAM M JR
DOB: 1980
Address: 1209 N CARLTON AVE
LIBERAL, KS 67901-2330
SEWARD COUNTY

Registration Information

Original Registration Date: 2/18/2015
Registration Date: 3/7/2017
Registration Expiration Date: 3/31/2018

Vehicle Information

VIN: 1GYEK63N94R238502
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2004
Make: Cadillac
Model: Escalade
Series: LUXURY
Body Style: 4 Dr Wagon Sport Utility

Plate Information

License Plate Type: Private
Previous Plate Number: 941DEY
Previous Plate State: KS
License Plate Number: 941DEY
Plate State: KS

Source Information

Data Source: GOVERNMENTAL

6: KS MVR

Vehicle Information

VIN: 1GYEK63N94R238502
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 2004
Make: Cadillac
Model: Escalade
Series: LUXURY
Body Style: 4 Dr Wagon Sport Utility

Owner Information

Name: BANGS, WILLIAM M JR
DOB: 1980
Address: 1209 N CARLTON AVE
LIBERAL, KS 67901-2330
SEWARD COUNTY

Title Information

Title Number: AA2021430
Title Transfer Date: 3/7/2014
Title Issue Date: 3/7/2014

Source Information

Data Source: GOVERNMENTAL

7: KS MVR

Registrant Information

Registrant 1

Registrant: BANGS, VICTORIA
DOB: 4/1979
Address: 1209 N CARLTON AVE
LIBERAL, KS 67901-2330
SEWARD COUNTY

Registrant 2

Registrant: BANGS, WILLIAM M JR
DOB: 1980
Address: 1209 N CARLTON AVE
LIBERAL, KS 67901-2330
SEWARD COUNTY

Registration Information

Original Registration Date: 2/7/2014
Registration Date: 2/7/2014
Registration Expiration Date: 12/31/2014

Vehicle Information

VIN: 47ZFB10121X016300
Class: UNKNOWN
Model Year: 2001
Body Style: CHASSIS AND CAB

Plate Information

License Plate Type: Other
Previous Plate Number: 585FPV
Previous Plate State: KS
License Plate Number: 585FPV
Plate State: KS

Source Information

Data Source: GOVERNMENTAL

8: KS MVR

Vehicle Information

VIN: 47ZFB10121X016300
Class: UNKNOWN
Model Year: 2001
Body Style: CHASSIS AND CAB

Owner Information

Owner 1

Name: BANGS, VICTORIA
DOB: 4/1979
Address: 1209 N CARLTON AVE
LIBERAL, KS 67901-2330
SEWARD COUNTY

Owner 2

Name: BANGS, WILLIAM M JR
DOB: 1980
Address: 1209 N CARLTON AVE
LIBERAL, KS 67901-2330
SEWARD COUNTY

Title Information

Title Number: AA1179093
Title Transfer Date: 5/31/2013
Title Issue Date: 5/31/2013

Source Information

Data Source: GOVERNMENTAL

9: KS MVR

Registrant Information

Registrant: BANGS, WILLIAM MICHAEL
DOB: 1980
Address: 1209 N CARLTON AVE
LIBERAL, KS 67901-2330
SEWARD COUNTY

Registration Information

Original Registration Date: 8/26/2011
Registration Date: 8/26/2011
Registration Expiration Date: 8/26/2012

Vehicle Information

VIN: 4D4036965
Class: UNKNOWN
Model Year: 1957
Make: BUICK
Series: SPEC
Body Style: 4 DOOR

Plate Information

License Plate Type: Antique
Previous Plate Number: 139416
Previous Plate State: KS
License Plate Number: 163539
Plate State: KS

Source Information

Data Source: GOVERNMENTAL

10: KS MVR

Vehicle Information

VIN: 4D4036965
Class: UNKNOWN
Model Year: 1957
Make: BUICK
Series: SPEC
Body Style: 4 DOOR

Owner Information

Name: BANGS, WILLIAM MICHAEL
DOB: 1980
Address: 1209 N CARLTON AVE
LIBERAL, KS 67901-2330
SEWARD COUNTY

Title Information

Title Number: R2494079
Title Transfer Date: 8/26/2011
Title Issue Date: 8/26/2011

Source Information

Data Source: GOVERNMENTAL

11: KS MVR

Registrant Information

Registrant: BANGS, MIKE JR
DOB: 1980

Address: 218 S CAIN AVE
LIBERAL, KS 67901-3518
SEWARD COUNTY

Registration Information

Original Registration Date: 3/26/2002
Registration Date: 3/26/2002
Registration Expiration Date: 3/31/2003

Vehicle Information

VIN: 1FTEF14H0LLA26191
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1990
Make: Ford
Model: F150
Series: CUSTOM~XL~XLT LARIAT
Body Style: Pickup

Plate Information

License Plate Type: Private
Previous Plate Number: RXI105
Previous Plate State: KS
License Plate Number: RXI105
Plate State: KS

Source Information

Data Source: GOVERNMENTAL

12: KS MVR

Vehicle Information

VIN: 1FTEF14H0LLA26191
Class: PASSENGER CAR/LIGHT TRUCK
Model Year: 1990
Make: Ford
Model: F150
Series: CUSTOM~XL~XLT LARIAT
Body Style: Pickup

Owner Information

Name: BANGS, MIKE JR
DOB: 1980
Address: 218 S CAIN AVE
LIBERAL, KS 67901-3518
SEWARD COUNTY

Title Information

Title Number: J0261202
Title Transfer Date: 10/15/1998
Title Issue Date: 10/15/1998

Source Information

Data Source: GOVERNMENTAL

13: Non-Governmental Vehicle Record

Vehicle Information

VIN: WBAAB640XJ8228115
Class: PASSENGER CAR/LIGHT TRUCK

Model Year: 1988
Make: BMW
Model: 325
Series: AUTOMATIC
Body Style: Sedan 2 Door

Owner Information

Name: BANGS, MIKE
DOB: 1980
Address: 218 S CAIN AVE
LIBERAL, KS 67901-3518
SEWARD COUNTY
Source Date First Seen: 12/27/2007
Source Date Last Seen: 11/11/2012

Source Information

Data Source: NON-GOVERNMENTAL

14: Non-Governmental Vehicle Record

Vehicle Information

VIN: 1FTEF14H7RNB56899
Class: HEAVY TRUCK
Model Year: 1994
Make: Ford
Model: F150
Body Style: Pickup

Owner Information

Name: BANGS, WILLIAM JR
DOB: 1980
Address: 218 S CAIN AVE
LIBERAL, KS 67901-3518
SEWARD COUNTY
Source Date First Seen: 2/25/2008
Source Date Last Seen: 8/6/2012

Source Information

Data Source: NON-GOVERNMENTAL

Boats - 0 records found
Aircraft - 0 records found
Bankruptcy Information - 0 records found
Judgments/Liens - 0 records found
UCC Liens - 1 records found

1:KS UCC LIEN FILING

Debtor Information

Name: BANGS, WILLIAM M JR
Address: 218 S CAIN AVE
LIBERAL, KS 67901-3518

Secured Party Information

Name: THE COMMUNITY BANK
Address: PO BOX 3065
LIBERAL, KS 67905-3065

Filing Information

Filing Jurisdiction: KANSAS
Original Filing Number: 96477782

Original Filing Date: 7/29/2008

Filing 1

Type: TERMINATION
Pages: 1
Number: 97643035
Date: 1/27/2010

Filing 2

Type: INITIAL FILING
Pages: 1
Number: 96477782
Date: 7/29/2008
Expiration Date: 7/29/2013

Filing Office Information

Filing Office 1

Filing Agency: SECRETARY OF STATE/UCC DIVISION
Address: 120 SW 10TH AVE
TOPEKA, KS 66612

Filing Office 2

Filing Agency: SECRETARY OF STATE/UCC DIVISION
Address: 120 SW 10TH AVE FL 1
TOPEKA, KS 66612

Fictitious Businesses - 0 records found

Notice Of Defaults - 0 records found

Potential Relatives - 6 records found

1st Degree: 5, 2nd Degree: 1

No.	Full Name	Address/Phone
1.	BANGS, VICTORIA ZAMORA • AKA ZAMORA, VICTORIA • AKA ZAMORIA, VICTORIA • AKA ZAMORA, DEBANGS VICTORIA • AKA DEBANGS, VICTORIA ZAMORA • AKA DE, VICTORIA ZAMORA • AKA DE BANGS, VICTORIA Z • AKA DE BANGS, ZAMORA • AKA VICTORIA, ZAMORA DE	1209 N CARLTON AVE LIBERAL, KS 67901-2330 218 S CAIN AVE LIBERAL, KS 67901-3518
1.A.	ZAMORA, RAUL • AKA CAMARGO, RAUL ZAMORA • AKA ZAMORACAMARGO, RAUL • AKA ZAMORA CAMARGO, RAUL	2500 N WESTERN AVE LOT 148 LIBERAL, KS 67901-9765 2500 N WESTERN AVE LOT 97 LIBERAL, KS 67901-9764 2500 N WESTERN AVE LOT 14N LIBERAL, KS 67901-9763 2500 N WESTERN AVE LOT 14 LIBERAL, KS 67901-9763 218 S CAIN AVE LIBERAL, KS 67901-3518

2.	BANGS, WILLIAM MICHAEL • AKA BANGS, MIKE • AKA BANGS, WILLIAM K • AKA BANGS, MICHAEL W • AKA BAMAS, W M • AKA BANGS, W M • AKA BANG, WILLIAM M • AKA BANGS, WILLIAM L SSN:513-52-XXXX DOB:8/1949 (Age: 68)	PO BOX 1424 BEAVER, OK 73932-1424 RR 1 BOX 31 FORGAN, OK 73938-9719 2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640 5 N DOUGLAS BEAVER, OK 73932 (580) 625-2933 PO BOX 1411 BEAVER, OK 73932-1411
3.	BANGS, JANIS MARIE • AKA BANGS, JANICE MARIE • AKA BARGS, JANIS SSN:515-56-XXXX DOB:9/1956 (Age: 61)	PO BOX 1424 BEAVER, OK 73932-1424 2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640 5 N DOUGLAS BEAVER, OK 73932 (580) 625-2933 RR 1 BOX 31 FORGAN, OK 73938-9719 PO BOX 1411 BEAVER, OK 73932-1411
4.	BANGS, MIKE	2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640
5.	BANGS, TROY SCOTT • AKA BAIER, TROY S SSN:514-98-XXXX	901 S GRANT AVE APT A LIBERAL, KS 67901-4539 2330 SIERRA DR APT 102 LIBERAL, KS 67901-5640 PO BOX 31 FORGAN, OK 73938-0031 417 S PURDUE AVE LIBERAL, KS 67901-3546 PO BOX 1424 BEAVER, OK 73932-1424

Business Associates - 0 records found

Person Associates - 1 records found

No.	Full Name	Address	SSN	Phone	DOB
1:	ZAMORA, RAUL CAMARGO, RAUL ZAMORA	2500 N WESTERN AVE LOT 148 LIBERAL, KS 67901-9765	168-08-XXXX		5/1977

ZAMORACAMARGO, RAUL ZAMORA CAMARGO, RAUL	2500 N WESTERN AVE LOT 97 LIBERAL, KS 67901-9764
	2500 N WESTERN AVE LOT 14N LIBERAL, KS 67901-9763
	2500 N WESTERN AVE LOT 14 LIBERAL, KS 67901-9763
	218 S CAIN AVE LIBERAL, KS 67901-3518

Neighbors - 10 records found

1209 N CARLTON AVE LIBERAL, KS 67901-2330

Name	Address	Phone
RAMOS, MARINA SWEARINGEN, BILLIE SUE SWEARINGEN, MICHAEL T SWEARINGEN, MICHAEL A WILLIMON, JOHN DAVID	1120 N CARLTON AVE LIBERAL, KS 67901-2329	
CISNEROS, JESSICA CISNEROS, LORENA LORENA CISNEROS, MARTIN M	1124 N CARLTON AVE LIBERAL, KS 67901-2329	
SCHILENS, GEORGE ADAM SCHILENS, JAN L	1125 N CARLTON AVE LIBERAL, KS 67901-2328	(620) 624-3678
WILSON, JESSE C WILSON, KAREN R WILSON, STEPHEN MARK	1203 N CARLTON AVE LIBERAL, KS 67901-2330	(620) 624-3050
GIBSON, CHANTHA GIBSON, GARY D HOLTEEN, NICOLE MAYE	1210 N CARLTON AVE LIBERAL, KS 67901-2331	(620) 626-6621
CHAPA, CHATHA	1210 N CARLTON AVE APT 12046 LIBERAL, KS 67901-2331	
HERGERT, CHRISTY DAWN HERGERT, CONRAD NEAL HERGERT, RYAN NEAL MYRICK, GENE E MYRICK, GLENNA EVALONNE	1216 N CARLTON AVE LIBERAL, KS 67901-2331	(620) 624-0535
HO, HENRY L HO, HOA THANH LE, TRANG T MORRIS, BETTY R MORRIS, BILL NGUYEN LY, TUNG THANH	1221 N CARLTON AVE LIBERAL, KS 67901-2330	(620) 624-5211
ESQUEDA RIVERA, HECTOR MANUEL GARCIA, FAVIOLA	1225 N CARLTON AVE LIBERAL, KS 67901-2330	

HAYS, CYNTHIA JEAN	1226 N CARLTON AVE	(620) 624-2292
KEMPER, DOUGLAS ANDREW	LIBERAL, KS 67901-2331	
PARKER, DAVID IRVIN		
PARKER, GOLDIE PEARL		

Employment Locator - 0 records found

Criminal Filings - 3 records found

1: Oklahoma Court Report

Offender information

Name: BANGS, WILLIAM MICHAEL
Address: LIBERAL, KS 67901
SEWARD COUNTY
Case Number: TR-2015-00875
Case Filing Date: 10/13/2015
Case Type: TRAFFIC
DOB: 10/1980
SSN: 515-94-XXXX

Offenses

Case Filing Date: 10/13/2015
Arresting Agency: OKLAHOMA HIGHWAY PATROL OF GUYMON OK
Court Description: BEAVER COUNTY COURT
Case Number: TR-2015-00875
Court Offense: SPEEDING 15 MPH OVER
Court Level/Degree: TRAFFIC

Court Activity

[NONE FOUND]

2: Oklahoma Court Report

Offender information

Name: BANGS, WILLIAM MICHAEL
Address: LIBERAL, KS 67901
SEWARD COUNTY
Case Number: TR-2014-00123
Case Filing Date: 02/18/2014
Case Type: TRAFFIC
DOB: 10/1980
SSN: 515-94-XXXX

Offenses

Case Filing Date: 02/18/2014
Arresting Agency: OHP OF ENID OK
Court Description: HARPER COUNTY COURT
Case Number: TR-2014-00123
Court Offense: 75 IN 65, SPEEDING (10 OVER)
Court Level/Degree: TRAFFIC

Court Activity

[NONE FOUND]

3: Oklahoma Court Report

Offender information

Name: BANGS, WILLIAM MICHAEL
Address: LIBERAL, KS 67901
SEWARD COUNTY
Case Number: TRC-2009-00491
Case Filing Date: 06/23/2009
Case Type: TRAFFIC
DOB: 10/1980
SSN: 515-94-XXXX

Offenses

Case Filing Date: 06/23/2009
Arresting Agency: OKLAHOMA HIGHWAY PATROL OF GUYMON OK
Court Description: BEAVER COUNTY COURT
Case Number: TRC-2009-00491
Court Offense: FAILURE TO WEAR SEAT BELT (FRONT SEAT PASSENGER)
Court Level/Degree: TRAFFIC

Court Activity

[NONE FOUND]

Cellular & Alternate Phones - 0 records found
Possible Education - 0 records found
Sources - 64 records found

All Sources	64 Source Document(s)
Criminal	3 Source Document(s)
Historical Person Locator	4 Source Document(s)
Motor Vehicle Registrations	14 Source Document(s)
Person Locator 1	1 Source Document(s)
Person Locator 5	7 Source Document(s)
Person Locator 6	23 Source Document(s)
Tax Assessor Records	11 Source Document(s)
UCC Lien Filings	1 Source Document(s)

Key
High Risk Indicator. These symbols may prompt you to investigate further.
Moderate Risk Indicator. These symbols may prompt you to investigate further.
General Information Indicator. These symbols inform you that additional information is provided.
✓The most recent telephone listing as reported by the EDA source.

Important: The Public Records and commercially available data sources used on reports have errors. Data is sometimes entered poorly, processed incorrectly and is generally not free from defect. This system should not be relied upon as definitively accurate. Before relying on any data this system supplies, it should be independently verified. For Secretary of State documents, the following data is for information purposes only and is not an official record. Certified copies may be obtained from that individual state's Department of State.

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Your GLBA Permissible Use is: Legal Compliance

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The Official Website of San Juan County Colorado (/)

San Juan County Colorado has a total area of 388.29 square miles. It has the highest mean elevation of any county in the United States, at 11,240 feet. Silverton, the county seat and only city in the County, sits at 9,318 feet.

San Juan County Population: 699 Town of Silverton Population: 637

2016 Election Results for San Juan County, CO (/elections.html)

Upcoming Foreclosure Sale

March 28, 2017: Notice 16-004 (/uploads/3/4/0/4/34042608/bent_forclosure.pdf): Glenn & Maisel, 1114 Empire St, Silverton, CO 81433

Public Alert Text Message System

text your ZIP CODE to 888777 for mobile alerts
https://local.nixle.com/register/ (https://local.nixle.com/register/)

2016 Mill Levy Breakdown

Mill Levy for Town of Silverton
10.560 Town of Silverton
19.888 San Juan County
13.994 School District #1
00.395 Southwest Water Conservation District
44.837

Mill Levy for South County
19.888 San Juan County
13.994 School Dist. #1
00.395 Southwest Water Con. District
05.700 Durango Fire Protection District
39.977

Mill Levy for remainder of San Juan County
19.888 San Juan County
13.994 School District #1
00.395 Southwest Water Conservation District
34.277

Calculating Property Tax Rates

Colorado's Assessment Rates = 7.96% Residential; 29% Non-Residential

Assessment Rate x Mill Levy/1000 = Effective Property Tax Rate

Actual Value x Effective Property Tax Rate = Taxes Due

2016 Effective Property Tax Rates (taxes dues in 2017)

Town of Silverton (District 112)
Residential: 0.357%
Non-Residential: 1.30%

South County (District 103)
Residential: 0.318%
Non-Residential: 1.159%

Remainder of County (District 101)
Residential: 0.273%
Non-Residential: 0.994%

San Juan County Courthouse

1557 Greene St
Silverton, CO 81433
Phone: 970-387-8040
Fax: 970-387-8043

Pay Property Tax (https://secure.pueblo.org/cgi-bin/webatrbroker.cgi/propertytaxpayinfosaj.p)

Clerk & Recorder Records (/document-search.html)

Search Property Records (http://www.co.pueblo.co.us/cgi-bin/webatrallbroker.wsc/ackatrsaj.p)

Recent Property Sales (/assessor.html) (updated March 2, 2017)
2017 County Budget (/uploads/3/4/0/4/34042608/0310_001.pdf) (approved December 15, 2016)
2016 Abstract of Assessment Brochure (/uploads/3/4/0/4/34042608/trifold_2016_abstract.pdf) (Jan 2017)
2015 County Audit (/uploads/3/4/0/4/34042608/sjc_audit_2015.pdf) (most recent available)

Home page photo courtesy of Ray Dileo

City/Town: _____ Parcel Number: 47750210050035 Tax Status: Active _____ Tax District: 101 12/01/17

Name: SJC LAND & CATTLE CO,
Address: EUREKA MNG DISTRICT , CO **Mailing Address:** PO BOX 4991 ASPEN, CO 81612

Grantee	Grantor	Sale Date	Sale Amount	Type	Reception	Sale Comments (Code)
SJC LAND & CATTLE CO	D W MELCHER	11/15/93	50000	BS	0	MULTIPLE PARCELS
CORE MOUNTAIN ENTERPRISES LLC	SJC LAND & CATTLE CO	08/17/06	65800	SW	145137	MULTIPLE PARCELS

No Photo available!

Legal Description:
BIG INDIAN - 14325

Land Area	Land Class	Land Value
3.584 Acres	Non-Producing Pat M	22120

********Historical values of land**********

Year	Actual Value	Assessed Value
2017	22120	6415
2016	5161	1497
2015	5161	1497
2014	5161	1497
2013	5161	1497
2012	5376	1559
2011	5376	1559

Treasurer Tax Information

Year	Type	Paid Date	Amount	Balance
2016	MC DUE			**51.32**
2016	Payment	01/27/17	51.32	0

Distribution of tax dollars by taxing entity

Tax Entity Name	Levy	Tax Amount	% of Tot

Additional Treasurer Fees

Special Improvements:	no
Property in Tax Sale:	no
Delinquent Payments:	no
Tax Sale Certificates Outstanding:	no
Advertising Charges due:	no

FOR the fees due on any of the above items, please call the Treasurer at 9703875488

City/Town: _____ Parcel Number: 47750210050220 Tax Status: Active _____ Tax District: 101 12/01/17

Name: HERMAN, SAMUEL R.,
Address: EUREKA MNG DISTRICT , CO **Mailing Address:** 13255 NASHVILLE HWY LIBERTY, TN 37095

Grantee	Grantor	Sale Date	Sale Amount	Type	Reception	Sale Comments (Code)
HERMAN, SAMUEL R.	HERMAN SAMUEL R AND ELIZABETH	04/19/09	0	DC	147398	RELATED PARTIES
HERMAN SAMUEL R AND ELIZABETH	MELCHER NORMA B AS PR FOR D W	09/19/07	7500	PR	146026	PATENTED MNG CLAIM
NORMA B MELCHER AS PERSONAL RE	D W MELCHER - DEATH CERTIFICAT	08/08/07	0	DC	145894	RELATED PARTIES
D W MELCHER	SILVER BAY MINES	04/27/90	7500	TD	0	SEE COMMENT/FIELD CHEC

No Photo available!

Legal Description:
BLACK HAWK - 14325

Land Area	Land Class	Land Value
10.33 Acres	Non-Producing Pat M	18030

********Historical values of land**********

Year	Actual Value	Assessed Value
2017	18030	5229
2016	6710	1946
2015	6710	1946
2014	6446	1869
2013	6446	1869
2012	6715	1947
2011	6715	1947

Treasurer Tax Information

Year	Type	Paid Date	Amount	Balance
2016	MC DUE			**66.7**
2016	Payment	01/24/17	66.7	0

Distribution of tax dollars by taxing entity

Tax Entity Name	Levy	Tax Amount	% of Tot

Additional Treasurer Fees

Special Improvements:	no
Property in Tax Sale:	no
Delinquent Payments:	no
Tax Sale Certificates Outstanding:	no
Advertising Charges due:	no

FOR the fees due on any of the above items, please call the Treasurer at 9703875488

City/Town: _____ Parcel Number: 47750280050021 Tax Status: Active _____ Tax District: 101 12/01/17

Name: CORE MOUNTAIN ENTERPRISES LLC,
Address: EUREKA MNG DISTRICT , CO **Mailing Address:** PO BOX 856 SILVERTON, CO 81433

Grantee	Grantor	Sale Date	Sale Amount	Type	Reception	Sale Comments (Code)
D W MELCHER	SILVER BAY MINES	04/27/90	0	TD	0	SEE COMMENT/FIELD CHEC
SJC LAND & CATTLE CO	D W MELCHER	11/16/93	50000	BS	0	MULTIPLE PARCELS
CORE MOUNTAIN ENTERPRISES LLC	SJC LAND AND CATTLE CO	08/17/06	65800	SW	145137	SEE COMMENT/FIELD CHEC

No Photo available!

Legal Description:
BLUE BIRD - 15061 CLAIRE MARCH - 15061 THOMAS JEFFERSON - 15504

Land Area	Land Class	Land Value
7.762 Acres	Non-Producing Pat M	7530
5.626 Acres	Non-Producing Pat M	5460
5.514 Acres	Non-Producing Pat M	5350

********Historical values of land**********

Year	Actual Value	Assessed Value
2017	18340	5319
2016	12442	3609
2015	12442	3609
2014	11795	3420
2013	11795	3420
2012	12286	3563
2011	12286	3563

Treasurer Tax Information

Year	Type	Paid Date	Amount	Balance
2016	MC DUE			**123.72**
2016	Payment	05/04/17	123.72	0

Distribution of tax dollars by taxing entity

Tax Entity Name	Levy	Tax Amount	% of Tot

Additional Treasurer Fees

Special Improvements:	no
Property in Tax Sale:	no
Delinquent Payments:	no
Tax Sale Certificates Outstanding:	no
Advertising Charges due:	no

FOR the fees due on any of the above items, please call the Treasurer at 9703875488

City/Town: _____ Parcel Number: 47750220050007 Tax Status: Exempt Tax District: 101 12/01/17

Name: UNITED STATES OF AMERICA, BUREAU OF LAND MANAGEMENT,
Address: EUREKA MNG DIST , CO **Mailing Address:** 2850 YOUNGFIELD ST LAKEWOOD, CO 80215

Grantee	Grantor	Sale Date	Sale Amount	Type	Reception	Sale Comments (Code)
USA, BLM	TRUST FOR PUBLIC LAND	09/06/11	247500	GWD	148128	MULTIPLE PARCELS
TRUST FOR PUBLIC LAND	SJC LAND & CATTLE CO	06/07/11	110000	GWD	147935	MULTIPLE PARCELS
SJC LAND & CATTLE CO	D W MELCHER	11/16/93	50000	BS	0	MULTIPLE PARCELS

No Photo available!

Legal Description:
CAMILLA - 15061 IMMATCHOCK - 18849 JO PI - 14325 NEWTON -
15061 TIP TOP - 18849 U S GRANT - 15504 CONFIDENCE - 14325

Land Area	Land Class	Land Value
10.331 Acres	Fed-Owned Pat Minin	10020
9.754 Acres	Fed-Owned Pat Minin	9460
10.331 Acres	Fed-Owned Pat Minin	10020
10.331 Acres	Fed-Owned Pat Minin	10020
10.33 Acres	Fed-Owned Pat Minin	14935
4.901 Acres	Fed-Owned Pat Minin	5150
10.324 Acres	Fed-Owned Pat Minin	10010

********Historical values of land**********

Year	Actual Value	Assessed Value
2017	69615	0
2016	44859	0
2015	44859	0
2014	41373	0
2013	41373	0
2012	43097	0
2011	43097	0

Treasurer Tax Information

Year	Type	Paid Date	Amount	Balance

Additional Treasurer Fees

Special Improvements:	no
Property in Tax Sale:	no
Delinquent Payments:	no
Tax Sale Certificates Outstanding:	no
Advertising Charges due:	no

FOR the fees due on any of the above items, please call the Treasurer at 9703875488

City/Town: _____ Parcel Number: 47750210050135 Tax Status: Exempt Tax District: 101 12/01/17

Name: UNITED STATES OF AMERICA, BUREAU OF LAND MANAGEMENT,
Address: EUREKA MNG DISTRICT , CO **Mailing Address:** 2850 YOUNGFIELD ST LAKEWOOD, CO 80215

Grantee	Grantor	Sale Date	Sale Amount	Type	Reception	Sale Comments (Code)
USA, BLM	TRUST FOR PUBLIC LAND	09/06/11	247500	GWD	148128	MULTIPLE PARCELS
TRUST FOR PUBLIC LAND	SJC LAND & CATTLE CO	06/07/11	11000014793		147935	MULTIPLE PARCELS
SJC LAND & CATTLE CO	D W MELCHER	11/15/93	50000	BS	0	MULTIPLE PARCELS
CORE MOUNTAIN ENTERPRISES LLC	SJC LAND & CATTLE CO	08/17/06	65800	SW	145137	MULTIPLE PARCELS

No Photo available!

Legal Description:
HOPEFUL - 15504 MURTON - 14325

Land Area	Land Class	Land Value
6.29 Acres	Fed-Owned Pat Minin	6610
9.618 Acres	Fed-Owned Pat Minin	9320

********Historical values of land**********

Year	Actual Value	Assessed Value
2017	15930	0
2016	10324	0
2015	10324	0
2014	22908	0
2013	22908	0
2012	23862	0
2011	23862	0

Treasurer Tax Information

Year	Type	Paid Date	Amount	Balance

Additional Treasurer Fees

Special Improvements:	no
Property in Tax Sale:	no
Delinquent Payments:	no
Tax Sale Certificates Outstanding:	no
Advertising Charges due:	no

FOR the fees due on any of the above items, please call the Treasurer at 9703875488

City/Town: _____ Parcel Number: 47750210050036 Tax Status: Active _____ Tax District: 101 12/01/17

Name: CORE MOUNTAIN ENTERPRISES LLC,
Address: EUREKA MNG DISTRICT , CO **Mailing Address:** PO BOX 856 SILVERTON, CO 81433

Grantee	Grantor	Sale Date	Sale Amount	Type	Reception	Sale Comments (Code)
SJC LAND & CATTLE CO	D W MELCHER	11/15/93	50000	BS	0	MULTIPLE PARCELS
CORE MOUNTAIN ENTERPRISES LLC	SJC LAND & CATTLE CO	08/17/06	65800	SW	145137	MULTIPLE PARCELS

No Photo available!

Legal Description:
INVINCIBLE - 15504 KLONDIKE NO 2 - 15061 LOUESIA - 15061 MOUNTAIN BOY - 15061 MOUNTAIN BOY EXT - 15061 OCCIDENTAL NO 2 - 15504

Land Area	Land Class	Land Value
4.78 Acres	Non-Producing Pat M	4640
9.024 Acres	Non-Producing Pat M	13090
3.99 Acres	Non-Producing Pat M	5790
7.784 Acres	Non-Producing Pat M	48030
9.674 Acres	Non-Producing Pat M	14030
9.963 Acres	Non-Producing Pat M	14450

********Historical values of land**********

Year	Actual Value	Assessed Value
2017	100030	29010
2016	29345	8511
2015	29345	8511
2014	65111	18883
2013	65111	18883
2012	67823	19668
2011	67823	19668

Distribution of tax dollars by taxing entity

Tax Entity Name	Levy	Tax Amount	% of Tot

Treasurer Tax Information

Year	Type	Paid Date	Amount	Balance
2016	MC DUE			**291.74**
2016	Payment	05/04/17	291.74	0

Additional Treasurer Fees

Special Improvements:	no
Property in Tax Sale:	no
Delinquent Payments:	no
Tax Sale Certificates Outstanding:	no
Advertising Charges due:	no

FOR the fees due on any of the above items, please call the Treasurer at 9703875488

City/Town: _____ Parcel Number: 47750270050003 Tax Status: Exempt Tax District: 101 12/01/17

Name: UNITED STATES OF AMERICA, BUREAU OF LAND MANAGEMENT,
Address: EUREKA MNG DISTRICT , CO **Mailing Address:** 2850 YOUNGFIELD ST LAKEWOOD, CO 80215

Grantee	Grantor	Sale Date	Sale Amount	Type	Reception	Sale Comments (Code)
USA BLM	TRUST FOR PUBLIC LAND	09/06/11	247500	GWD	148128	GOV, UTIL, CHARITY, ED
TRUST FOR PUBLIC LAND	D W MELCHER	06/07/11	110000	GWD	147935	GOV, UTIL, CHARITY, ED
D W MELCHER	SILVER BAY	04/27/90	0	TD	0	SEE COMMENT/FIELD CHEC
SJC LAND & CATTLE CO	D W MELCHER	11/16/93	50000	BS	0	MULTIPLE PARCELS

No Photo available!

Legal Description:
NATALIE - 15061

Land Area	Land Class	Land Value
7.64 Acres	Fed-Owned Pat Minin	7410

********Historical values of land**********

Year	Actual Value	Assessed Value
2017	7410	0
2016	6269	0
2015	6269	0
2014	4767	0
2013	4767	0
2012	4966	0
2011	4966	0

Treasurer Tax Information

Year	Type	Paid Date	Amount	Balance

Additional Treasurer Fees

Special Improvements:	no
Property in Tax Sale:	no
Delinquent Payments:	no
Tax Sale Certificates Outstanding:	no
Advertising Charges due:	no

FOR the fees due on any of the above items, please call the Treasurer at 9703875488

City/Town: _____ Parcel Number: 47750210050021 Tax Status: Active _____ Tax District: 101 12/01/17

Name: TAYLOR KENT,
Address: EUREKA MNG DISTRICT , CO **Mailing Address:** 5402 BULL RUN CIR AUSTIN, TX 78727

Grantee	Grantor	Sale Date	Sale Amount	Type	Reception	Sale Comments (Code)
TAYLOR KENT	SAN JUAN COUNTY TREASURER	04/05/17	0	TRES	151073	PRD/SHRF/PTD/TREAS/COR
BANGS WILLIAM M JR	BANGS WILLIAM M	08/25/11	0	QC	148123	RELATED PARTIES
BANGS WILLIAM M & WILLIAM M	SILVER BAY MINES	05/31/94	0	TD	0	SEE COMMENT/FIELD CHEC
MELCHER D W	PUBLIC TRUSTEE	04/27/90	0	TD	0	N/A

No Photo available!

Legal Description:
ORLEANS M S - 15061

Land Area	Land Class	Land Value
5 Acres	Non-Producing Pat M	30850

********Historical values of land**********

Year	Actual Value	Assessed Value
2017	30850	8947
2016	13348	3871
2015	13348	3871
2014	12000	3480
2013	12000	3480
2012	12500	3625
2011	12500	3625

Treasurer Tax Information

Year	Type	Paid Date	Amount	Balance
2016	MC DUE			**132.7**
2016	Payment	03/30/17	132.7	0

Distribution of tax dollars by taxing entity

Tax Entity Name	Levy	Tax Amount	% of Tot

Additional Treasurer Fees

Special Improvements:	no
Property in Tax Sale:	no
Delinquent Payments:	no
Tax Sale Certificates Outstanding:	no
Advertising Charges due:	no

FOR the fees due on any of the above items, please call the Treasurer at 9703875488

City/Town: _____ Parcel Number: 47750210050121 Tax Status: Active _____ Tax District: 101 12/01/17

Name: CORE MOUNTAIN ENTERPRISES LLC,
Address: EUREKA MNG DISTRICT , CO **Mailing Address:** PO BOX 856 SILVERTON, CO 81433

Grantee	Grantor	Sale Date	Sale Amount	Type	Reception	Sale Comments (Code)
CORE MOUNTAIN ENTERPRISES LLC	BANGS, WILLIAM M & JANIS M	08/12/11	8541	SWD	148086	MULTIPLE PARCELS
CORE MOUNTAIN ENTERPRISES LLC	BANGS WILLIAM M	08/28/00	1000	EA	140787	LAND USE CHANGE
WILLIAM M BANGS & WILLIAM M BA	SILVER BAY MINES	05/31/94	0	TD	0	SEE COMMENT/FIELD CHEC
MELCHER D W	PUBLIC TRUSTEE	04/27/90	0	TD	0	N/A

No Photo available!

Legal Description:
OCCIDENTAL - 15504 SILVER LEDGE - 15061

Land Area	Land Class	Land Value
10.331 Acres	Non-Producing Pat M	10020
8.128 Acres	Non-Producing Pat M	50150

********Historical values of land**********

Year	Actual Value	Assessed Value
2017	60170	17450
2016	21780	6316
2015	21780	6316
2014	17721	5139
2013	17721	5139
2012	18459	5353
2011	18459	5353

Treasurer Tax Information

Year	Type	Paid Date	Amount	Balance
2016	MC DUE			**216.5**
2016	Payment	05/04/17	216.5	0

Additional Treasurer Fees

Special Improvements:	no
Property in Tax Sale:	no
Delinquent Payments:	no
Tax Sale Certificates Outstanding:	no
Advertising Charges due:	no

FOR the fees due on any of the above items, please call the Treasurer at 9703875488

Distribution of tax dollars by taxing entity

Tax Entity Name	Levy	Tax Amount	% of Tot

City/Town: _____ Parcel Number: 47750280050002 Tax Status: Active Tax District: 101 12/01/17

Name: CORE MOUNTAIN ENTERPRISES LLC,
Address: EUREKA MNG DISTRICT , CO **Mailing Address:** PO BOX 856 SILVERTON, CO 81433

Grantee	Grantor	Sale Date	Sale Amount	Type	Reception	Sale Comments (Code)
CORE MOUNTAIN ENTERPRISES	BANGS, WILLIAM M. & JANICE M.	08/12/11	8541	SWD	148086	MULTIPLE PARCELS
CORE MOUNTAIN ENTERPRISES	BANGS WILLIAM M	08/28/00	1000	EA	140787	SEE COMMENT/FIELD CHEC
WILLIAM M BANGS & WILLIAM M BA	SILVER BAY MINES	05/31/94	0	TD	0	SEE COMMENT/FIELD CHEC
MELCHER D W	PUBLIC TRUSTEE	04/27/90	0	TD	0	N/A

No Photo available!

Legal Description:
MAGNOLIA - 15061 SILVER LEDGE EXT - 15061

Land Area	Land Class	Land Value
9.372 Acres	Non-Producing Pat M	13590
8.495 Acres	Non-Producing Pat M	8240

********Historical values of land**********

Year	Actual Value	Assessed Value
2017	21830	6331
2016	11746	3407
2015	11746	3407
2014	11149	3233
2013	11149	3233
2012	11614	3368
2011	11614	3368

Treasurer Tax Information

Year	Type	Paid Date	Amount	Balance
2016	MC DUE			**116.78**
2016	Payment	05/04/17	116.78	0

Additional Treasurer Fees

Special Improvements:	no
Property in Tax Sale:	no
Delinquent Payments:	no
Tax Sale Certificates Outstanding:	no
Advertising Charges due:	no

FOR the fees due on any of the above items, please call the Treasurer at 9703875488

Distribution of tax dollars by taxing entity

Tax Entity Name	Levy	Tax Amount	% of Tot

City/Town: _____ Parcel Number: 47750280050001 Tax Status: Active _____ Tax District: 101 03/14/18

Name: CORE MOUNTAIN ENTERPRISES LLC,
Address: EUREKA MNG DISTRICT , CO **Mailing Address:** PO BOX 654 SILVERTON, CO 81433

Grantee	Grantor	Sale Date	Sale Amount	Type	Reception	Sale Comments (Code)
SUNNYSIDE GOLD	WASHINGTON MINING	04/01/92	0	TA	141051	N/A
CORE MOUNTAIN ENTERPRISES, LLC	SUNNYSIDE GOLD CORP	02/16/01	20700	SW	141051	MULTIPLE PARCELS

No Photo available!

Legal Description:
ALEXANDER - 15504 CAMP BIRD - 15061 KLONDYKE - 15061 NAPOLEON - 15504

Land Area	Land Class	Land Value
9.885 Acres	Non-Producing Pat M	14340
9.548 Acres	Non-Producing Pat M	9260
5.991 Acres	Non-Producing Pat M	8580
9.187 Acres	Non-Producing Pat M	56690

********Historical values of land**********

Year	Actual Value	Assessed Value
2018	88870	25772
2017	88870	25772
2016	23086	6695
2015	23086	6695
2014	21597	6264
2013	21597	6264
2012	22497	6524

Treasurer Tax Information

Year	Type	Paid Date	Amount	Balance
2017	MC DUE			**879.7**

Distribution of tax dollars by taxing entity

Tax Entity Name	Levy	Tax Amount	% of Tot

Additional Treasurer Fees

Special Improvements:	no
Property in Tax Sale:	no
Delinquent Payments:	no
Tax Sale Certificates Outstanding:	no
Advertising Charges due:	no

FOR the fees due on any of the above items, please call the Treasurer at 9703875488

City/Town: _____ Parcel Number: 47750270050002 Tax Status: Exempt Tax District: 101 03/15/18

Name: UNITED STATES OF AMERICA, BUREAU OF LAND MANAGEMENT,
Address: EUREKA MNG DISTRICT , CO **Mailing Address:** 2850 YOUNGFIELD ST LAKEWOOD, CO 80215

Grantee	Grantor	Sale Date	Sale Amount	Type	Reception	Sale Comments (Code)
UNITED STATES OF AMERICA	SUNNYSIDE GOLD	09/26/11	0	QCD	148192	MULTIPLE PARCELS
SUNNYSIDE GOLD	WASHINGTON MINING	04/01/92	0	TA	0	N/A

No Photo available!

Legal Description:
CROESUS - 19150 DOROTHY - 15061 EASY STREET - 19150 FICTION - 19150 IRON CHANCELLOR - 13247 STELLA - 15061 STRANGER - 19150 SUMNER - 15061

Land Area	Land Class	Land Value
10.331 Acres	Fed-Owned Pat Minin	10020
10.331 Acres	Fed-Owned Pat Minin	10020
9.981 Acres	Fed-Owned Pat Minin	9680
4.663 Acres	Fed-Owned Pat Minin	4520
8.731 Acres	Fed-Owned Pat Minin	8470
10.29 Acres	Fed-Owned Pat Minin	9980

Only the first 6/8 land lines displayed!

********Historical values of land**********

Year	Actual Value	Assessed Value
2018	68460	0
2017	68460	0
2016	47824	0
2015	47824	0
2014	44046	0
2013	44046	0
2012	45882	13306

Treasurer Tax Information

Year	Type	Paid Date	Amount	Balance

Additional Treasurer Fees

Special Improvements:	no
Property in Tax Sale:	no
Delinquent Payments:	no
Tax Sale Certificates Outstanding:	no
Advertising Charges due:	no

FOR the fees due on any of the above items, please call the Treasurer at 9703875488

City/Town: _____ Parcel Number: 47750210050023 Tax Status: Active Tax District: 101 03/21/18

Name: CORE MOUNTAIN ENTERPRISES LLC,
Address: EUREKA MNG DISTRICT , CO **Mailing Address:** PO BOX 654 SILVERTON, CO 81433

Grantee	Grantor	Sale Date	Sale Amount	Type	Reception	Sale Comments (Code)
SUNNYSIDE GOLD	WASHINGTON MINING	04/01/92	0	TA	0	N/A
CORE MOUNTAIN ENTERPRISES, LLC	SUNNYSIDE GOLD CORP	02/16/01	20700	SW	141051	MULTIPLE PARCELS

No Photo available!

Legal Description:
KLONDYKE #3 - 15061 OCCIDENTAL #3 - 15504

Land Area	Land Class	Land Value
6.67 Acres	Non-Producing Pat M	9680
5.911 Acres	Non-Producing Pat M	36160

********Historical values of land**********

Year	Actual Value	Assessed Value
2018	45840	13293
2017	45840	13293
2016	14720	4269
2015	14720	4269
2014	12078	3503
2013	12078	3503
2012	12581	3648

Treasurer Tax Information

Year	Type	Paid Date	Amount	Balance
2017	MC DUE			**453.74**

Distribution of tax dollars by taxing entity

Tax Entity Name	Levy	Tax Amount	% of Tot

Additional Treasurer Fees

Special Improvements:	no
Property in Tax Sale:	no
Delinquent Payments:	no
Tax Sale Certificates Outstanding:	no
Advertising Charges due:	no

FOR the fees due on any of the above items, please call the Treasurer at 9703875488

Ref. 14

000001

CEMENT CREEK

RECLAMATION FEASIBILITY REPORT

UPPER ANIMAS RIVER BASIN

Jim Hei[illegible] nd Paul Krabacher

Colorad[illegible] als and Geology

[illegible]ember, 1998

1260037

Ref. 14

000001

CEMENT CREEK

RECLAMATION FEASIBILITY REPORT

UPPER ANIMAS RIVER BASIN

Jim Herron, Bruce Stover and Paul Krabacher

Colorado Division of Minerals and Geology

September, 1998

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CEMENT CREEK

RECLAMATION FEASIBILITY REPORT

UPPER ANIMAS RIVER BASIN

Jim Herron, Bruce Stover and Paul Krabacher

Edited by Anne Clift

Colorado Division of Minerals and Geology

Funded through Clean Water Act - 319 Grants

Special thanks to the Animas River Stakeholders

September, 1998

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INTRODUCTION

This report is intended to be a guidance document for use by the Animas River Stakeholders Group (ARSG) in prioritizing and planning water quality reclamation projects at mine sites in the Cement Creek basin in southwestern Colorado. The initial reconnaissance of the basin was performed by the Colorado Department of Public Health and Environment, Water Quality Control Division (WQCD) in 1991, 1992, and 1993. The water samples collected at that time bracketed the tributary streams of Cement Creek, but did not identify or sample individual sources. Based on those data, the Colorado Division of Minerals & Geology (DMG) conducted a more comprehensive reconnaissance to formulate a sampling plan for collecting and analyzing water quality and waste rock extract data. The DMG sampling program was conducted in 1996 and 1997 in accordance with this plan. The result of the DMG sampling program is this reclamation feasibility investigation. Using this report, the ARSG will prioritize the sites investigated and plan future reclamation work in the Cement Creek area.

The ultimate goal of this work is to improve the water quality and fisheries of the Animas River downstream of Silverton, Colorado by reclaiming abandoned mine sites upstream of Silverton. To achieve this goal, four reclamation feasibility investigations are planned for the Animas River watershed above Silverton. The first, which covered mining sites in the Mineral Creek area, was published in 1997. This report, which covers mining sites in the Cement Creek area, is the second to be published. The third, which will cover mining sites in the upper Animas River above the townsite of Eureka, is to be completed in 1999. Water quality sampling for that report will be completed in July 1998. The final report, which will cover mining sites in the Animas River between Silverton and the Eureka townsite is scheduled for completion in 2000.

GENERAL SITE DESCRIPTION

LOCATION

Cement Creek is located in San Juan County in the San Juan Mountains in southwestern Colorado. The creek is approximately eight miles long flowing from north to south into the Animas River at Silverton. Figure 1 is a general location map of the area.

Prospecting began in San Juan County in the 1860's. Mining began in the area in 1874. There are hundreds of abandoned mines and prospects in the Cement Creek drainage. Mining still continues today in the North Fork of Cement Creek.

Investigation of the water in Cement Creek was initiated as part of the effort to improve the water quality in the Animas River. The visual impact and unnatural color of Cement Creek targeted it for further investigation. Although there are numerous natural sources of metals in the basin, drainage from the abandoned mines in the area also contribute to the degradation of the water quality in Cement Creek and ultimately the Animas River. In addition, there are numerous waste rock piles,

Cement Creek Watershed
Scale: 1: 50,000
contour interval 80 feet
Base from USGS San Juan County Sheet, 1975
Red Mountain No 3
McMillan Peak
Chattanooga
Ohio Peak
Storm Peak
Tower Mountain
Macomber Peak
Gladstone
Bonita Peak
Silverton
Mayflower Mill
Tailings Ponds
Hillside Cem
Aspen Mine
Landing Strip
North Star Mine
Minnesota Gulch
Cascade Gulch
Grassy Gulch
Illinois Gulch
Hancock Gulch
Topeka Gulch
Niagara Gulch
Henrietta Gulch
Soda Gulch
Prospect Gulch
Georgia Gulch
Tiger Gulch
Big Colorado Mine
Fairview Gulch
Porcupine Gulch
Dry Gulch
Boulder Gulch
Minnehaha Basin
Ross Basin
Slagle Basin
Hematite Basin
Lark Mine
Brown Gulch
COLORADO
LOCATION DIAGRAM
N

Figure 1

which contribute acidic water and high metals to the creek.

GEOLOGY

The Cement Creek watershed lies within the Silverton Caldera, a regionally prominent Tertiary-aged volcanic center within the larger San Juan Volcanic Depression.

Stratigraphy

The Tertiary-age Silverton Volcanic Group underlies the Cement Creek area. Included in the Silverton Volcanic Group are the Burns Formation and overlying Henson Formation. A stratigraphic column of the units in the area is shown on Figure 2.

The Burns Formation consists dominantly of medium to dark, brown and black, thick, massive rhyodacite and quartz latite flows and flow breccias. This sequence of rocks has been divided into several units, including a lower flow-layered amphibole-bearing member, a pebble-tuff unit, and an upper, massive pyroxene-bearing member (Burbank and Luedke, 1969).

The overlying Henson Formation consists of dark, dense, coarse-grained porphyritic and amygdaloidal flows and flow breccias, and fine-grained sandy tuffs of andesitic and rhyodacitic composition. Although there are many interesting local variations in texture, volcanic structures, and mineralogy of the dark volcanic flows in the area, they are generally too localized and discontinuous to map, and these variations are not important for this investigation.

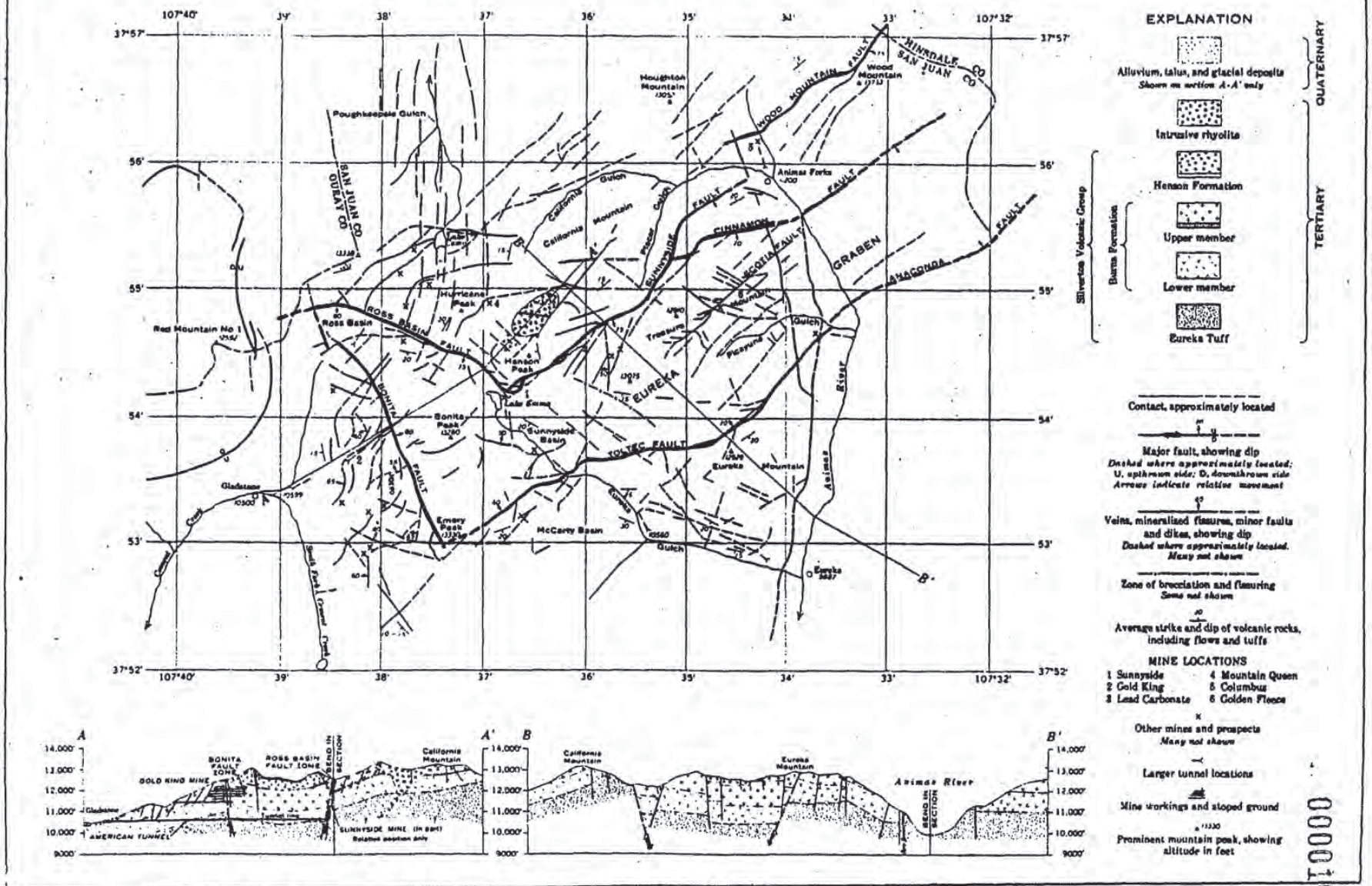
Structural Geology

Structurally, the Cement Creek basin lies in the northern part of the Silverton Volcanic Caldera. The basin is affected by both the ring-fault structure defining the western edge of the caldera and the Eureka Graben, which defines the down-dropped area within the caldera. The Eureka Graben is believed to have formed as the domed-up caldera rocks above active magma chambers relaxed and sagged back during periods of volcanic quiescence and magma retreat. During the various resurgences in volcanic activity through the late Tertiary, the faults bounding the graben were repeatedly reactivated. Today, the Eureka Graben is a boot-shaped graben bounded by a series of major, steeply dipping mineralized faults. (Burbank and Luedke, 1969)

Figure 2 is a map showing the structural geology of the area. The Cement Creek basin is situated inside the caldera, several miles east of the bordering ring-fault structure and at the southwest end of the Eureka Graben.

Hydrothermal Alteration

All the volcanic rocks in the San Juan Volcanic Depression were extensively propylitized and altered on a regional scale, prior to ore deposition. "Propylitic" alteration is a term used to describe a particular type of mineralogic and chemical changes which occurs by circulation of aqueous



GENERALIZED STRUCTURE MAP AND GEOLOGIC SECTIONS OF THE EUREKA, ANIMAS FORKS AND GLADSTONE AREAS, SAN JUAN COUNTY, COLORADO

Figure 2.
Plate 6 from USGS Prof. Paper 535, Burbanke and Luedke, 1969

hydrothermal solutions through the original volcanic rock mass. The addition of carbon dioxide and water to the rock mass results in mineralogical changes to the rocks. Propylitic alteration here is typified by the formation and addition of chlorite, calcite, and clays in weakly altered rocks, to epidote, albite, and chlorite in more intensely altered rocks. Propylitic alteration has resulted in a dull green or greenish gray color to virtually all of the Burns Formation rocks.

Rocks near the structural margin of the caldera and around volcanic breccia pipes have been highly altered by solfataric and hydrothermal processes. "Solfataric" processes have subjected the rock to attack and leaching by hot sulphurous gases and solutions moving upwards along the structural margin of the Silverton Caldera and Red Mountain graben. These hydrothermal processes have leached and "stewed" most of the base minerals from the rocks, while introducing such large amounts of sulphur that this type of solfatarically-altered terrain is readily distinguished from the surrounding regional propylitic alteration. Volcanic flows within the Red Mountain block forming the northwestern edge of the Cement Creek basin were so strongly altered and leached that little remains except silica, kaolinite, and sulfate and sulfide alteration products. Virtually all potential buffering minerals in the country rock have been leached away, leaving the quartz-allunite-pyrite alteration assemblage characteristic of the Red Mountain District. Bleaching of the rocks and subsequent surficial oxidation of the solfataric pyrite through geologic time has resulted in the brilliant red, orange, and yellow staining which characterizes the "Red" Mountains.

Wall rock adjacent to the vein deposits has been subjected to more intense but localized alteration processes. Wall rock alteration occurred episodically as the veins were reopened and subjected to successive phases of mineralization from solutions having often very different composition.

Manganese minerals are characteristic of alteration in the wall rocks of the major fault-fracture veins. Manganese from mineralizing solutions moving through the fissure veins has penetrated the wall rocks, leaving rhodonite and rhodocrosite alterations. Where weathered on the surface, these manganese-altered rocks often are conspicuous due to the characteristic black staining of manganese oxides (pyrolusite, psilomelane).

Surficial Geology

Many of the slopes in the Cement Creek basin are steep and prone to snow avalanches, rockfalls, and debris flows. Above timberline, rock outcrops dominate the landscape and soils are thin to patchy tundra varieties. Near the ridges bordering the basin are several active rock glaciers. The lower valley walls and valley floor are extensively mantled by talus deposits. Alluvial deposits are present on the valley floor in isolated patches.

BASELINE DATA COLLECTION

Water and waste rock samples were collected and analyzed to better understand the hydrology and chemistry of Cement Creek. Water quality data were collected by the WQCD in 1991, 1992

and 1993 during an initial reconnaissance of the area. Water samples were collected at 67 different sites along the creek. The locations of these sites are shown on Figures 3, 4 and 5 in smaller italicized underlined letters. The WQCD sampled these sites from one to four times during each of four sampling events. The samples collected were analyzed for various dissolved and total recoverable metals. The number of dissolved and total recoverable analytes varied with each sample event. These data are not included in this report, but are available from the WQCD at the Colorado Department of Public Health and Environment.

Based on the WQCD results, baseline water quality sampling was conducted by DMG in October 1996, and February and June 1997. Waste rock sampling was conducted by the DMG in August 1996. The sampling program, collection and analysis methods are discussed below. For sampling purposes, the Cement Creek basin was divided into three major areas. These include Upper Cement Creek upstream of about Gladstone, Prospect Gulch and Lower Cement Creek, downstream of Gladstone. The locations of these sampling areas are shown on Figure 1.

SAMPLING OF WATER QUALITY

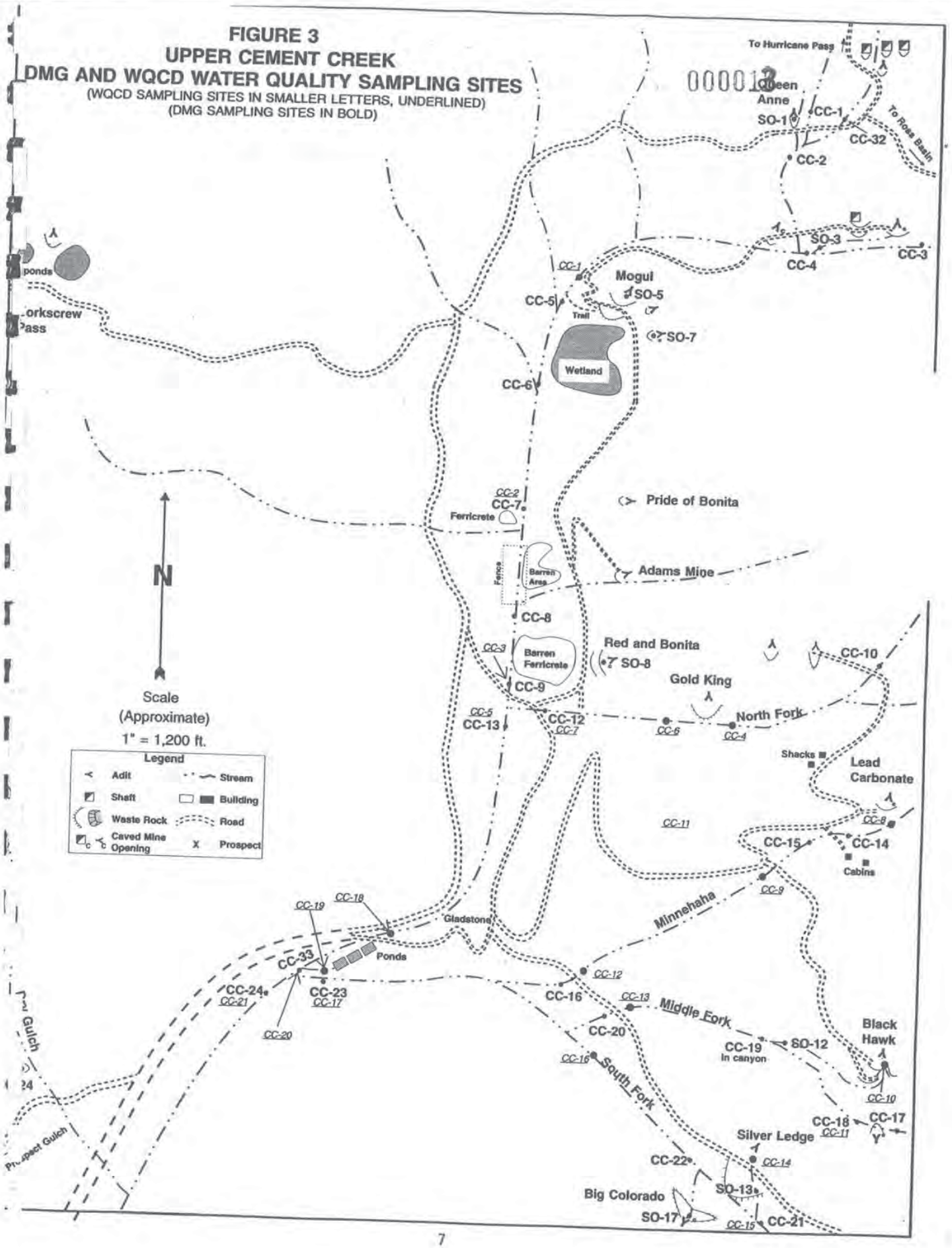
The DMG sampled along Cement Creek during the low-flow and high-flow regimes to determine the extremes in the amount of heavy metals contributed by various sources. Water samples were taken on October 1, 1996 to obtain low-flow data, February 25, 1997 to obtain absolute low-flow data at accessible sites, and June 25 and 26, 1997 to obtain high-flow data. The results showed that the flows measured during February were higher than those measured during October.

Water samples were taken in Cement Creek above and below sites identified as potential sources during reconnaissance investigations. The DMG sampling plan included collecting dissolved metal, total recoverable metal, and major cation and anion samples at 72 different locations in the Cement Creek watershed. A list of the sampling sites, their locations, the figures on which the location is shown and the time of year at which sampling was performed at that location is provided in Table 1. The locations of the sampling sites are shown on Figures 3, 4 and 5 in larger bold letters.

The low-flow (October 1996) and high-flow (June 1997) sampling events provide data on the range of metals loading in Cement Creek. The flow in Cement Creek during the low-flow sampling event was much lower than had been observed by the authors during any of the previous sampling events. Likewise, the flow in Cement Creek and its tributaries during the high-flow sampling event was higher than previously observed. The June 1997 samples were taken shortly after Cement Creek reached its peak flow in 1997.

Water quality samples were collected by teams comprised of individuals from various government agencies and volunteers. Raw depth-integrated samples were taken in the stream. The total recoverable metals samples were then transferred directly to pre-cleaned pre-acidified 250 ml. sample bottles; anion samples were transferred to pre-cleaned neutral 250 ml. sample bottles; and dissolved metals samples were taken by filtering the raw water through a 0.45 micron filter into a pre-cleaned pre-acidified 250 ml. sampling bottle. After sampling, the samples were placed in coolers, and the anion samples were iced. All sampling activities were completed at the sampling

FIGURE 3
UPPER CEMENT CREEK
DMG AND WQCD WATER QUALITY SAMPLING SITES
(WQCD SAMPLING SITES IN SMALLER LETTERS, UNDERLINED)
(DMG SAMPLING SITES IN BOLD)



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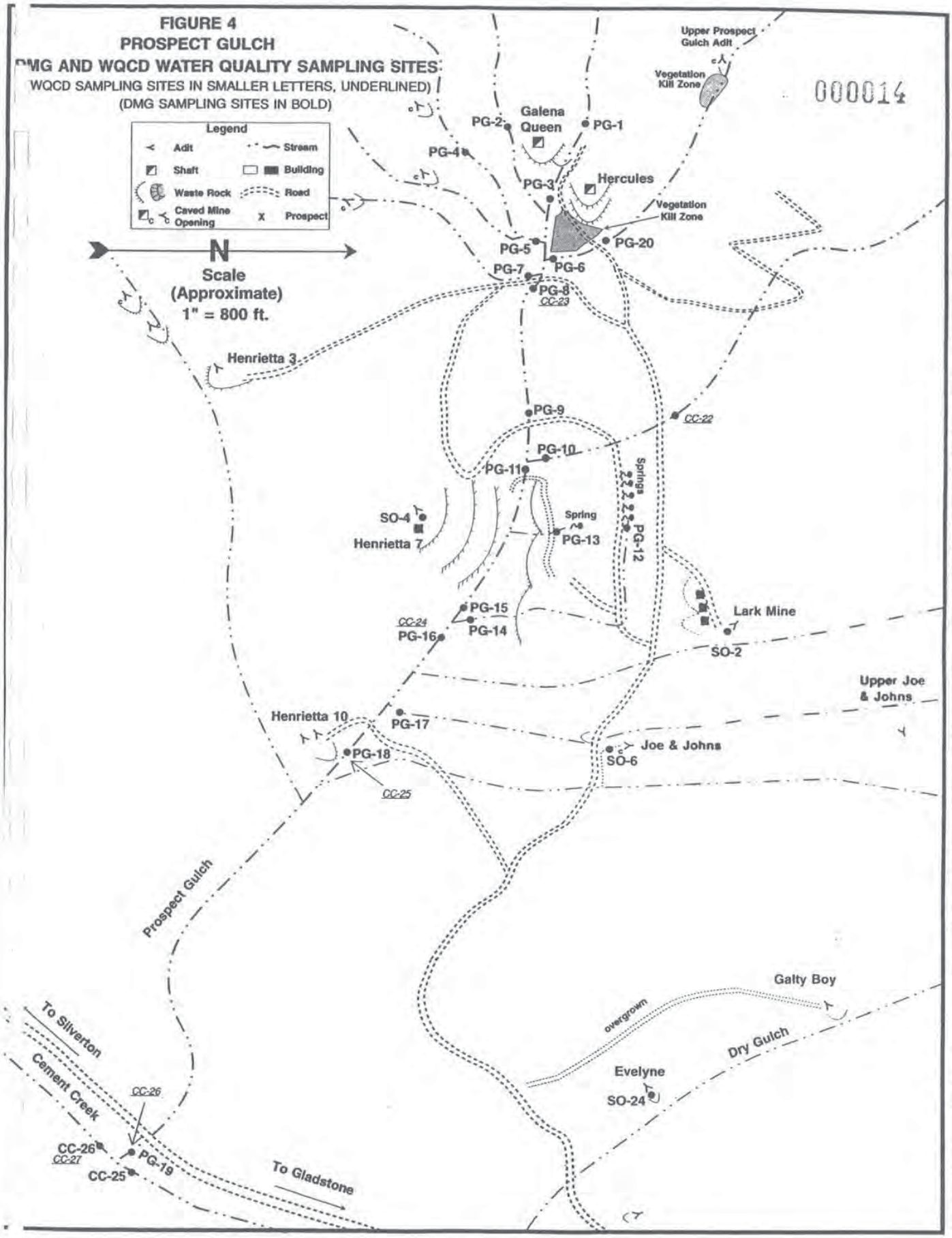


FIGURE 4
PROSPECT GULCH
DMG AND WQCD WATER QUALITY SAMPLING SITES
(WQCD SAMPLING SITES IN SMALLER LETTERS, UNDERLINED)
(DMG SAMPLING SITES IN BOLD)
000014
Legend
Adit
Stream
Shaft
Building
Waste Rock
Road
Caved Mine Opening
Prospect
N
Scale
(Approximate)
1" = 800 ft.
Upper Prospect Gulch Adit
Vegetation Kill Zone
Galena Queen
PG-1
PG-2
PG-3
PG-4
Hercules
Vegetation Kill Zone
PG-5
PG-6
PG-7
PG-8
CC-23
PG-20
Henrietta 3
PG-9
CC-22
PG-10
PG-11
Springs
SO-4
Henrietta 7
Spring
PG-13
PG-12
PG-15
PG-14
CC-24
PG-16
Lark Mine
SO-2
Upper Joe & Johns
Henrietta 10
PG-17
PG-18
CC-25
Joe & Johns
SO-6
Prospect Gulch
Galty Boy
overgrown
Dry Gulch
Evelyne
SO-24
To Silverton
Cement Creek
CC-26
CC-26
CC-27
PG-19
CC-25
To Gladstone

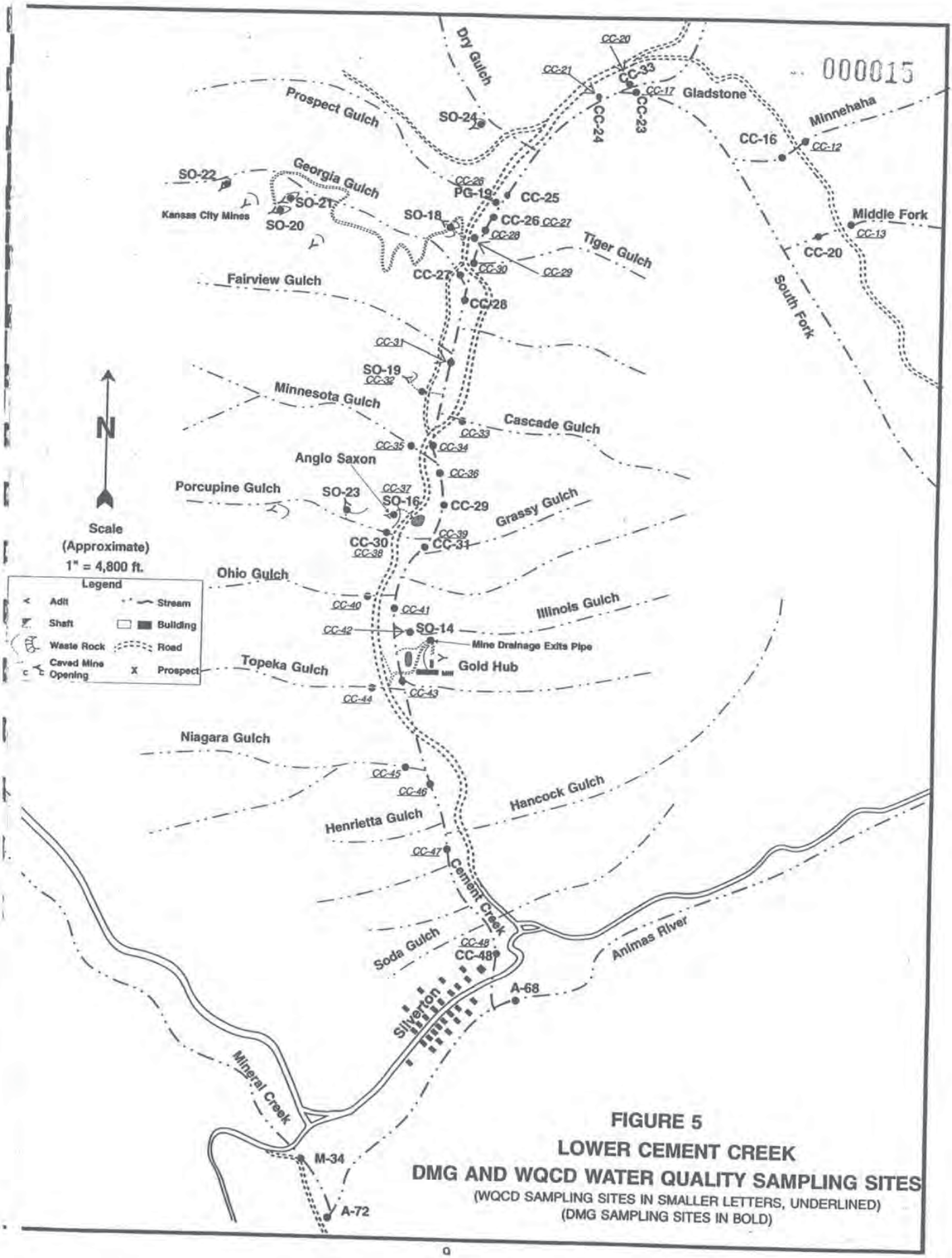


FIGURE 5
LOWER CEMENT CREEK
DMG AND WQCD WATER QUALITY SAMPLING SITES
(WQCD SAMPLING SITES IN SMALLER LETTERS, UNDERLINED)
(DMG SAMPLING SITES IN BOLD)

Table 1. DMG Sampling Program in 1996 and 1997

Sample No.	Location	Shown on Figure #	Oct. 1996	Feb. 1997	June 1997	Comments
A-68	Silverton Co.	5	X			
A-72	Silverton Co. G.S. Gage	5	X			
CC-1	Above Queen Anne	3	X		X	
CC-2	CC Below Queen Anne	3	X		X	
CC-3	Background Below Ross Basin	3	X		X	
CC-4	CC Below SO-3	3	X		X	
CC-5	CC Above Mogul	3	X		X	
CC-6	CC Below Mogul	3	X		X	
CC-7	CC Above Ferricrete	3	X		X	
CC-8	Below North Ferricrete	3	X		X	
CC-9	Below Lower Ferricrete	3	X		X	
CC-10	Background North Fork	3				No flow in Oct. 1996, under snow in June 1997
CC-12	North Fork above CC	3	X		X	
CC-13	Below North Fork	3	X		X	
CC-14	Minnehaha Background	3			X	No flow in Oct. 1996; had subsurface flow as evidenced by flow below CC-14 and CC-17 and flow above CC-27
CC-15	Minnehaha Below Lead Carbonate	3	X		X	
CC-16	Minnehaha Above SF	3, 5	X		X	
CC-17	Middle Fork Above Mine Blockage	3			X	No flow in Oct. 1996; had subsurface flow as evidenced by flow below CC-14 and CC-17 and flow above CC-27
CC-18	Middle Fork Below Mine Blockage	3				No flow in Oct. 1996, under snow in June 1997
CC-19	MF Below Blackhawk	3	X		X	
CC-20	MF Above SF	3, 5	X		X	
CC-21	SF Above Silver Ledge	3	X		X	
CC-22	SF Below Silver Ledge	3	X		X	
CC-23	SF Above CC	3, 5	X	X	X	
CC-24	CC Below SF	3, 5	X	X	X	
CC-25	CC Above Prospect Gulch	4, 5	X	X	X	
CC-26	CC Below Prospect	4, 5	X	X	X	
CC-27	Georgia Gulch Above Confluence	5			X	No flow in Oct. 1996; had subsurface flow as evidenced by flow below CC-14 and CC-17 and flow above CC-27
CC-28	CC Below Georgia Gulch	5	X		X	
CC-29	CC Above Porcupine Gulch	5	X	X	X	
CC-30	Porcupine Gulch Above CC	5	X	X	X	
CC-31	CC Below Porcupine	5	X	X	X	
CC-32	Below Hurricane Mine Complex	3			X	No flow in Oct. 1996
CC-33	CC Below Sunnyside Ponds	3, 5	X	X	X	
CC-48	Cement Creek Gage	5	X			
DG-1	Deadwood Gulch	-			X	Along segment 4A; Concentrations only
EP-1	Elk Park	-			X	Along segment 4A; Concentrations only
KC-1	Kendall Creek	-			X	Along segment 4A; Concentrations only
M-34	Mineral Creek Gage	5	X			

Table 1. DMG Sampling Program in 1996 and 1997 (continued)

Sample No.	Location	Shown on Figure #	Oct. 1996	Feb. 1997	June 1997	Comments
PG-1	Background-Upper Prospect	4	X		X	
PG-2	Background-Upper Prospect	4	X		X	
PG-3	Below Galena Queen	4	X		X	
PG-4	Background-Upper Prospect	4	X		X	
PG-5	Below Mine Drainages	4	X		X	
PG-6	Tributary Below Hercules	4	X		X	
PG-7	Tributary Below Draining Mine	4	X		X	
PG-8	Below Upper Mines	4	X		X	
PG-9	Below Mineralized Canyon	4	X		X	
PG-10	Undisturbed Tributary	4	X		X	
PG-11	Above Henrietta 7	4	X		X	
PG-12	Spring	4			X	No flow in Oct. 1996
PG-13	Spring	4			X	No flow in Oct. 1996
PG-14	Tributary Below Lark & Mine Waste	4			X	No flow in Oct. 1996
PG-15	Below Henrietta 7	4			X	Not sampled in Oct. 1996; bracketed PG-14 which was dry
PG-16	Below Tributary PG-14	4	X		X	
PG-17	Below Joe & Johns Tributary	4			X	No flow in Oct. 1996
PG-18	Above Henrietta 11	4	X		X	
PG-19	Prospect Gulch Above Confluence	4		X	X	Inadvertently not sampled in Oct. 1996
PG-20	Tributary Above Hercules	4			X	
SO-1	Queen Anne	3	X		X	
SO-2	Lark Mine	4			X	Added at Lark Mine in June 1997
SO-3	Grand Mogul	3	X		X	
SO-4	Henrietta 7 Mine	4			X	No flow in Oct. 1996
SO-5	Mogul	3	X		X	
SO-6	Joe & Johns	4	X		X	
SO-7	Mine South of Mogul	3			X	No flow in Oct. 1996
SO-8	Red & Bonita Mine	3			X	No flow in Oct. 1996
SO-12	Black Hawk Mine	3	X		X	
SO-13	Silver Ledge	3	X		X	
SO-14	Yukon Tunnel	5	X		X	
SO-16	Anglo Saxon	5	X		X	
SO-17	Big Colorado	3	X		X	
SO-18	Mammoth Tunnel	5	X		X	
SO-19	Adit Below Georgia Gulch	5	X		X	
SO-20	Kansas City Adit #1	5	X		X	
SO-21	Kansas City Adit #2	5			X	No flow in Oct. 1996
SO-22	Kansas City Mines	5				No flow in Oct. 1996, under snow in June 1997
SO-23	Porcupine Gulch Adit	5	X		X	
SO-24	Dry Gulch Adit (Adelaide)	3, 4, 5	X		X	
UK-1	1st East Trib. Below Deer Creek	-			X	Along segment 4A; Concentrations only

site. During the October 1996 and February 1997 sampling, the pH and electrical conductivities were taken in-stream at the sampling site. During the June 1997 sampling, pH and electrical conductivities were measured from a raw water sample collected at the stream sites, and measurements were taken directly from the flow for the mine drainage samples.

During the October 1996 and February 1997 sampling events, flow measurements were taken at the same time that the water quality samples were collected. Water quality sampling and flow measurements were taken by continually moving up the watershed during the day. During the June 1997 sampling event, all the water quality samples were taken in a one hour period between 10:00 a.m. and 11:00 a.m. This was done to limit the effects of diumal flow variations in the streams. After the samples were taken, flow measurements were taken, then adjusted to the flow at 11:00 a.m., based upon duplicate flow measurements taken at various stations during the day and continuous measurements at the Cement Creek Gage (DMG sampling site CC-48 located near Silverton, as shown on Figure 5).

The October 1996 low-flow data is presented in Appendix 1 of this report. The February 1997 data is presented in Appendix 2. The June 1997 high-flow data is presented in Appendix 3. It should be noted that the metals data in the appendices are reported in grams per day, whereas throughout the text, these data are reported in pounds per day. This was done to enable the reader to visualize the amounts better. To convert pounds to grams, multiply the number of pounds by 453.6. Conversely, to convert grams to pounds, divide the number of grams by 453.6.

SAMPLING OF WASTE ROCK

Waste rock samples were collected at 44 different locations in Cement Creek in August 1996. These locations are shown on Figures 6, 7 and 8. This investigation was conducted to provide information on waste rock piles sufficient to allow the Animas River Stakeholders Group to prioritize mine sites for reclamation, using the limited funds available. Samples were collected from 40 waste rock sites and four soil/outcrop sample sites in the Cement Creek watershed.

A 2:1, by volume, extract was collected in the field. The extract was analyzed for field parameters, then a portion was analyzed in the laboratory for heavy metals.

Waste rock and soil/outcrop samples were collected from a minimum of ten and maximum of twenty locations at each site. Acid-washed plastic 100 ml. beakers were used to remove the top two inches of material. The 10+ sub-samples from each site were composited in a 1-gallon recloseable plastic bag. The composited samples were thoroughly mixed in the field by inverting the bag numerous times. After mixing, 150 ml. of sample was removed and placed in a 1 liter plastic beaker along with 300 ml. of deionized water. The wetted sample was then vigorously mixed for 15 seconds, and plastic wrap was placed over the top. The sample was left to settle for 90 minutes, which is the amount of time it takes for the clay fraction to settle to the bottom of the beaker.

Composite Extract

FIGURE 6
UPPER CEMENT CREEK
WASTE ROCK SAMPLING SITES

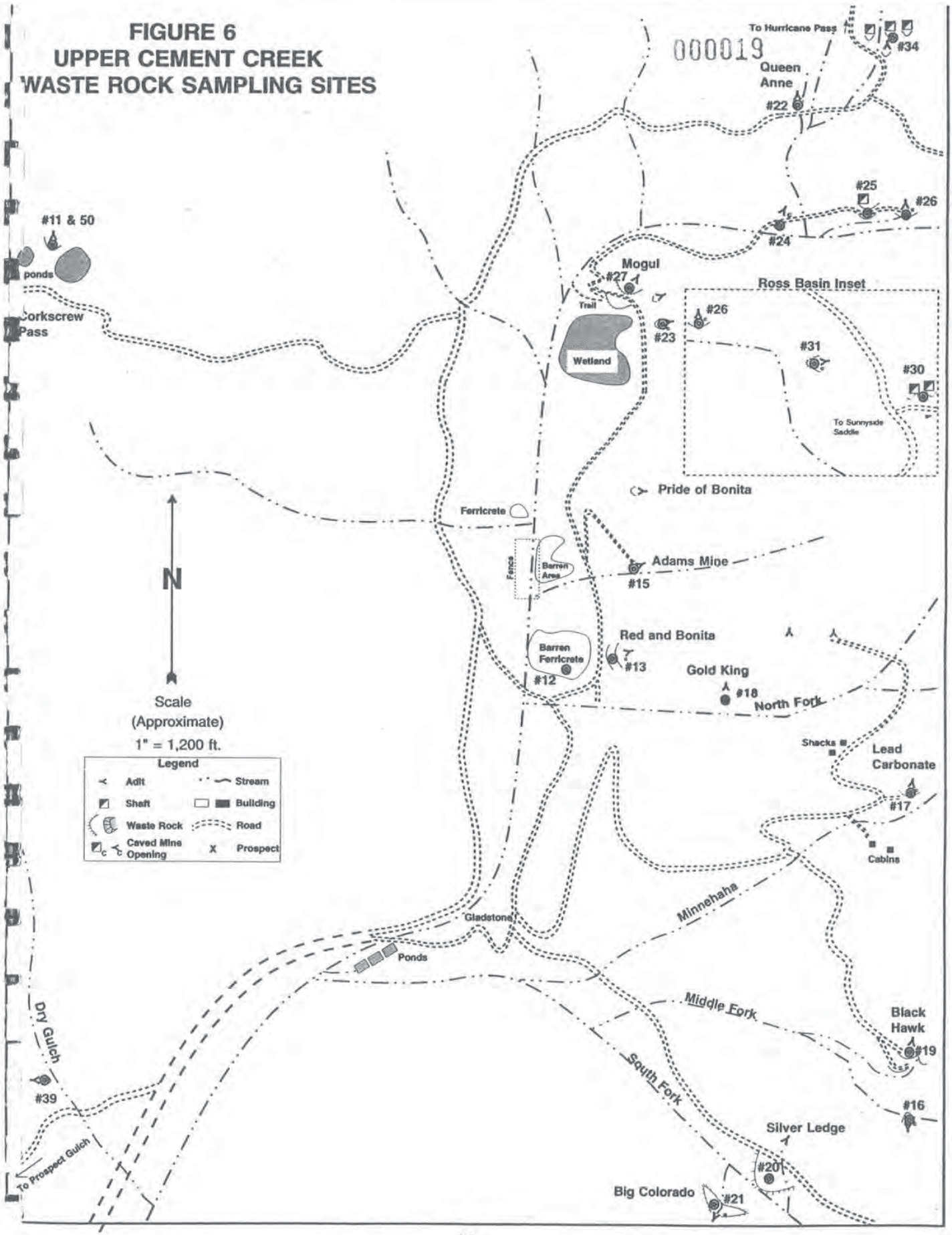
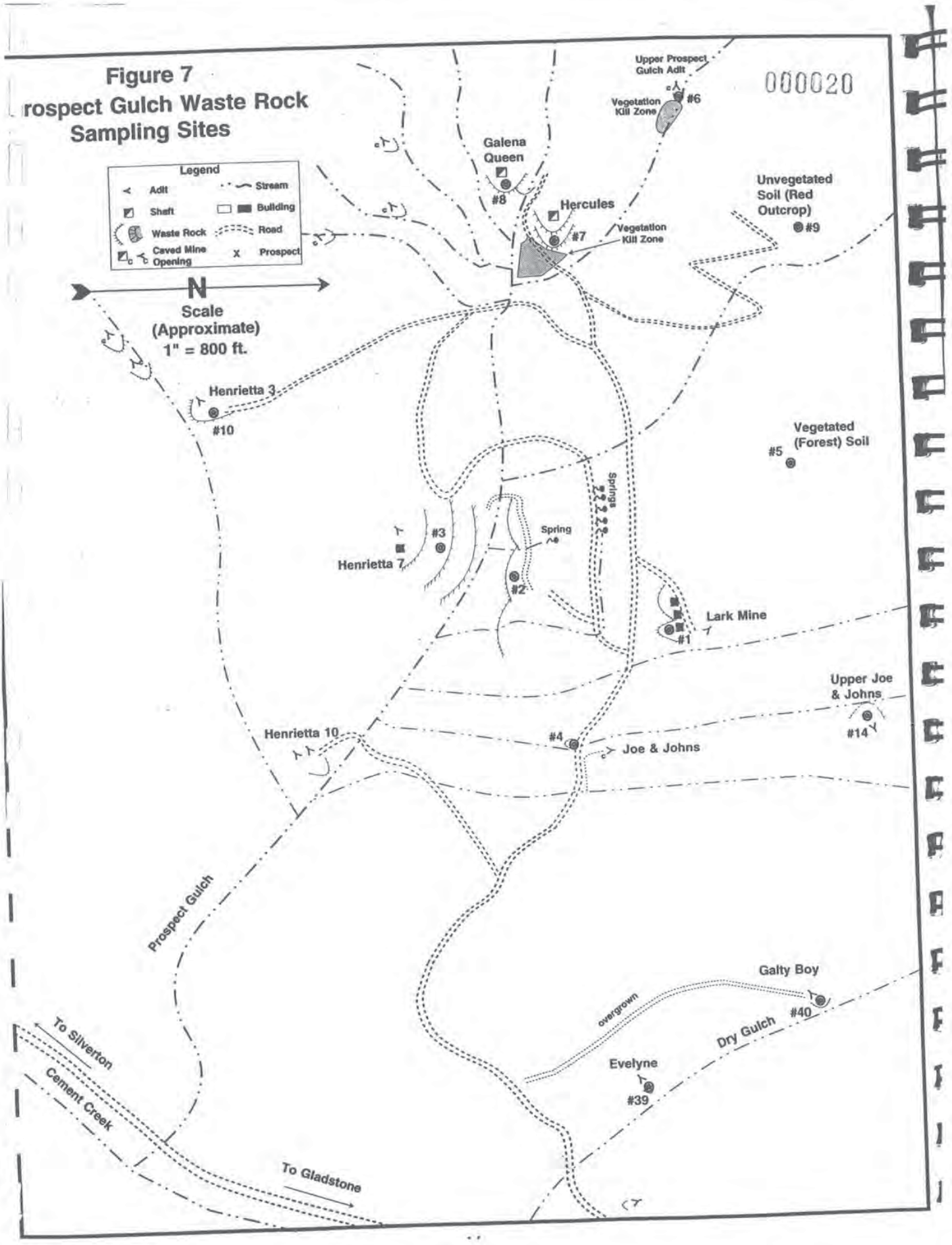


Figure 7
rospect Gulch Waste Rock Sampling Sites



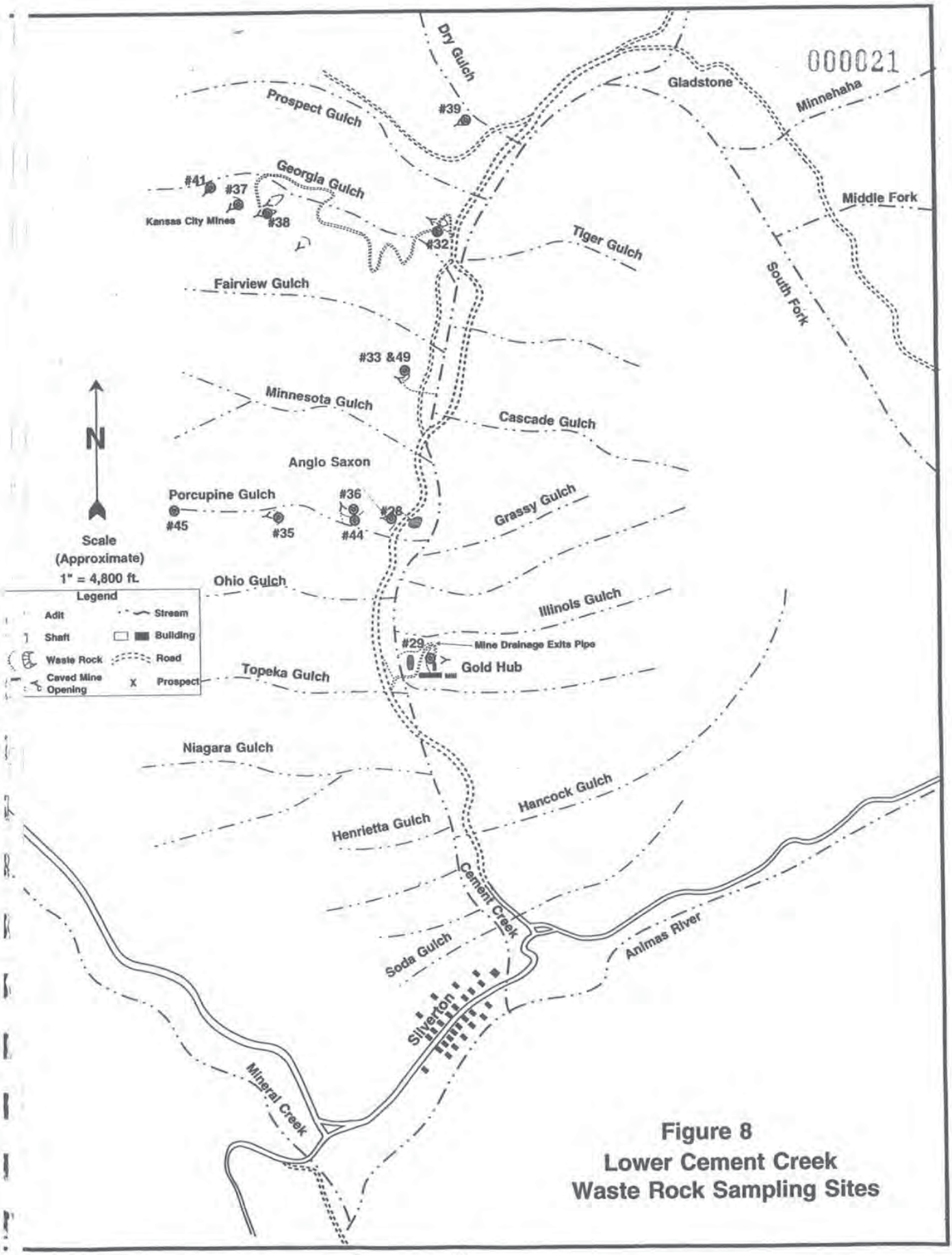


Figure 8
Lower Cement Creek
Waste Rock Sampling Sites

After 90 minutes, the liquid was filtered through very fine grade soil filters (approximately 2 microns). A portion of the liquid was used to measure the total alkalinity, pH, specific conductance, and sulfates. The remaining liquid was acidified with nitric acid for lab analysis. Total alkalinity was determined using a Hach digital titrator to reach a phenolthalein end-point. Specific conductance and pH were measured with a HyDAC instrument. Sulfates were measured using a Hach DR700 Colorimeter.

The data from the waste rock sampling are presented in Appendix 4. Results for total acidity, dissolved copper, iron and zinc are also reported on the maps on Figures 9, 10 and 11.

A brief discussion of the sampling results is warranted. Natural background samples were taken at four sites (#5, #9, #43, #45). Locations of these sampling sites are shown on Figures 7 and 8. Results for total acidity, dissolved copper, iron and zinc at these sites are shown on Figures 10 and 11. The total acidity and sulfate values for these samples are shown below.

Natural Soil and Outcrops

Site	Total Acidity (mg/l)	ICP Sulfate (mg/l)
#5 - Vegetated (Forest) Soil	18	7
#9 - Unvegetated Soil (Red Outcrop)	16	4
#43 - Ohio Gulch	60	87
#45 - Porcupine Gulch	2735	2517

The total acidity and sulfate values from the natural soils and outcrops are less than 100 mg/l, except for Porcupine Gulch, which is two orders of magnitude higher. The sample taken at Porcupine Gulch consisted of solfatarically-altered outcrop material. These rocks have been so strongly altered and leached by hot sulphurous gases and solutions during Tertiary volcanism, that virtually all potential buffering minerals have been leached away, leaving only silica, kaolinite, and sulfate and sulfide alteration products. Subsequent surficial oxidation of the solfataric pyrite has caused the material to be high in sulfates and extremely acidic.

Average total acidity and sulfate values from the waste piles sampled in the Cement Creek area are 1000 and 1400 mg/l respectively. These data indicate that the waste rock piles produce two orders of magnitude more sulfate than the natural soils and outcrops (not including the solfatarically-altered material).

WATERSHED CHEMISTRY

The water chemistry of Cement Creek is very complex, because there are both natural metals

FIGURE 9
UPPER CEMENT CREEK
MINING WASTE SAMPLES
SELECTED RESULTS OF EXTRACT ANALYSES

Concentrations in ppm

(TA=Acidity)

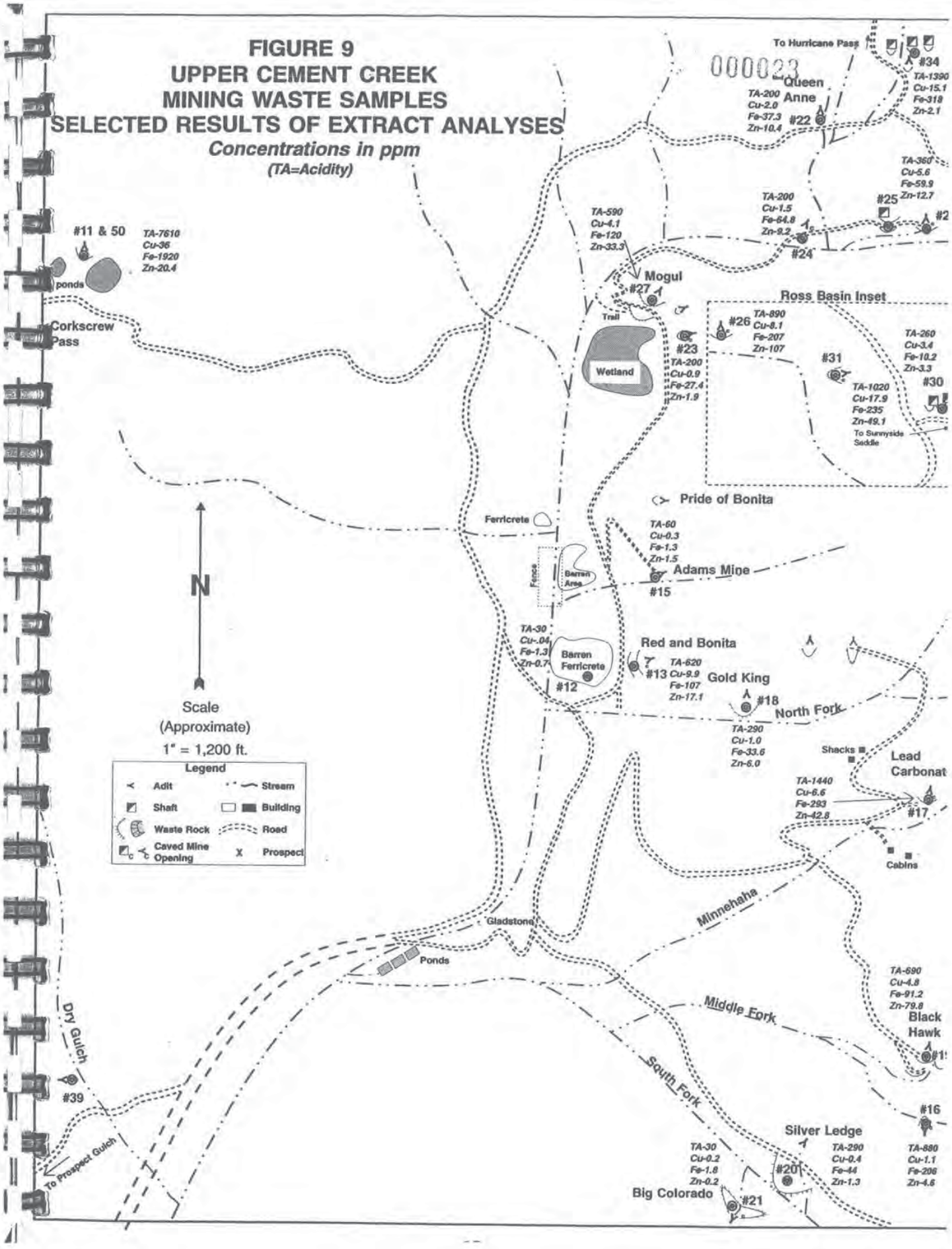
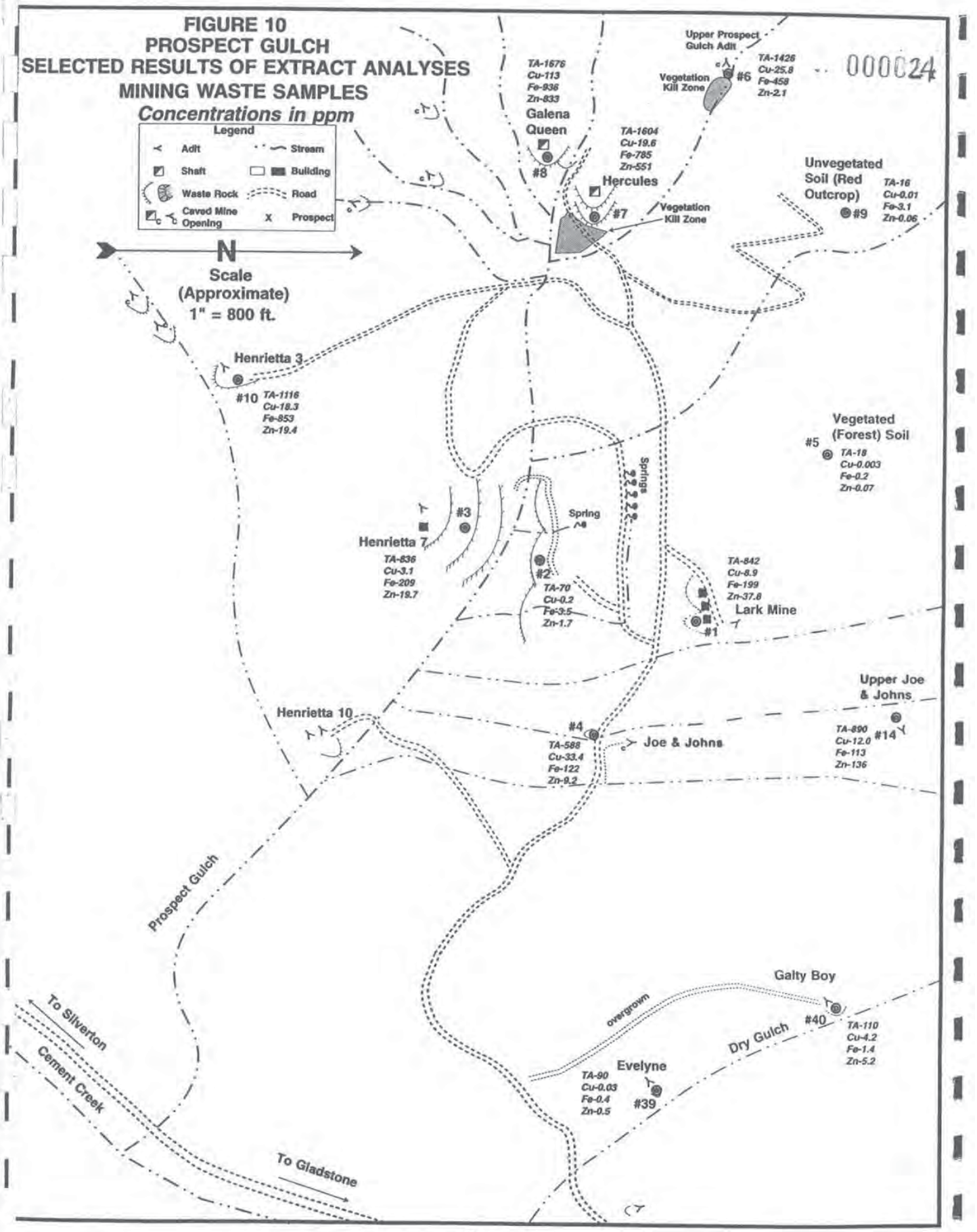


FIGURE 10
PROSPECT GULCH
SELECTED RESULTS OF EXTRACT ANALYSES
MINING WASTE SAMPLES
Concentrations in ppm



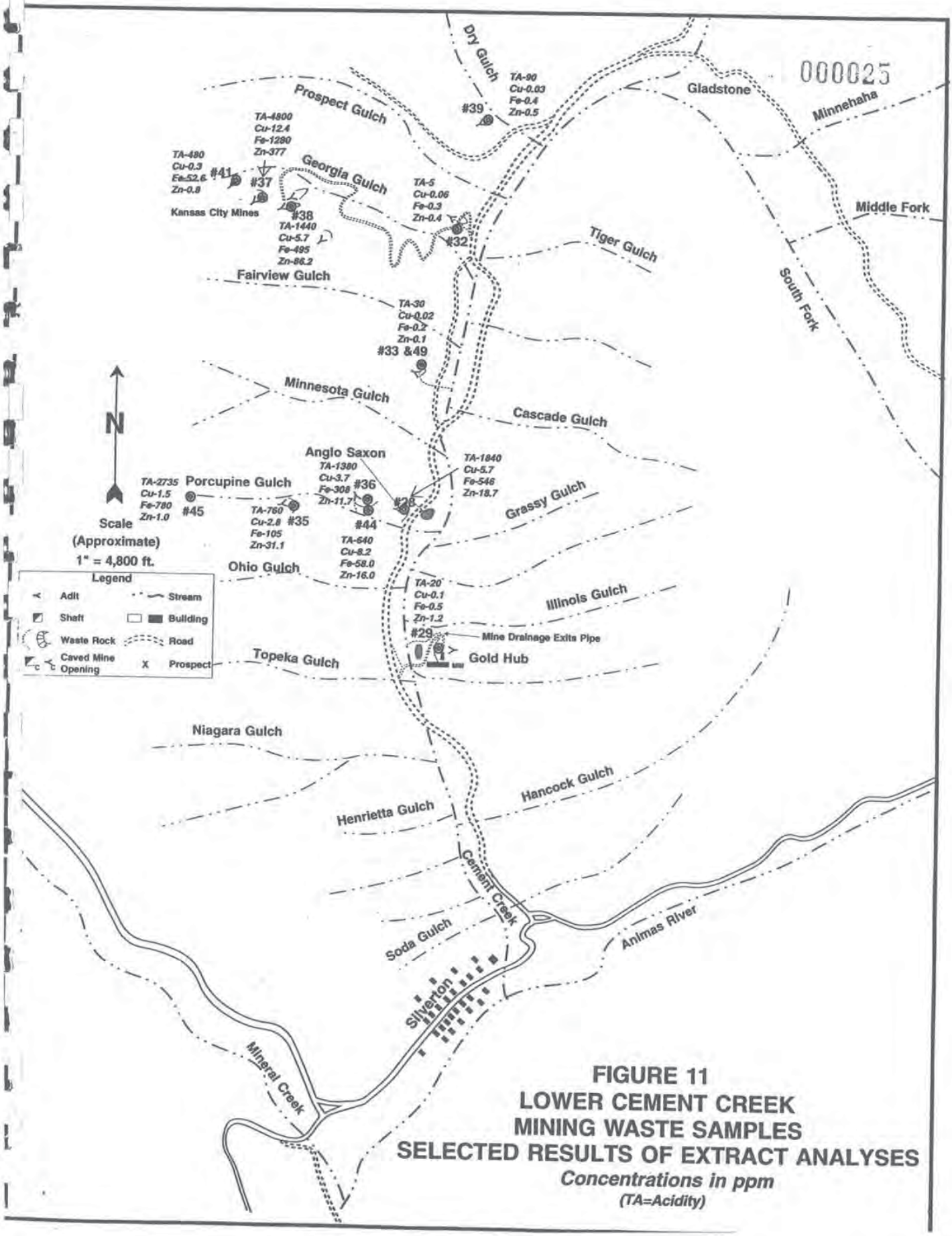


FIGURE 11
LOWER CEMENT CREEK
MINING WASTE SAMPLES
SELECTED RESULTS OF EXTRACT ANALYSES
Concentrations in ppm
(TA=Acidity)

loading and mining-related metals loading affecting the creek. Also, because of the varying geology within the Cement Creek watershed, the speciation of heavy metals in the tributaries varies in several major regions.

Water samples were tested for the concentration of many different metal types, but zinc, iron and copper are thought to be the principal metals impacting the aquatic life in the Animas River. Therefore, the focus in the following discussion will be on these three constituents. Upper Cement Creek and Prospect Gulch are the major source areas for zinc and copper. The South Fork of Cement Creek and Cement Creek below Gladstone are principally iron loaders, but also produce considerable zinc. The iron bogs between Gladstone and Georgia Gulch are a major source of iron.

Using the data collected, concentrations and loads of key metals were tabulated for each site. Concentration data are reported here in ug/l. Concentration data are useful primarily for evaluating the biological effects of the constituents in the water. Load data are reported here in grams or kilograms per day or pounds per day. Load indicates the total amount of constituent carried by the water. Load equals the concentration times the amount of flow, so it varies with the amount of flow. Load is useful in identifying source areas for the constituents. Both concentration and load are reported in Appendices 1, 2 and 3. It should be noted that the load data in the appendices are reported in grams per day, whereas load data in the text are discussed in pounds per day. This was done to enable the reader to visualize the amounts better. To convert pounds to grams, multiply the number of pounds by 453.6. Conversely, to convert grams to pounds, divide the number of grams by 453.6.

It is worthy to note that there is a water treatment system near Gladstone for the drainage from the American Tunnel. The location of this system is shown on Figure 3 as the series of settling ponds between WQCD sampling sites *CC-18* and *CC-19*. This treatment system, operated by Sunnyside Gold Corporation, consists of a lime neutralization system with settling ponds. During low-flow, virtually all the drainage in Cement Creek is passed through the treatment system. Therefore, all the flow in Cement Creek during the September 1996 and February 1997 sampling events was being treated by the Sunnyside Gold treatment system. During the high-flow sampling event, the majority of the flow in Cement Creek was bypassing the treatment system.

Figures 12 through 23 present the concentrations and loads of zinc, iron and copper found during high-flow sampling and low-flow sampling in Upper Cement Creek, Prospect Gulch and Lower Cement Creek. Load data on the figures are shown in kilograms/day, but discussed in the text in pounds/day. As previously mentioned, this is to enable the reader to better visualize these quantities. To convert pounds to kilograms, divide the number of pounds by 2.2046. Conversely, to convert kilograms to pounds, multiply the number of kilograms by 2.2046.

CEMENT CREEK IN-STREAM ZINC

During low-flow, there was virtually no zinc load from the headwaters of Cement Creek near Hurricane Pass, although the concentrations were 225 ug/l (Figures 12 and 13). There are a large

FIGURE 12
UPPER CEMENT CREEK
DISSOLVED Zn, Fe, & Cu CONCENTRATIONS
DURING LOW-FLOW, 1996
(Concentrations in ug/l)

000027

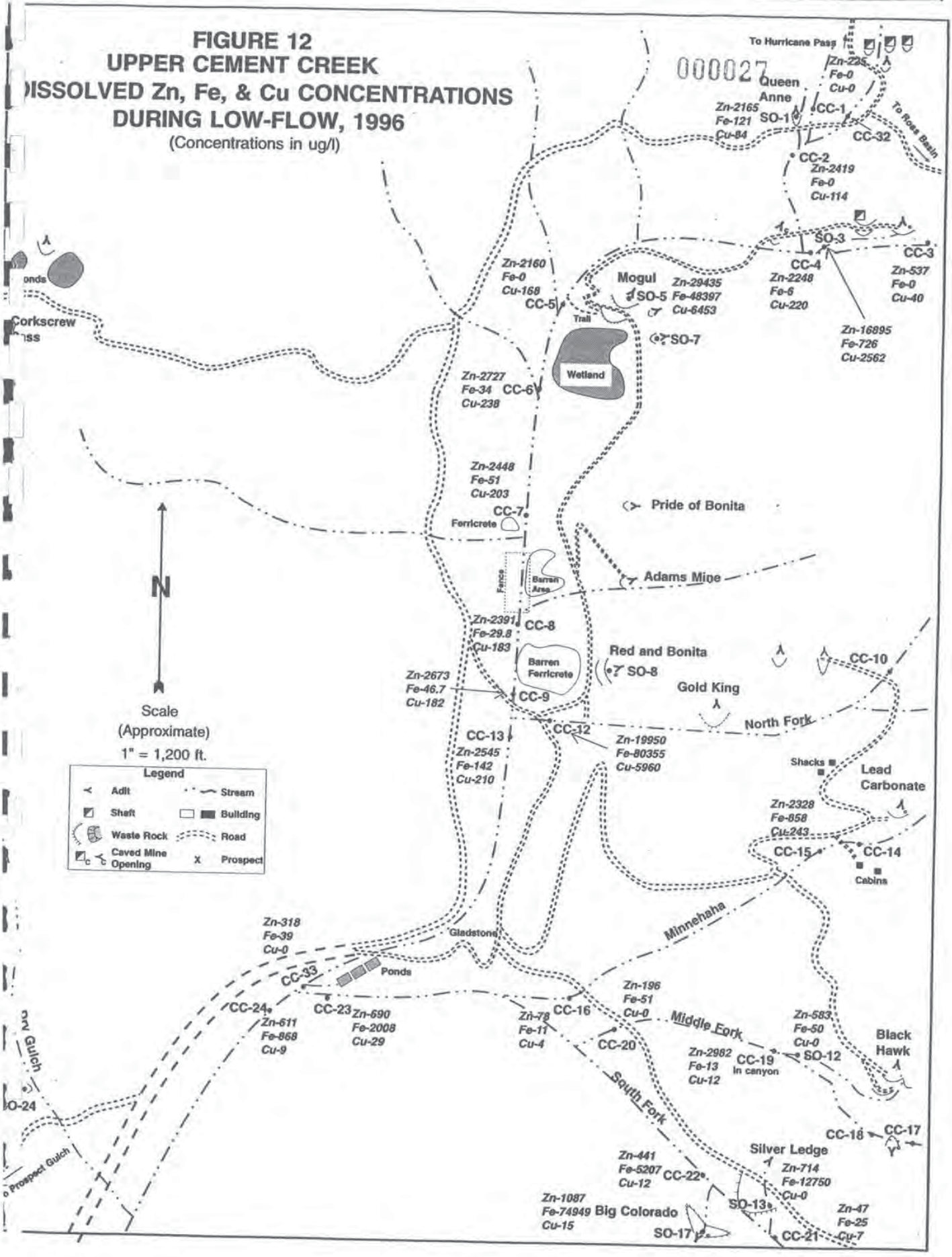


FIGURE 13
UPPER CEMENT CREEK
DISSOLVED ZINC, IRON, AND COPPER LO...
DURING LOW-FLOW, 1996
(Loads in Kg/day)

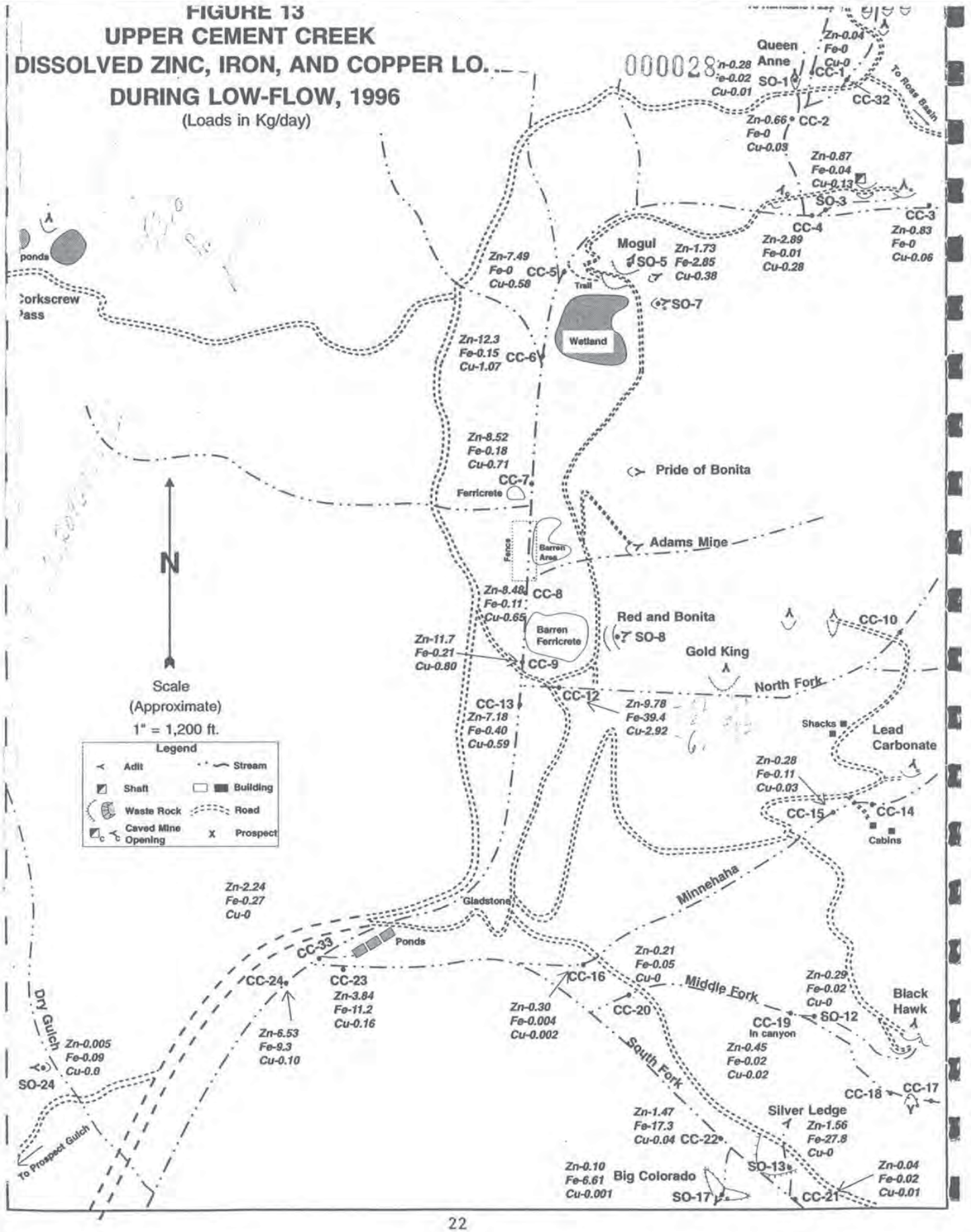


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FIGURE 14
UPPER CEMENT CREEK
DISSOLVED Zn, Fe, & Cu CONCENTRATIONS
DURING HIGH-FLOW, 1997
(Concentrations in ug/l)

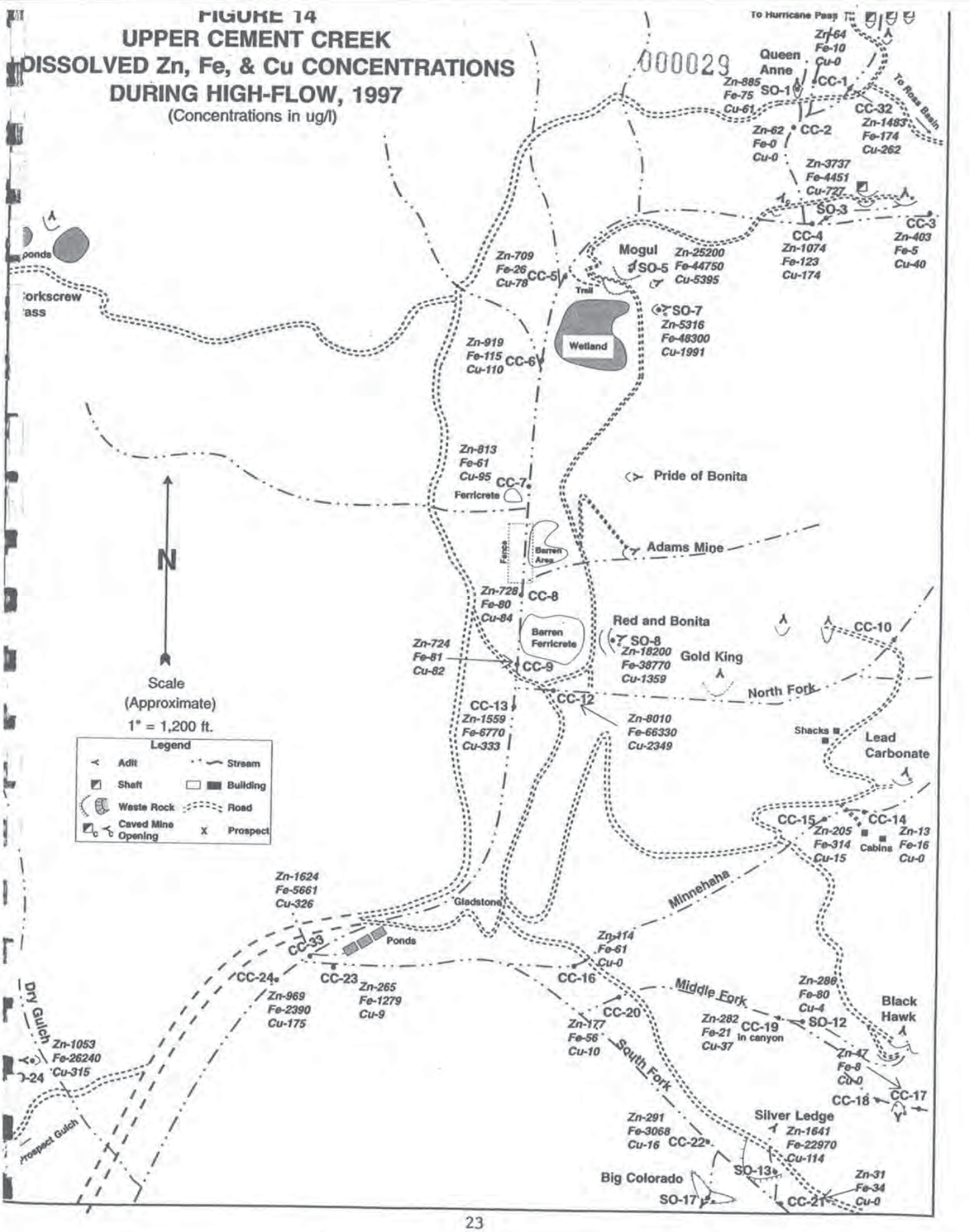

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FIGURE 15
UPPER CEMENT CREEK
[SSOLVED ZINC, IRON, AND COPPER LOADS
DURING HIGH-FLOW, 1997
(Loads in Kg/day)

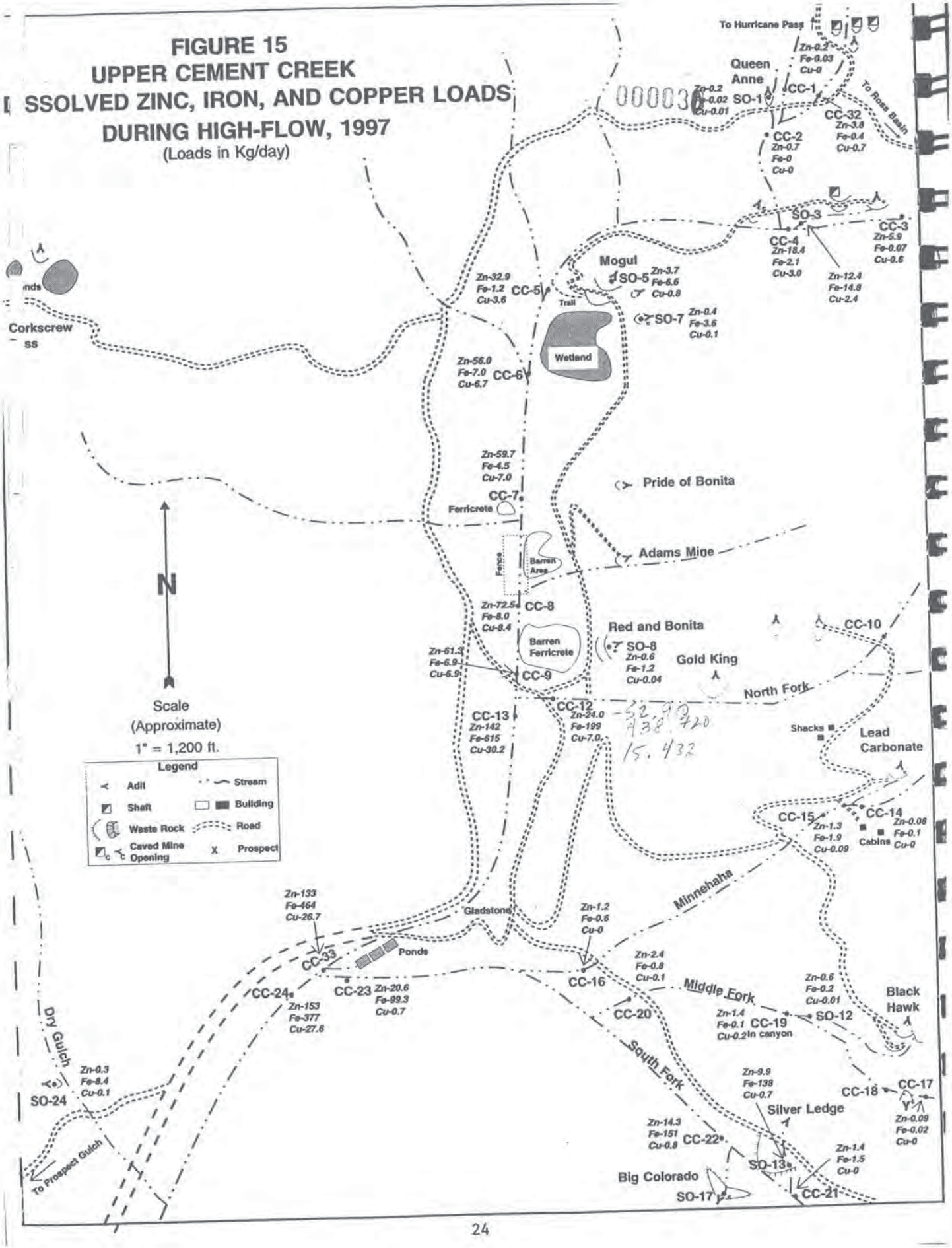

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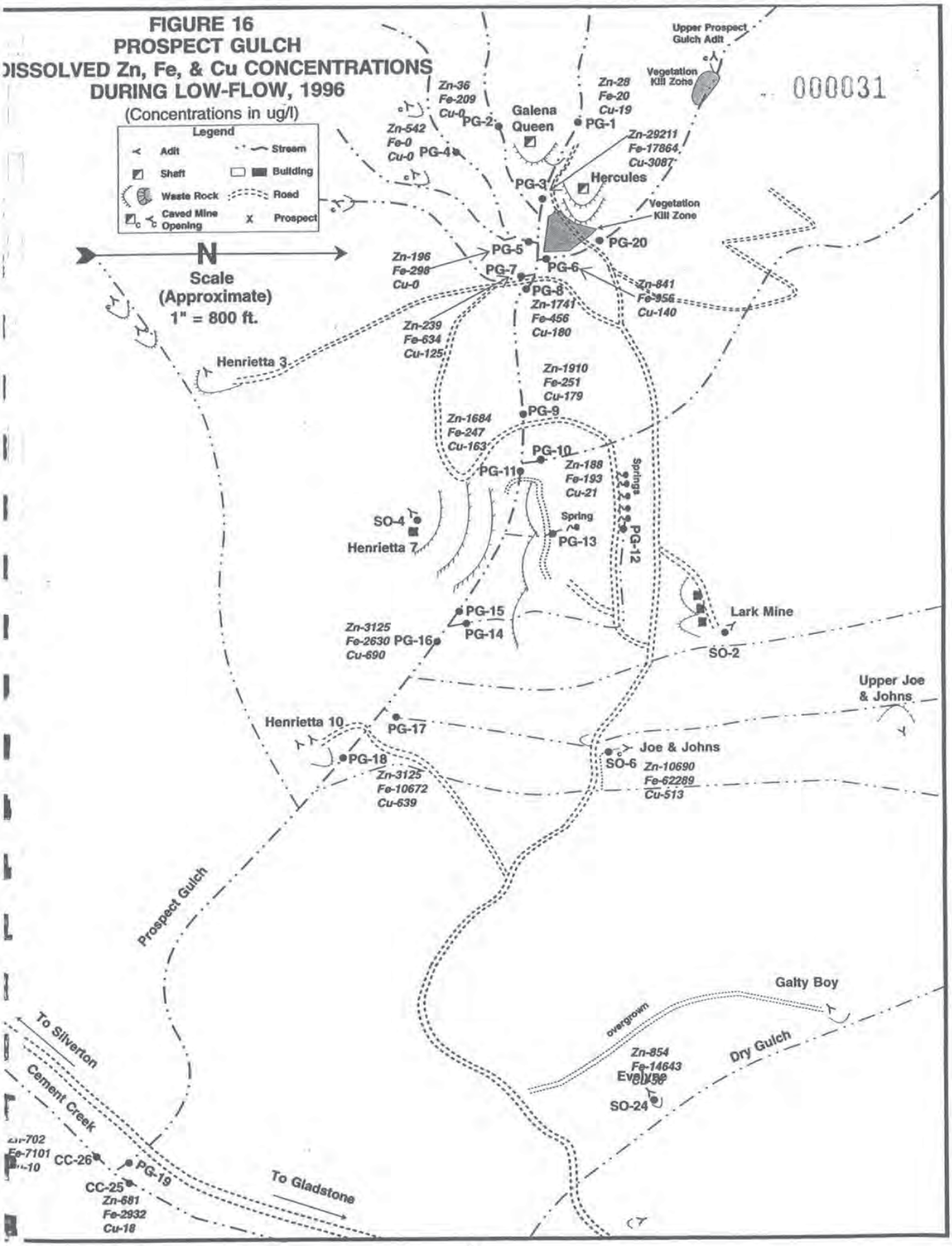
FIGURE 16
PROSPECT GULCH
DISSOLVED Zn, Fe, & Cu CONCENTRATIONS DURING LOW-FLOW, 1996

(Concentrations in ug/l)



000031

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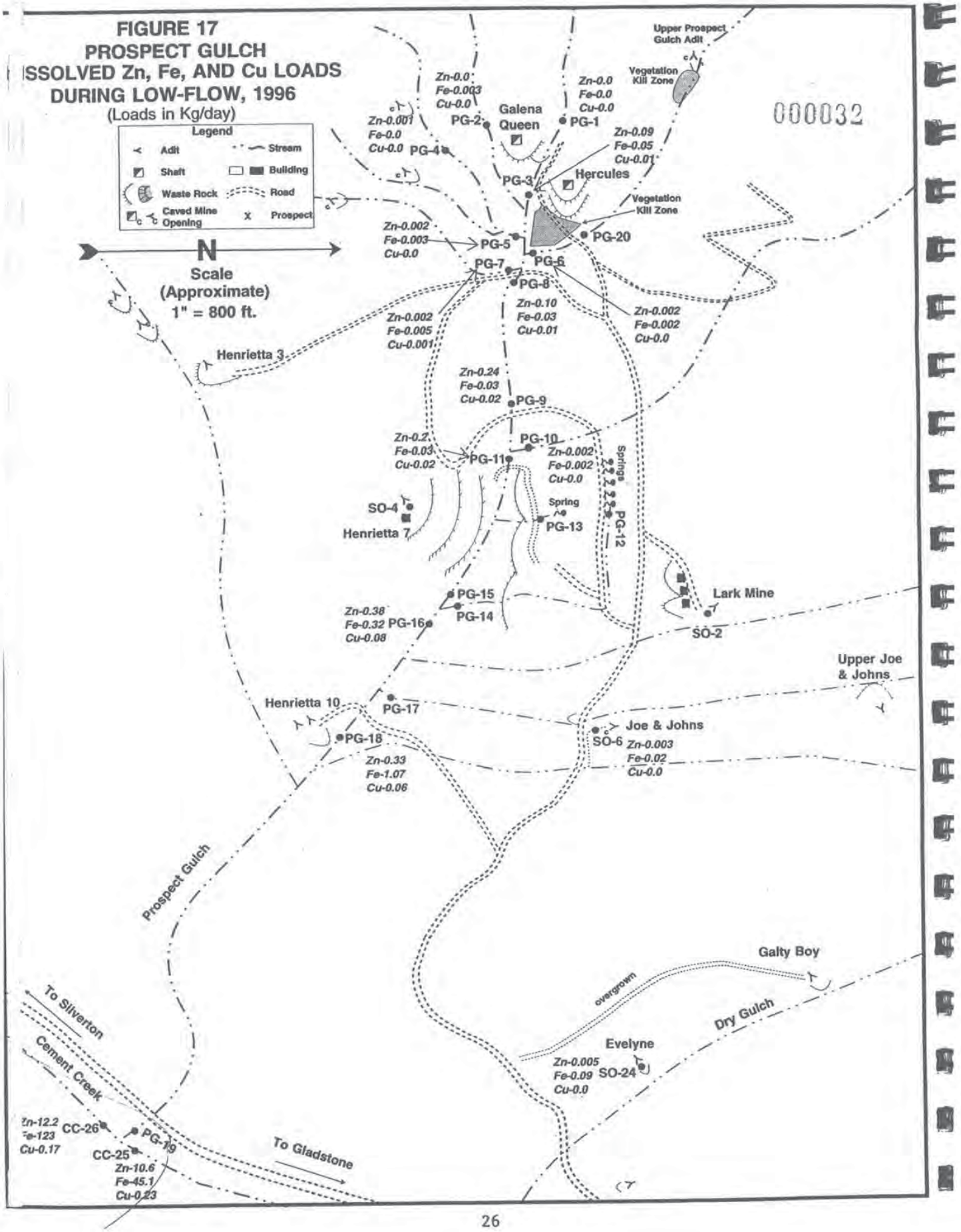
FIGURE 17
PROSPECT GULCH
SSOLVED Zn, Fe, AND Cu LOADS
DURING LOW-FLOW, 1996
(Loads in Kg/day)



000032

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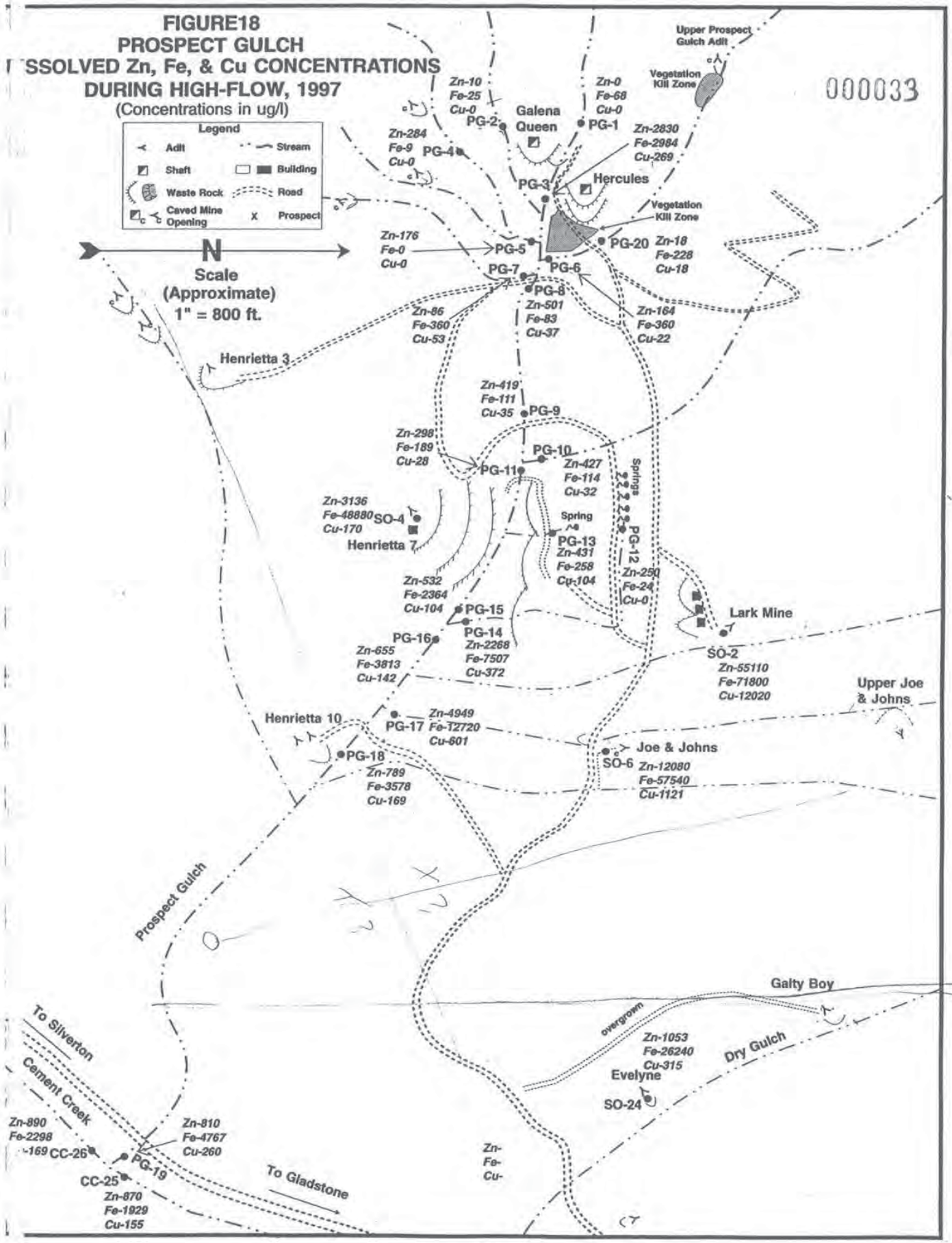
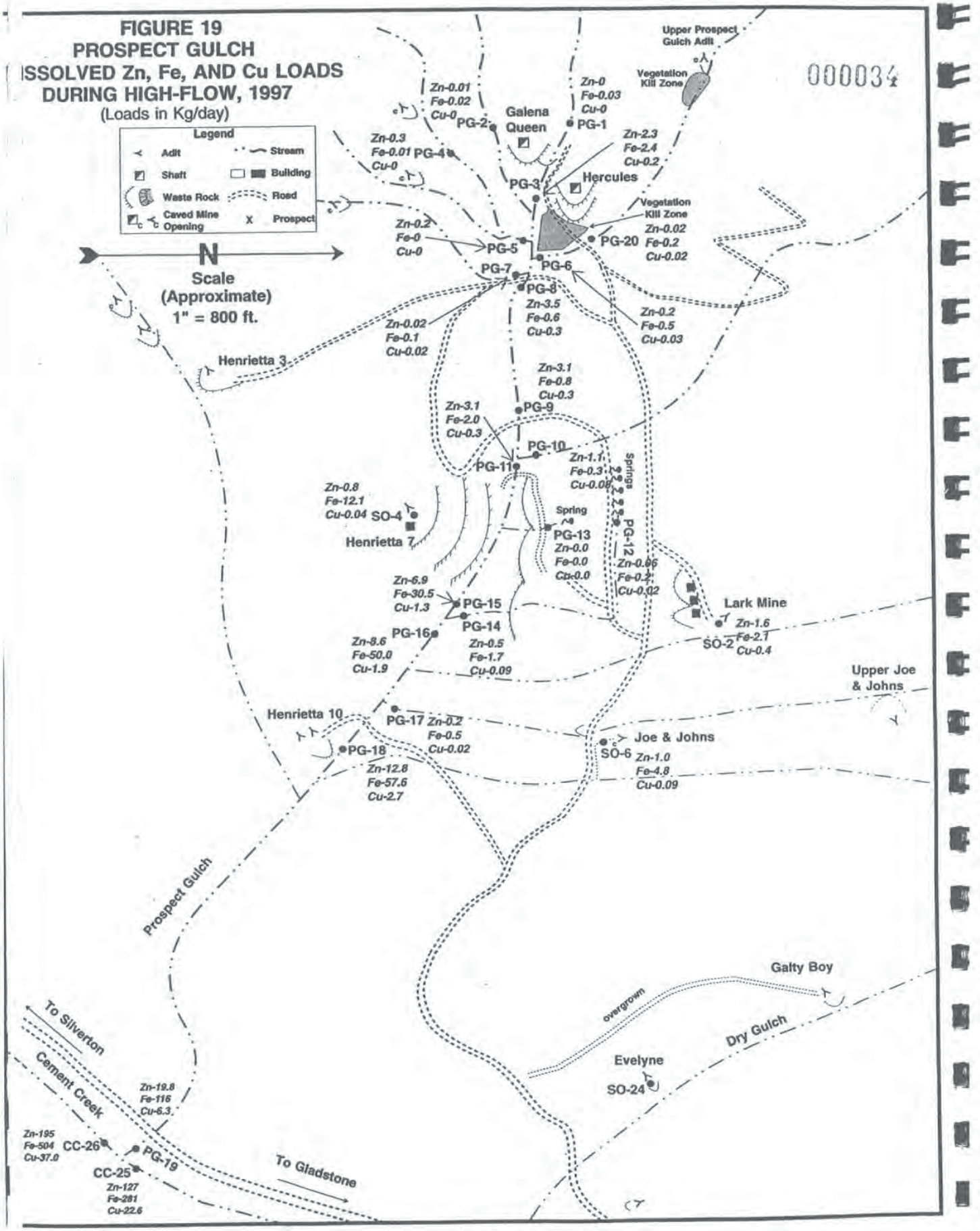


FIGURE18
PROSPECT GULCH
DISSOLVED Zn, Fe, & Cu CONCENTRATIONS
DURING HIGH-FLOW, 1997
(Concentrations in ug/l)
000033
Legend
Adit
Shaft
Waste Rock
Caved Mine Opening
Stream
Building
Road
Prospect
N
Scale
(Approximate)
1" = 800 ft.
Upper Prospect Gulch Adit
Vegetation Kill Zone
Zn-10 Fe-25 Cu-0
Zn-0 Fe-68 Cu-0
Galena Queen
PG-2
PG-1
Zn-284 Fe-9 Cu-0
PG-4
Zn-2830 Fe-2984 Cu-269
PG-3
Hercules
Vegetation Kill Zone
Zn-176 Fe-0 Cu-0
PG-5
PG-20
Zn-18 Fe-228 Cu-18
PG-7
PG-6
PG-8
Zn-501 Fe-83 Cu-37
Zn-86 Fe-360 Cu-53
Zn-164 Fe-360 Cu-22
Henrietta 3
Zn-419 Fe-111 Cu-35
PG-9
Zn-298 Fe-189 Cu-28
PG-10
PG-11
Zn-427 Fe-114 Cu-32
Springs
Zn-3136 Fe-48880 Cu-170
SO-4
Henrietta 7
Spring
PG-13
Zn-431 Fe-258 Cu-104
PG-12
Zn-250 Fe-24 Cu-0
Zn-532 Fe-2364 Cu-104
PG-15
Lark Mine
PG-16
PG-14
Zn-2268 Fe-7507 Cu-372
Zn-655 Fe-3813 Cu-142
SO-2
Zn-55110 Fe-71800 Cu-12020
Upper Joe & Johns
Henrietta 10
PG-17
Zn-4949 Fe-12720 Cu-601
PG-18
Zn-789 Fe-3578 Cu-169
Joe & Johns
SO-6
Zn-12080 Fe-57540 Cu-1121
Prospect Gulch
Galty Boy
overgrown
Zn-1053 Fe-26240 Cu-315
Dry Gulch
Evelyne
SO-24
To Silverton
Cement Creek
Zn-890 Fe-2298 -169
CC-26
PG-19
Zn-810 Fe-4767 Cu-260
CC-25
Zn-870 Fe-1929 Cu-155
To Gladstone
Zn-
Fe-
Cu-

FIGURE 19
PROSPECT GULCH
ISSOLVED Zn, Fe, AND Cu LOADS
DURING HIGH-FLOW, 1997
(Loads in Kg/day)



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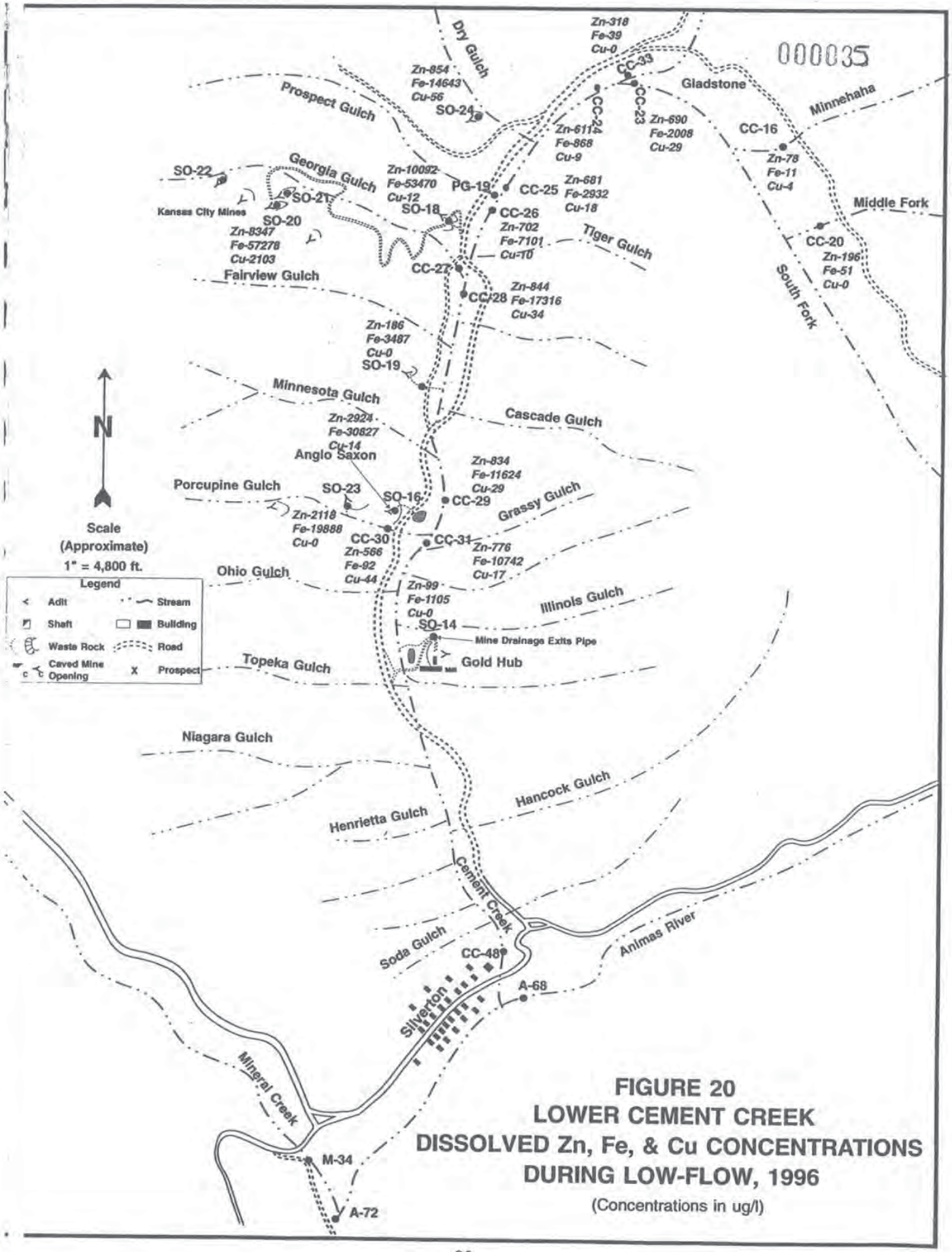

FIGURE 20
LOWER CEMENT CREEK
DISSOLVED Zn, Fe, & Cu CONCENTRATIONS
DURING LOW-FLOW, 1996
(Concentrations in ug/l)

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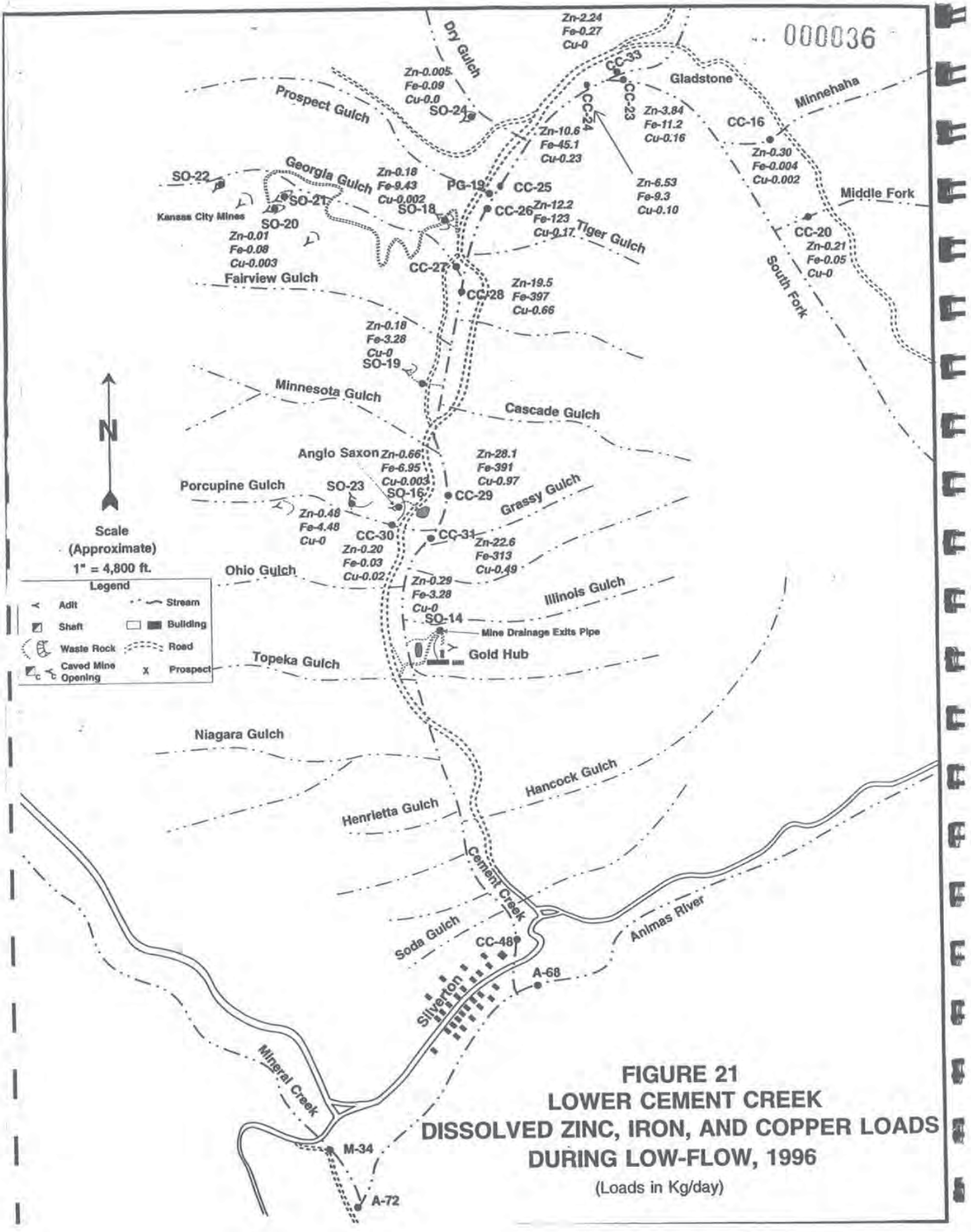

FIGURE 21
LOWER CEMENT CREEK
DISSOLVED ZINC, IRON, AND COPPER LOADS
DURING LOW-FLOW, 1996
(Loads in Kg/day)

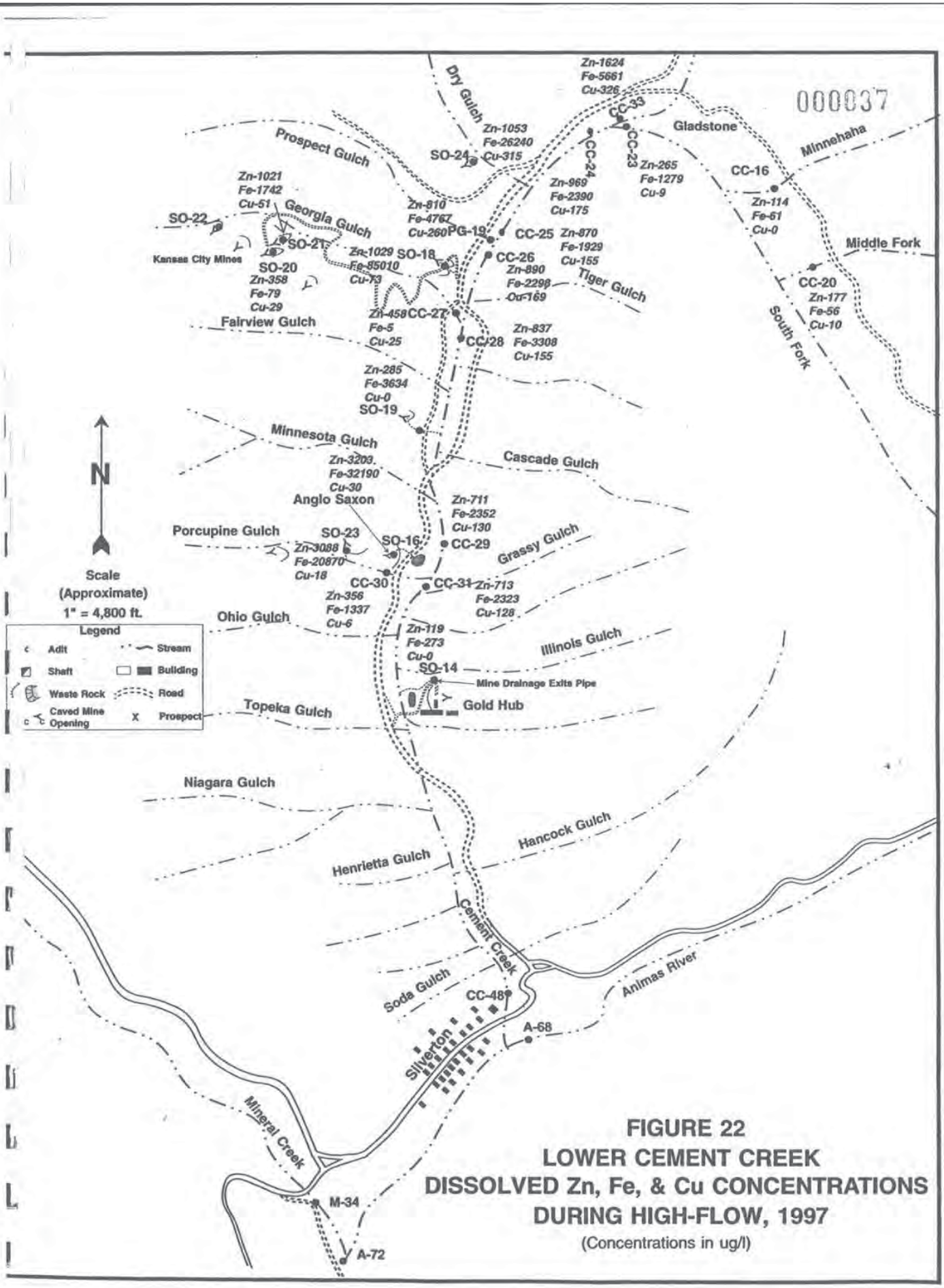

FIGURE 22
LOWER CEMENT CREEK
DISSOLVED Zn, Fe, & Cu CONCENTRATIONS
DURING HIGH-FLOW, 1997
(Concentrations in ug/l)

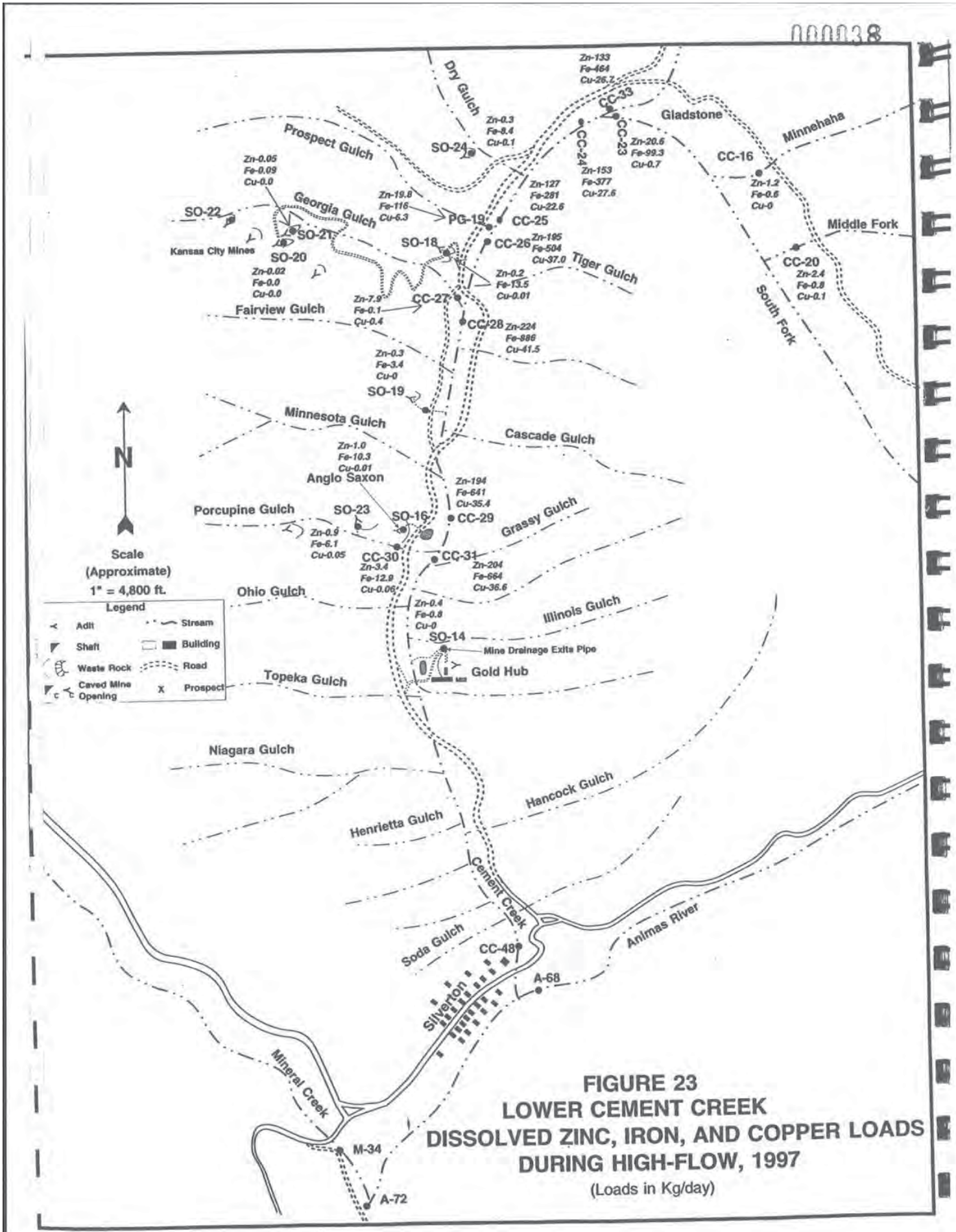

FIGURE 23
LOWER CEMENT CREEK
DISSOLVED ZINC, IRON, AND COPPER LOADS
DURING HIGH-FLOW, 1997
(Loads in Kg/day)

number of prospects above sampling site CC-1, some with waste rock in or adjacent to the stream, that probably contribute zinc to the stream. At high-flow, there is a slightly higher zinc load, but concentrations are much lower (Figures 14 and 15).

At sampling site CC-2, below the draining Queen Anne Mine and the Columbia/Upper Queen Anne area (shown as three shafts northeast of the Queen Anne Mine on Figures 13 and 15), the zinc load increases during low-flow and high-flow. During low-flow, the zinc concentration increased dramatically, but it decreased during high-flow. The high-flow zinc load at site CC-32 is higher than at site CC-2. This may be due to the drainage from CC-32 bypassing site CC-2. At the time of sampling, the stream was totally covered with snow. The sampling site had to be moved about 50 yards upstream. Most of the load from the watershed above CC-2 is thought to be from the Columbia/Upper Queen Anne area.

Sampling site CC-3 was located as a background water quality site for upper Cement Creek from Ross Basin. However, low-flow and high-flow sampling shows that a significant zinc load comes from the area above. There are numerous prospects, a few small mines, and one large mine above this site. The large mine is approximately 200 yards above the sampling site (shown at waste rock sampling site #31 on Figure 6). A portion of the zinc load is thought to come from this large mine site, particularly during spring snow melt. It is recommended that a water quality monitoring station be added to bracket this area. The monitoring site should be set at the bottom of the cascade from Ross Basin. This is immediately above where white precipitate has been observed to form in the channel.

Sampling site CC-4 is located downstream of the acid rock drainage from the Grand Mogul Mine (sampled at site SO-3 on Figures 12 through 15). Zinc loads and concentrations increase dramatically during low-flow and high-flow. During high-flow, the measured dissolved zinc load was less at site CC-4 than site SO-3. The reason for this apparent discrepancy is unknown. It is unlikely that there was that much zinc precipitation between the sampling sites.

At sampling site CC-5, the zinc load increases during both low-flow and high-flow, while the concentrations decrease. During low-flow, the zinc load greatly increases through this stretch. This is probably partially due to several waste rock piles in and adjacent to the small tributaries to this portion of Cement Creek. This site should be upstream of any effects from the Mogul Mine (sampled at site SO-5 on Figures 12 through 15).

At sampling site CC-6, zinc concentrations and load increase, in proportion to the loads from the Mogul Mine and draining mine at site SO-7. The small tributary that joins Cement Creek immediately downstream of site CC-6 contains several minor waste rock piles, none of which were sampled.

Between sampling sites CC-6 and CC-9, it is difficult to assess contributions to the system because of flow-gaining and losing sections. During low-flow, zinc concentrations remain within +/- 10%, while zinc load varies between 18.7 and 27.1 lb/day. At high-flow, concentrations steadily decline in this reach, while all the loads, except at site CC-8, remain within +/- 10%. The measured flow at

site CC-8 was much higher than measured at sites CC-7 or CC-9. If the data are interpolated between sites CC-7 and CC-9, there is virtually no load increase. The data indicate that zinc contributions through this stream section are insignificant.

Sampling sites CC-9 and CC-13 bracket the North Fork of Cement Creek. Loading analysis in this section is very difficult because a significant amount of the flow in Cement Creek and the North Fork goes underground in this area. During August 1996, all the flow from the North Fork was observed to infiltrate into the alluvial gravels prior to reaching Cement Creek. Also, the flow in Cement Creek was visibly reduced near the confluence with the North Fork. Below the Cement Creek/North Fork confluence, an inflow was observed above sampling site CC-13, but no other significant inflows were observed between the confluence and the Sunnyside Gold treatment system intake (between sites CC-13 and CC-33 on Figures 12 through 15). In addition, during high flow sampling in June 1997, the flow from the North Fork was evidently higher than the flow measured at site CC-12 as evidenced by the metals loading differential between the sites bracketing the North Fork. There was some dissolved metal increase due to dissolution of the suspended material as the pH decreased in Cement Creek following the low pH input from the North Fork. The North Fork contributes a larger zinc load to Cement Creek than any other tributary. Also, zinc concentrations reach their highest level below the confluence with the North Fork. The source areas in the North Fork were not investigated because the major mines are currently permitted.

Below sampling site CC-13 is the Sunnyside Gold Corporation (SGC) treatment system for the American Tunnel. During low-flow, virtually all the drainage in Cement Creek is passed through the treatment system. During high-flow, only a small portion is passed through the treatment system. Sampling site CC-33 is located below the outlet from the final treatment pond. At low-flow, the treatment system is removing at least 2/3 of the zinc load from upper Cement Creek, while during high-flow, there was only a slight reduction in loading.

Sampling site CC-24 is below the confluence of Cement Creek and the South Fork of Cement Creek. Historically, the South Fork has diluted the zinc concentrations from upper Cement Creek. During low-flow, because the SGC treatment system treats most of the flow from upper Cement Creek, water from the South Fork is diluted by upper Cement Creek. During high-flow, water from upper Cement Creek is diluted by water from the South Fork. The majority of the metals in the South Fork come from the draining Silver Ledge Mine.

Below the confluence with the South Fork, it is difficult to ascertain trends or changes in water quality because of the relatively large amount of flow and the numerous natural inflows. At low-flow, zinc loads and concentrations generally increase downstream of sampling site CC-24 (Figures 12 and 13). During high-flow, zinc loads increased downstream, but the concentrations, in general, are reduced (Figures 14 and 15). In both flow regimes, the largest increase in loading occurred between Prospect Gulch and Georgia Gulch. This increase is probably due to the natural iron springs (bogs) and subsurface flow from Prospect Gulch, although there is probably a greater contribution of metals from Georgia Gulch than has been measured. Much of the flow in Georgia Gulch has, subsequent to the completion of monitoring, been observed to flow underground

through the alluvial fan. It is recommended that Georgia Gulch be monitored in at least two new areas. The first would be a background sample above the upper-most mine of the Kansas City Group. This site will be difficult to monitor during the spring because of high flow. The most important monitoring site may be in the canyon above the alluvial fan.

There were five tributaries in the headwaters of Prospect Gulch that were monitored during both low-flow and high-flow. Loads and concentrations are shown on Figures 16 through 19. All the tributaries have some mining activities within their respective watersheds.

Sampling sites PG-1 and PG-2 are located downstream of small prospects, with less than 100 cu. yds. of waste rock, in their respective watersheds. During both low-flow and high-flow, zinc concentrations at sites PG-1 and PG-2 were below the no effect concentrations (NEC) for aquatic life.

The principal zinc addition at low-flow and high-flow in the headwaters of Prospect Gulch occurs at the Hercules and Galena Queen Mines. The Galena Queen Mine is downstream of sites PG-1 and PG-2. Whereas water quality below the PG-1 site is affected by the Galena Queen Mine, there does not appear to be any visible effect on the drainage below the PG-2 site.

Between sampling sites PG-1 and PG-3, the stream passes over and through a portion of the waste rock of the Galena Queen Mine. This results in a 2-3 order of magnitude increase in zinc concentrations (Figures 16 and 18). The zinc loading attributable to this small area is approximately 0.2 lb/day of zinc per day during low-flow (Figure 15) and 5 lb/day of zinc per day during high-flow (Figure 17).

Mine drainage has been observed at the small mine located above sampling site PG-5. However, zinc concentrations indicate that this drainage is probably insignificant. The waste rock at that site appears to be principally unmineralized country rock. Sampling site PG-4 was established as a background site to assess the effects of the draining mine above site PG-5. However, during low-flow and high-flow, zinc concentrations were higher at this location than at site PG-5. This discrepancy is probably due to dilution by clean water inflows between sites PG-4 and PG-5.

Sampling site PG-7 is below a waste rock pile in the stream channel. It also appears that the mine adit occasionally drains, although there has been no drainage observed. At high-flow, the zinc concentrations at PG-7 was below NEC, however during low-flow, the concentrations were elevated.

Sampling site PG-20 was established to bracket the snowmelt contribution of the Hercules Mine. This site was not monitored during low-flow because it is unlikely that the Hercules Mine waste rock has any appreciable effect on water quality at that time of the year. At low-flow, the major mining effect on that small tributary is a small waste rock pile upstream of the Hercules that blocks the stream. At high-flow, the zinc concentrations at site PG-20 were below NEC.

Further downstream at sampling site PG-8 in Prospect Gulch, the zinc concentration drops due to

dilution. The low-flow zinc load at PG-8 is consistent with the measured loads upstream, indicating that the Hercules waste rock has very little zinc contribution during low-flow. At high-flow, there is a greater zinc load at PG-8 than can be accounted for at the upstream monitoring sites. There is an increase in zinc concentration and loading between PG-20 and PG-6 directly attributable to the Hercules Mine. Based upon the water quality data, the zinc contribution from the Hercules Mine is estimated to be 2 lb/day during high-flow. The zinc contributions by the Hercules and Galena Queen Mines are probably higher at the beginning of snowmelt. At the time of the high-flow sampling, both waste rock piles were completely snow free, while the surrounding area had approximately 50% snow cover. This is most likely due to the higher than ambient temperatures in the waste rock from the exothermic acid production process. Approximately two weeks before the high-flow sampling, both waste rock piles were observed to be virtually snow free, while the surrounding area was covered with up to 5 ft. of snow.

Between sampling sites PG-8 and PG-9 is a mineralized canyon. This area is monitored principally to determine the natural inflows, but may include a mining-related source. A flowing spring occurs on a mineralized fracture immediately below site PG-8. There may be a connection with this spring and the Hercules shaft, where swirling water has been observed. During low-flow, zinc concentration and load increased between PG-8 and PG-9. This compares to a slight drop in zinc concentrations at the high-flow monitoring. The high-flow reductions may be partially due to an increase in pH, as compared to a slight drop in pH during low-flow.

Between sampling sites PG-9 and PG-11, the principal inflow is a tributary with no mine-related features, which originates at Red Mountain. During snowmelt, there is a small amount of drainage from the Henrietta 7 Mine that flows down the road, entering the stream between these sampling sites. The stream above PG-10 was monitored by WQCD in 1991-1993 above the main access road into Prospect Gulch. Between the WQCD site and PG-10, there are no mine-related features, other than the two roads which the drainage crosses. Low-flow and high-flow concentrations measured at PG-10 are higher than measured at the WQCD site. In fact, the concentrations measured at PG-10 were higher at high-flow than at low-flow. The WQCD data shows the opposite trend. The most likely explanation is that the roads are the principal cause of the apparent increase. Particularly during snowmelt, tributary water flowing down the roads is churned up by 4-wheel drive vehicles. This may explain the increase in zinc concentrations. The area between the WQCD sampling site and PG-10 should be investigated further.

It should be noted that the flow measurements for sites PG-16 and PG-18 were improperly taken. Therefore, the flow measurements and loading values reported in the appendix are based on addition of the measured in-flows at stations PG-14 and PG-17 to the flow at station PG-15.

At sampling site PG-16, downstream of the Henrietta 7 Mine, the zinc concentration and load are approximately double those at site PG-11. A portion of this is probably due to the drainage from the Henrietta 7 adit and possibly the Henrietta 8 adit, which is collapsed with no visible signs of drainage. However, the largest contribution is from leaching of the waste rock in that area. Much of the waste rock leaching occurs at the northern pile along the northern side of Prospect Gulch. There are several springs which flow perennially most years above the waste rock. Sampling site

PG-14 provides a direct measurement of the leaching effects, but there are numerous other small springs and seeps upstream, that are similar in chemistry to site PG-14. The zinc loading from the Henrietta 7 area is approximately 0.4 lb/day and 12 lb/day of zinc during low-flow and high-flow, respectively.

Between sampling sites PG-16 and PG-18, the zinc concentration and load increase during high-flow and remain relatively stable during low-flow. This is principally attributed to leaching of the waste rock at the Joe & Johns Mine and drainage from the Lark Mine. The drainage from the Lark Mine infiltrates into the waste rock, resulting in a zinc load greater than that measured directly in the mine drainage. The stream passing by the Joe & Johns Mine is mostly diverted by the Prospect Gulch access road. A portion flows underground through the waste rock, and was measured at sampling site PG-17. The actual zinc load from this tributary is greater than shown on Figure 17, because of subsurface flow in this tributary. A large portion of the input of 9+ lb/day of zinc could be removed by reclaiming the Lark and Joe & Johns Mines.

Between sampling sites PG-18 and PG-19, zinc concentrations increased slightly and zinc load increased by about 50% during high-flow. This is consistent with the data collected at WQCD sampling sites CC-25 and CC-26, which were taken in roughly the same locations. Sampling site PG-19, near the confluence with Cement Creek, was inadvertently skipped during the low-flow sampling, but the WQCD data shows that the concentration decreased by a factor of about 2.5, while the load increased by about the same factor. The only mining-related surface discharge contributions between sites PG-18 and PG-19 are the drainage from the Joe & Johns Mine, a tributary with headwaters near the Henrietta 1, 2 and 3 Mines, and a small seeping mine adit downstream of PG-18.

CEMENT CREEK IN-STREAM IRON

The North Fork of Cement Creek, South Fork of Cement Creek, Prospect Gulch, and iron bogs below Prospect Gulch are the principal source areas for dissolved iron in the Cement Creek watershed. Except for localized areas, the headwaters of Cement Creek are not an important source of in-stream iron. At low-flow and high-flow, very little iron was found at sampling site CC-5 (Figures 12 through 15). The two localized exceptions are at sampling sites CC-32 and CC-4/SO-3. Most of the iron from these areas precipitates downstream. There is visible iron staining on the stream channels below both these sites.

At low-flow, iron concentrations steadily increase between sampling sites CC-5 and CC-9, then increase by a factor of three below the North Fork of Cement Creek (Figure 12). Between CC-5 and CC-6, there is a slight increase in iron loading from the Mogul Mine, although the dissolved iron load from the Mogul Mine drainage is an order of magnitude greater than the in-stream load at CC-6. This shows that the wetland receiving the mine drainage is removing most of the iron. Surprisingly, there is virtually no increase in concentration or load as Cement Creek flows through the ferricrete deposits between CC-7 and CC-9.

At high-flow, there is an increase in concentration and load between CC-5 and CC-6, due to the

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mine drainages from the Mogul Mine and site SO-7 (Figures 14 and 15). At this time of year, snowmelt from the surrounding area significantly reduces the residence time in the wetland. Between CC-6 and CC-7, the concentration and load drop. Between CC-7 and CC-9, the concentrations rise, while the load varies. The load variation is probably due to gaining and losing reaches of the stream.

The North Fork is the largest iron loader of all the tributaries in Cement Creek. At site CC-13, below the confluence with the North Fork, iron concentration and load at high-flow increase by two orders of magnitude from 15 to 1,356 lb/day. The most prominent iron staining in Cement Creek begins below the North Fork. As discussed for zinc, the load measured at CC-13 is three times higher than that measured at site CC-12 on the North Fork.

At CC-33, downstream of the SGC treatment system near Gladstone, iron concentrations and loads were significantly reduced. At CC-24, the South Fork of Cement Creek acts as a diluter during high-flow, with the reverse occurring during low-flow. This is because virtually all the drainage in upper Cement Creek is treated by SGC during low-flow.

Most of the dissolved iron in the South Fork comes from the draining Silver Ledge Mine. The Silver Ledge Mine is the single largest point source iron loader in Cement Creek. There is very little iron in the streamflow from Minnehaha and the Middle Fork.

Downstream of the South Fork, dissolved iron concentrations generally increase during low-flow and high-flow to sampling site CC-28, below Georgia Gulch (Figures 20 and 22). The one exception is the inflow from Dry Gulch, which dilutes the iron concentrations in Cement Creek during high-flow. The two largest increases in concentration and load downstream of the South Fork, occur below Prospect Gulch between sampling sites CC-25 and CC-26 and below the iron bogs located between sampling sites CC-26 and CC-28. Between sites CC-25 and CC-26, dissolved iron load increases by 172 lb/day at low-flow and 492 lb/day at high-flow. Between sites CC-26 and CC-28, dissolved iron load increases by 604 lb/day at low-flow and 842 lb/day at high-flow. Less than 5% of the iron in this segment (CC-26 to CC-28) can be attributed to mining-related surface discharges.

Downstream of sampling site CC-28, dissolved iron concentrations as measured in this study decrease until just upstream of the Cement Creek Gage (CC-48). WQCD data confirm this.

At the headwaters of Prospect Gulch, dissolved iron load at five of the six tributaries was minimal at both low-flow and high-flow (Figures 17 and 19). The one exception is the tributary measured at sites PG-6 and PG-20. The iron load at these stations was minimal during low-flow, but during high-flow, iron from the Hercules Mine and an unknown mine upstream amounted to 1.1 lb/day. Between stations PG-1 and PG-3, the iron concentrations increased two and three orders of magnitude at high-flow and low-flow, respectively. The iron loading from this area was 0.1 lb/day at low-flow and 5.5 lb/day at high-flow. At stations PG-5 and PG-7, iron concentrations were slightly elevated, which is probably due to subsurface drainage from the mine above each tributary. At site PG-8 on the mainstem of Prospect Gulch, dilution greatly reduced dissolved iron loading.

Between sampling sites PG-8 and PG-9, iron concentration decreased during low-flow and increased during high-flow (Figures 16 and 18). The dissolved iron load remained steady during low-flow, while there was a slight increase during high-flow (Figures 17 and 19).

From sampling site PG-9 to PG-11, iron concentration and load remained steady during low-flow. At high-flow, iron concentration increased and iron load more than doubled.

Between sampling sites PG-11 and PG-16, which bracket the Henrietta 7 Mine, dissolved iron concentrations and loads increased by at least one order of magnitude during both low-flow and high-flow.

At high-flow and low-flow, iron concentrations and load increased downstream to sampling site PG-19 at the confluence with Cement Creek. If all the iron attributable to mining-related surface discharge sources in Prospect Gulch was removed, at best, the iron load from Prospect Gulch could only be reduced by about 50%.

CEMENT CREEK IN-STREAM COPPER

The principal sources of copper in the Cement Creek watershed are upper Cement Creek upstream of Gladstone and Prospect Gulch. At the headwaters of Cement Creek near Hurricane Pass, the only in-stream copper measured was from the Columbia/Upper Queen Anne area at high-flow (upstream of sampling site CC-32 on Figures 12 through 15). During high-flow at site CC-32, 1.5 lb/day of copper was measured. At the headwaters from Ross Basin, copper was above detection limits at the upper site (CC-3), during both low-flow and high-flow. At sampling site CC-4, below the confluence of the acid rock drainage from SO-3, copper concentrations increased dramatically. Between sites CC-3 and CC-4, copper load increased from about 0.1 to 0.6 lb/day at low-flow and from about 1.3 to 6.6 lb/day at high-flow. Between sampling sites CC-4 and CC-5, copper concentrations declined, but copper load increased by about two times. These data are shown on Figures 12 through 15.

Between stations CC-5 and CC-6, dissolved copper concentrations increased during low-flow and high-flow. At low-flow, the increase in copper load between these two stations is consistent with the load from the Mogul Mine. At low-flow, there was no drainage from the mine at sampling site SO-7. At high-flow, the downstream loading increase is greater than what can be accounted for at these two draining mines. A portion of the increased loading is probably from snowmelt and mine drainage leaching through the waste rock, but the small tributary downstream of sampling site CC-5 may also be a partial source. This tributary should be investigated further.

From sampling site CC-6 to CC-9, dissolved copper concentrations declined during low-flow and high-flow. At low-flow, dissolved copper load decreased through this segment. At high-flow, dissolved copper load increased in flow-gaining areas and decreased in flow-losing areas.

At sampling site CC-13, downstream of the North Fork, dissolved copper concentrations increased

at both low-flow and high-flow. Copper load at site CC-13 showed a decrease during low-flow. This is a problem because much of the drainage from the North Fork probably flowed underground and entered Cement Creek below sampling site CC-13. At high-flow, the dissolved copper load increased by about five times. The in-stream loading increase was over three times that measured at site CC-12, indicating that much of the flow at site CC-12 was subsurface.

Treatment of the flow in upper Cement Creek by SGC at the treatment system near Gladstone reduced copper concentrations to below detection limits at sampling site CC-33 during low-flow. At high-flow, copper concentrations and loading at that site were only reduced slightly.

At sampling site CC-24, the low-flow copper concentrations were back to headwaters levels. The high-flow copper concentration was reduced by the inflow from the South Fork. The high-flow dissolved copper load increased in accordance with the load addition from the South Fork. During both low-flow and high-flow, the South Fork is a relatively insignificant source of copper.

Low-flow copper concentrations generally increased downstream of sampling site CC-24 to site CC-28, then declined through station CC-31. The one exception is below Prospect Gulch (CC-26) where there was a decrease. Low-flow data collected by the WQCD indicate that copper concentrations at the mouth of Prospect Gulch are less than 10 ug/l. Without the SGC treatment system in upper Cement Creek, it is likely that concentrations would decline throughout this segment.

High-flow dissolved copper concentrations showed a general decline in Cement Creek downstream of the South Fork (Figure 22). There was a slight increase in concentration below Prospect Gulch. High-flow dissolved copper loading declined between sites CC-24 and CC-25, then increased through site CC-28. Downstream of Prospect Gulch (between sites CC-25 and CC-26), the high-flow copper load increased by about 32 lb/day. Between sites CC-26 and CC-28, the high-flow copper load increased by 10 lb/day. The source of much of the increased load between CC-26 and CC-28 is unknown, but may possibly come from the iron springs (bogs) in that area. Downstream of site CC-28, the dissolved copper load declined.

In the headwaters of Prospect Gulch, copper concentrations in the tributaries monitored by stations PG-6 and PG-7 showed elevated concentrations of dissolved copper during low-flow and high-flow. However, the dissolved loads are relatively insignificant. Between sites PG-1 and PG-3, the low-flow and high-flow concentrations increased dramatically (Figures 16 and 18). At low-flow, the copper load is insignificant, but at high-flow, the copper load is about 0.4 lb/day (Figures 17 and 19).

Copper concentrations do not increase until site PG-16 downstream of the Henrietta 7 Mine. Low-flow dissolved copper loading at site PG-16 is only about 0.2 lb/day. High-flow dissolved copper loading at site PG-16 is about 4 lb/day. Low-flow copper concentrations and loads decrease downstream after that point. High-flow copper concentrations and loads increase below site PG-16.

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The high-flow dissolved copper load at the mouth of Prospect Gulch was 14 lb/day. This compares to an increase in the copper load in Cement Creek downstream of Prospect Gulch 32 lb/day as discussed above. Of this load, only about 6 lb/day of copper load from Prospect Gulch can be directly attributed to mining-related surface discharge in Prospect Gulch.

RECLAMATION OPTIONS

There are many different types of mining-related disturbances in the Cement Creek watershed, which affect the water quality in the creek. A thorough understanding of the hydrologic system is necessary to determine which reclamation options would be best at a particular site. Reclamation of the area will be complicated and several reclamation options may be required at some sites to provide the most efficient system of cleanup.

One of the most complex situations involves the reclamation of mine drainages. These situations usually involve collection and treatment of the adit discharge. In the case of draining mines in the Cement Creek watershed, a moderate to high potential for fracture-flow groundwater-minepool interactions exists because of the complex geology and extensive mining that has occurred. If a treatment system is contemplated to address adit discharges, it will be necessary not only to understand the chemistry and hydrology of the adit discharge, but also to determine any potential groundwater loadings which leave the site through fractures that are not seen as surface flows at the portal. The fractured, jointed, highly altered nature of the bedrock could be allowing seepage from the adit to enter the groundwater system. A treatment system could work well on the adit discharge, but fail to meet metals removal goals in the stream due to unidentified groundwater pathways to the creek. In that case, simply sticking pipes into the portals would not be adequate to collect all the water which needs to be treated. It may be necessary to re-enter the adit to some point beyond fracture influences where a grout-sealed bulkhead water-inlet can be placed to collect and prevent the infiltration of adit flows into fractured bedrock.

Reclamation and treatment methods considered in this feasibility investigation include:

1) Hydrologic Controls (Preventative Measures) - diversion ditches, mine waste removal and consolidation, stream diversion, bulkhead seals, revegetation.

2) Passive Treatment - anoxic limestone drains, settling ponds, sulfate reducing wetlands, aqueous lime injection, limestone water jet, oxidation wetlands, aeration, powered mechanical neutralization systems, dilution, electro-kinetics, and land application.

A short description of each method is given below.

HYDROLOGIC CONTROLS

Most hydrologic controls are preventative measures in that they inhibit or prevent the process of

acid formation and/or heavy metal dissolution. If it is possible to prevent water from entering a mine, or coming into contact with sulphide ores or wastes, this can be the best, most cost effective reclamation approach. Unfortunately, very few cases are found where preventative measures can be effectively implemented to completely prevent mine drainage.

Diversion ditches are effective where run-on water is degraded by flowing over or through mine waste, or into mine workings. Diversion ditches can also be used to intercept shallow ground water that may enter mine waste. In some cases, mine discharge can be improved by flowing through the waste rock. Mine drainage must be sampled above and below a waste rock pile to determine whether or not the waste rock is degrading the water quality.

Mine waste removal and consolidation is effective where there are several small mining waste piles in an area, or where there is a large pile in direct contact with flowing water. The method is simply to move reactive material away from water sources.

Stream diversion is similar to mine waste removal and consolidation. It involves moving the water sources away from reactive materials. In most cases, it is usually preferable to move mining waste rather than move the stream, since the relocated stream can require considerable maintenance, particularly following high-flow events.

Bulkhead Seals are another type of preventative measure. For most inactive mines, bulkhead seals are expensive and require considerable geologic and engineering investigation and characterization. Sites which have simple geology, sound rock, and limited subsurface workings may be amenable to this approach. In the long term, bulkhead seals can be cost effective for these types of sites.

Revegetation is often used in combination with other hydrologic controls above. Revegetation by itself can be a very effective method of reducing heavy metals concentrations, particularly where much of the metals are contributed by erosion of mining waste into a stream. Revegetation also reduces the amount of water that infiltrates a waste pile, thereby reducing leachate production. The roots of growing plants also have been shown to produce carbonates through respiration.

PASSIVE TREATMENT

Anoxic limestone drains are the simplest method of introducing alkalinity into mine discharges. Anoxic limestone drains (ALD) are constructed by placing coarse limestone (3/4" - 3") inside an adit or in a fully sealed trench outside a discharging mine. In order for an ALD to function properly, the mine discharge must be devoid of oxygen. In the absence of oxygen, limestone will not become coated by iron and other metal hydroxides, which can shorten the useful life of limestone. In addition, the mine drainage should be relatively low in dissolved aluminum. Aluminum has been shown to precipitate in ALDs, causing plugging. It is theorized that very coarse limestone (4-6") should provide large enough pore spaces to minimize or prevent clogging by aluminum. The disadvantage of using larger limestone is the reduced surface area to react with the mine drainage. After the mine drainage exits the ALD, aeration causes precipitation of metals. The increase in pH

due to ALDs is site specific, but generally does not exceed two standard units.

Settling ponds are often overlooked as an effective treatment method. Settling ponds are particularly effective for treating near neutral mine drainages high in total suspended solids (TSS). Aeration of a near neutral pH mine drainage by means of a series of drops, followed by a settling pond can effectively remove iron and other metals that co-precipitate with iron. Settling ponds should be designed for a 24-hour or greater retention time wherever possible.

Sulfate reducing wetlands are often called bioreactors. These systems treat water through bacterial reduction of heavy metals. Sulfate reducing bacteria (SRBs) utilize the oxygen in sulfates for respiration, producing sulfides. The sulfides then combine with heavy metals to form relatively insoluble metal sulfides. The bacteria derive their energy from a carbon source such as cow manure or mushroom compost. There are many other substrates which are an acceptable source of carbon, but most have a low hydraulic conductivity which can result in short circuiting of the system by the formation of preferential flow paths.

Sulfate reducing bacteria cannot survive in a drainage with pH below 4.5. Highly acidic drainages will require a pH increase before the effluent enters the bioreactor.

Sulfate reducing wetlands should generally not be constructed near population centers. These systems commonly produce excess hydrogen sulfide, which can cause undesirable odors up to ¼ mile from the system. When initially started, organics in the substrate discolor the treated water for several months, making water quality appear, to the layman, to be worse than the water entering the system.

Aqueous lime injection is a passive method to introduce neutralizing agents into mine drainage. This system requires a clean water source. Clean water is passed through a pond containing neutralizing agent, then the high pH effluent is mixed with the mine drainage before it enters a settling pond. This system can be cost effective if alkaline wastes such as kiln dusts or fly ash are available. Although still in the experimental phase, this method holds promise for some mine sites.

Limestone water jets are an aerobic method of accelerating the dissolution of limestone. In situations where mine drainage flows down a steep slope, the discharge can be piped, and the resultant head can produce a high pressure water jet. The high pressure jet can be either sprayed onto loose crushed limestone, or passed upward through a vessel containing limestone. In both situations, the limestone does not become coated because of abrasion by the water jet, and agitation of the surrounding clasts. The system using a vessel can result in higher alkalinity in the effluent due to greater abrasion. Both system types are in the experimental phase.

Oxidation wetlands are what most people think of as "wetlands". They differ from sulfate reducing systems in that metals are precipitated through oxidation, and aquatic plants must be established. This treatment method is applicable where the pH of a mine drainage is approximately 6.5 or higher, and where metals concentrations in the drainage are primarily a problem during the summer months. Aeration is an important part of this system. The plant materials provide aeration

and, when they die, provide adsorption surfaces, along with sites for algal growth.

Aeration is best used where the mine drainage pH is about 6.5 or above. Aeration promotes metal precipitation through oxidation processes. Aeration can be accomplished by mechanical means, or simply by channeling the drainage over rough slopes. Mechanical methods require some source of power, which may be generated through wind, solar cells, or hydro-power. Aeration methods normally include a settling pond below the aeration component.

Mechanical injection of neutralizing agents involves a powered mechanical feeder/ dosing system for dispensing neutralizing agents. This type of system requires frequent maintenance, may produce significant quantities of metal sludges, and should be considered "semi-passive". Power for the feeder can come from wind, solar, or hydro-power. At the Pennsylvania Mine in Summit County, a turbine running in the mine drainage stream demonstrated that hydropower is practical in some situations. Mechanical systems are generally considered only where there are no options for truly passive alternatives.

Any high pH material can be used in this type of system. Because of cost effectiveness and sludge characteristics, the most common neutralizing agent used is finely ground limestone.

Dilution is often overlooked as a treatment method. It can be a cost effective method of treatment, because the neutralizing agent is simply uncontaminated water. Clean water is mixed with the mine drainage in a settling pond, and the resulting pH increase initiates the precipitation of metals. A drawback to this method is that the percentage of metals precipitated is significantly less than most other methods. Metals removal is site specific, but generally less than 50%. This method is most effective in removing iron, aluminum, copper, cadmium, and lead, but has only slight effectiveness for zinc and manganese.

Electro-Kinetics is a newer semi-passive method to remove metals from mine drainage. There are several forms of this treatment currently being developed. The electro-kinetic method discussed in this report uses a low-maintenance, self-regenerating resin to remove metals from mine discharge. Different metals can be separated by using ion specific resins. Electricity is used to strip metals from the resins, producing a sludge, and allowing reuse of the resin.

Land Application is a method designed to use natural metals attenuation processes in soils and subsoils to remove metals. Plant uptake, evaporation and transpiration, and soil exchange capacity act to tie up and remove metals. This method is most effective where mine discharge can be spread over a large area to infiltrate into relatively thick soils or unconsolidated deposits. Drainage should be neutral or near neutral to avoid plant toxicity. This alternative is also effective for discharges with high iron and/or aluminum, and where pH is approximately 4.5 or above.

MINE SITE CHARACTERIZATIONS

ROSS BASIN SITES

Location

The headwaters of Cement Creek begin in Ross Basin two miles upstream from Gladstone, as shown on Figure 1. Ross Basin is a cirque which lies between the slopes of Hurricane Peak on the north, and Bonita Peak on the south. Sunnyside Saddle forms the cirque head wall. Elevations in Ross Basin drainage range from 13,447 ft. on Hurricane Peak to 11,280 ft. at the Mogul Mine, which marks the lower end of the steep-walled cirque basin. Several mine sites in Ross Basin have been selected by DMG and ARSG for reclamation feasibility studies, including the Queen Anne, Columbia Mine on Hurricane Pass, workings on the Grand Mogul Vein in Ross Basin, and the Mogul Mine at the lower end of Ross Basin. These sites are shown on Figures 3 and 6. The mine workings are generally situated on privately owned patented lode mining claims. Coordinates of each site are given in the individual site descriptions which follow below.

The area is characterized by rugged, steep, high alpine terrain well above timber line. Winters are long with snow depths averaging 440 inches, and the summer growing season is short. Average annual precipitation for the past 3 years is 45 inches, 37 inches occurring as snowfall (Sunnyside Gold Corporation, 1996).

Geologic Setting

The regional geologic setting of the Cement Creek area is discussed at the beginning of this report. More specific information about the Ross Basin area is included below.

Bedrock Geology

The Ross Basin area is situated near the center of the Silverton Caldera. Bedrock consists dominantly of the massive rhyodacite and quartz latite flows and flow breccias of the Silverton Group Burns Formation. All of the members of the Burns Formation are present in the Ross Basin watershed. The overlying Henson Formation, consisting of porphyritic and amygdaloidal flows and flow breccias, and fine-grained sandy tuffs, crops out on the upper slopes of Bonita Peak and Sunnyside Saddle. (Burbank and Luedke, 1969)

Structural Geology

Structurally, Ross Basin lies in the north-central part of the Silverton Caldera, within the major, steeply dipping mineralized faults of the Eureka Graben (Burbank and Luedke, 1969). Figure 2 shows the structural geology of the area.

The Ross Basin Fault forms the top of the boot-shaped graben's "toe". It trends southeastward from just north of the main Cement Creek valley, along the northern wall of Ross Basin, and continues through the Sunnyside Saddle into the Lake Emma basin. Near Lake Emma, it makes

an almost right-angled junction with the northeast-trending Sunnyside Fault. Dips on the Ross Basin Fault are from 75° to 80° south, with the south block (hanging wall), being downthrown. Displacement is greatest at the junction with the Sunnyside fault, and decreases westward through Ross Basin.

A second major parallel and curving strand of the Ross Basin Fault structure splits off south into the hanging wall in lower Ross Basin. Heavily mineralized and persistent over several thousand feet, it is known as the Grand Mogul Vein. It runs along the foot of the north valley wall just above the floor of the basin. This vein has been extensively mined in both upper and lower Ross Basin, and was stoped to the surface in several locations.

Numerous mineralized fractures (veins) branch off and cut nearly perpendicularly across the two main southeast-trending fault strands. These north-northeast trending veins form a series of repeating narrow fault blocks eastward along the slopes of Hurricane Peak, continuing northwards into the upper part of Poughkeepsie Gulch, and through the Hurricane Pass area in the high north branch of Ross Basin near the Queen Anne Mine.

Hydrothermal Alteration

All the volcanic rocks in the Ross Basin area, and indeed the entire San Juan Caldera region, were extensively propylitized and altered on a regional scale, prior to ore deposition. Propylitic alteration here is typified by the formation and addition of chlorite, calcite, and clays in weakly altered rocks, to epidote, albite, and chlorite in the stronger phases. It has resulted in a dull green or greenish gray color to virtually all of the Burns Formation rocks. Wall rock adjacent to the vein deposits has been subjected to more intense but localized alteration processes Quartz, sericite, and pyrite are common mineralogical products of wall rock alteration associated with the siliceous sulfide veins in the Ross Basin area.

Manganese minerals, such as rhodonite and rhodocrosite, are also characteristic of alteration in wall rock of the major fault-fracture veins. Where weathered on the surface, these manganese-altered rocks often are conspicuous due to the characteristic black staining of manganese oxides (pyrolusite, psilomelane).

Ore Mineralization

Ore mineralization in the Ross Basin area occurs as siliceous sulphide veins associated with the extensive system of open fissures created along the major Eureka Graben structure. Although the mineralized faults and fissures can often be traced for hundreds of feet to several miles, economic ore deposits ("ore shoots"), occur on a much more restricted basis due to localized influences of structure and mineralizing solutions. Many of the most productive ore shoots of the district are found within the Ross Basin and Sunnyside fault veins.

The most common sulfide minerals of the veins are pyrite, chalcopyrite, sphalerite, galena, and tetrahedrite. Tennanite also occurs, and free gold is associated with localized shoots and in siliceous gangues, such as rhodonite ("pink", as the miners called it). (Ransome, 1901). Gold has also been found associated with the base metal sulphides in some veins. Silver is associated with

argentiferous tetrahedrite and sometimes with silver sulfo salts and sulfobismuthites (Burbank and Luedke,1969).

Gangue minerals associated with the veins in Ross Basin consist dominantly of quartz, rhodonite, rhodocrosite, calcite, fluorite, and minor barite. There is thus a better potential for buffering capacity associated with the veins of Ross Basin than in veins in Prospect Gulch-Georgia Gulch and upper Mineral Creek.

Sulphide minerals found on the mine dumps of the Grand Mogul vein workings and the main Mogul Mine dump included pyrite, galena, and sphalerite. There was abundant calcite, rhodonite, and quartz as well. The Grand Mogul vein is considered by some local workers to be one of the only veins in the district which might be successful as a lead-zinc mining operation.

Surficial Geology

Slopes around upper Ross Basin are steep, and prone to snow avalanches and rockfalls. Much of the lower valley walls and valley floor are mantled by talus deposits. There is also an active rock glacier near the upper basin headwall on the north slope of Bonita Peak, which is believed to have an ice core. As the basin is generally at and well above tree line, soils are thin to patchy tundra varieties, with rock outcrops dominating the landscape.

The avalanche danger in Ross Basin is high. Many avalanche chutes exist on both sides of the valley, and it is common to see huge piles of snow in the runout zones on the valley floor persist well into August of each year. It appears that past avalanches have damaged or destroyed all the structures which may have remained in the basin. Nothing is left standing, and wood and timber debris has been spread all along the valley floor.

Upper Cement Creek runs through extensive talus deposits in Ross Basin. There are only small isolated patches of true stream alluvium.

Ross Basin Area Mine Site Descriptions

The volcanic rocks of the Burns Formation are cut by numerous mineralized faults and fissures which have been prospected and mined for sulphide ores. The mine sites included for feasibility assessments in the Ross Basin area are described below, and shown on Figures 3 and 6.

Ross Basin Upper Site

Location

This site is located in Ross Basin, about ½ mile above the Queen Anne Mine, north of the road to Sunnyside Saddle at an elevation of 12,600 ft. This site is believed to be on the M.E. Harrison claim. This site was sampled as waste rock site #30 shown on Figures 6 and 24. The site is located at LAT. N37°54'30.9", LONG. W107°37'21.2".

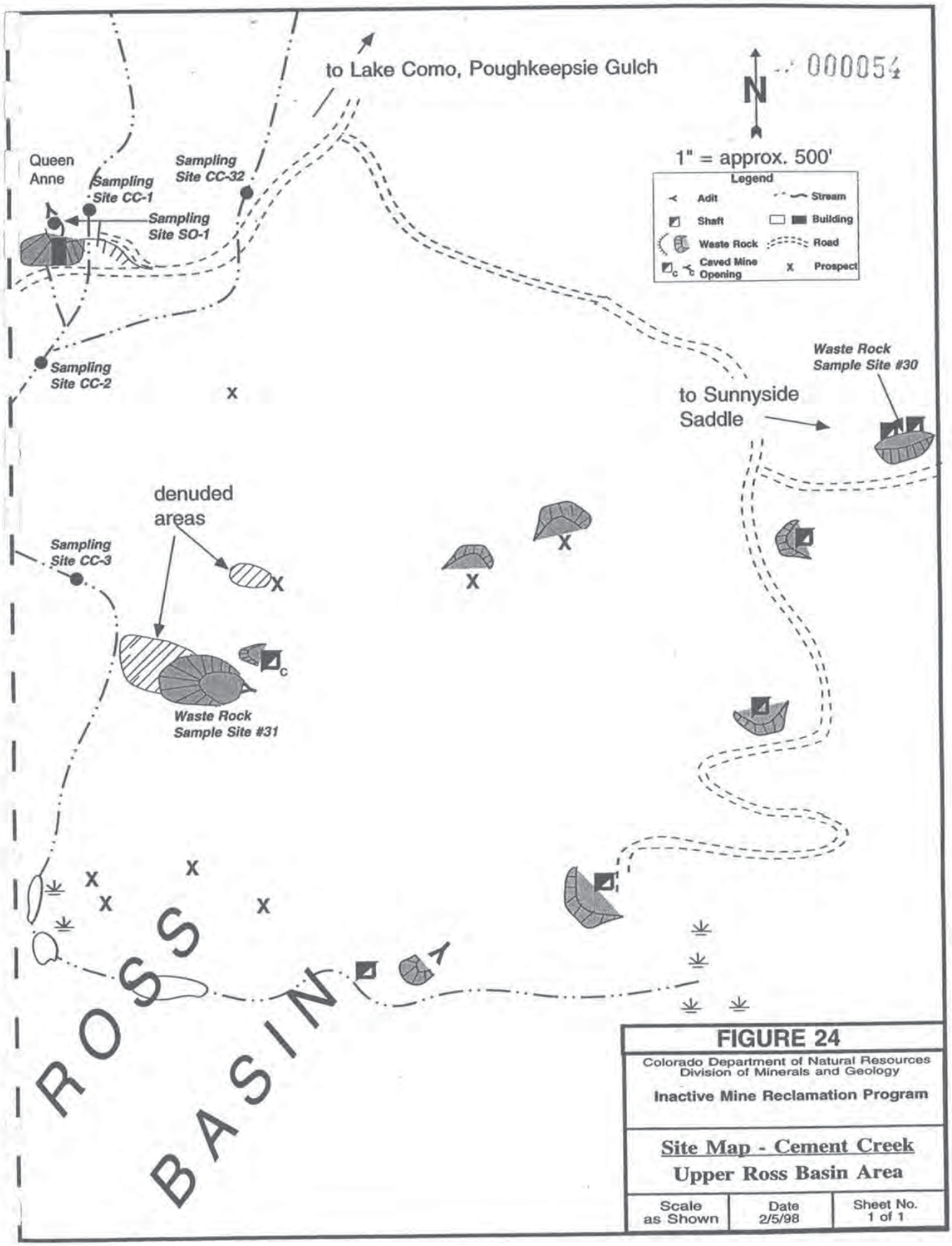

FIGURE 24

Colorado Department of Natural Resources
Division of Minerals and Geology

Inactive Mine Reclamation Program

Site Map - Cement Creek
Upper Ross Basin Area

Scale	Date	Sheet No.
as Shown	2/5/98	1 of 1

Workings
Two capped shafts and associated stopes were mined along a vein outcrop. The waste rock was cast to the south side of the shafts and collapsed stopes. There is no surface discharge from the mine workings.

Mine Wastes
The shallow waste rock pile covers an area of approximately 50 ft. by 250 ft. The waste rock is generally coarse material from the oxidized portion of the vein. The dump primarily contains gossen, but there is some unoxidized waste containing massive pyrite along with some galena and sphalerite. The dump contains approximately 1,800 cu. yds. of material. A small kill zone extends downgradient from the dump. Total acidity and sulfates are shown below.

Ross Basin Upper Site

Total Acidity (mg/l)	ICP Sulfate (mg/l)
260	386

Historic Structures
There are no structures or equipment, other than scattered debris.

Geologic Constraints to Reclamation
This site is generally outside of avalanche paths, being in a saddle area. Bedrock is at or near the surface over most of the site, though there is some loose talus and scree north of the site on the slopes of Hurricane Peak. There are some localized deposits of shallow topsoil nearby, but a large area would have to be disturbed for a borrow area. The extreme elevation makes revegetation difficult.

Water Quality Impacts
The only area of concern at this site is the mine waste. This waste rock had the highest concentration of lead and the second highest concentration of silver in the leachates tested in Cement Creek. Even with a large amount of oxidized material, this waste rock was still acid forming (Figure 9). The total acidity of the waste rock was 260 mg/l. This waste rock is visually similar to other small piles in the vicinity.

Reclamation Options
Reclamation recommended for this site is to grade the material back into the shallow stopes, then cover the waste with a portion of the topsoil under the waste rock. The topsoil will likely have to be amended with limestone to neutralize the acidity from years of leaching.

The other waste rock piles similar to the material in the upper pile are located near small prospect shafts. These shafts should be investigated to determine whether the waste rock can be simply placed back in the mine opening. If this solution can be used, the waste rock material can then be covered and revegetated. Alternately, the waste rock can be amended in-place.

Ross Basin Lower Site

Location
This site is located on a steep slope in Ross Basin about ¾ mile above the Mogul Mine main adit below the access road into Ross Basin at an elevation of 12,200 ft. This site is believed to be on the Jane claim. This site was sampled as waste rock site #31 shown on Figures 6 and 24. There is no access road to the site. The site is located at LAT. N37°54'26.1", LONG. W107°37'34.1".

Workings
A collapsed mine adit and associated waste rock pile comprise this site. There is no surface discharge from the mine workings.

Mine Wastes
The dump at the portal is steep sided, containing approximately 900 cu. yds. of fine to coarse sulphide mine waste consisting mostly of massive pyrite, with some rhodonite, calcite, and quartz. The dump lies on the top margin of a colluvial debris slope. Runoff and seepage from the wastes infiltrates rapidly into the surface, continuing a few yards down slope where it enters the headwater stream. Ore minerals in the waste rock include pyrite, galena and sphalerite, principally in a quartz matrix. Leachate analysis indicates that this waste rock is acid forming. Total acidity and sulfates are shown below.

Ross Basin Lower Site

Total Acidity (mg/l)	ICP Sulfate (mg/l)
1020	1165

Historic Structures
There are no structures or equipment, other than scattered debris.

Geologic Constraints to Reclamation
This site is located on a steep slope adjacent to vertical or near vertical cliffs. The site is probably subject to small localized avalanches during the winter. Bedrock is at or near at the surface over most of the site, though there is colluvial debris below. There are some localized deposits of shallow topsoil nearby, but a large area would have to be disturbed for a borrow area. The extreme elevation makes revegetation difficult.

Water Quality Impacts
The only area of concern at this site is the mine waste. A large area of vegetation has been killed by leachate from the waste rock pile. White precipitate was observed in the stream below this pile. Leachate analysis of the waste rock shows high levels of zinc and copper (Figure 9). This site may be partially responsible for the elevated levels of zinc and copper found at sampling site CC-3 below. As was recommended in the in-stream chemistry section, another sampling station should

be established above the potential area of influence of this pile to determine whether this site is responsible or partially responsible for the elevated metals at site CC-3.

Reclamation Options
Due to the steep slope of this site, the reclamation recommended is to amend the waste rock in-place. Organic material and limestone can be incorporated into the shallow waste rock, then the site can be revegetated.

There are several small waste rock piles in the vicinity that appear to be similar to the waste rock at this site. The other waste rock piles are located near small prospect shafts. These shafts should be investigated to determine whether the waste rock can be simply placed back in the mine opening. If this solution can be used, the waste rock material can then be covered and revegetated. Alternately, the waste rock can be amended in-place.

Grand Mogul - East Adit

Location
This site is located in Ross Basin about ½ mile above the Mogul Mine main portal near the base of the north basin wall at an elevation of 11,800 ft. Access is via a narrow, steep 4-wheel drive trail which leads up Ross Basin from the Mogul Mine. This site is believed to be on the Grand Mogul and Narrow Gauge claims. The site was sampled as water quality station SO-3 and as waste rock sampling site #26 and is shown on Figures 3, 6 and 25. The site is located at LAT. N37°54'31.3", LONG. W107°37'41.9".

Workings
An adit driven northeast into the basin wall connects to workings on the Grand Mogul Vein 50 ft. from the portal. The Grand Mogul Vein strikes N.75°W. The adit continues through the Grand Mogul Vein and cross-cuts to intersect the Ross Basin Fault vein 300 ft. from the portal. There are several levels within the Grand Mogul Vein. The workings on the Ross Basin Fault extend eastward to connect with the Brenneman and Washington ore shoots in the Sunnyside Mine on the 3D level. There is no surface discharge from the collapsed adit, but there is discharge from the toe of the waste rock pile.

Mine Wastes
The dump at the portal contains approximately 9,000 cu. yds. of fine to very coarse bouldery sulphide mine waste consisting mostly of pyrite and quartz, with chalcopyrite, sphalerite, and some galena. The dump is moderately to completely cemented on both the slopes and the top. A kill zone extends outwards a little way from the dump, but as the dump is constructed on extremely permeable talus materials, most of the runoff and seepage from the wastes infiltrates rapidly. Total acidity and sulfates are shown below.

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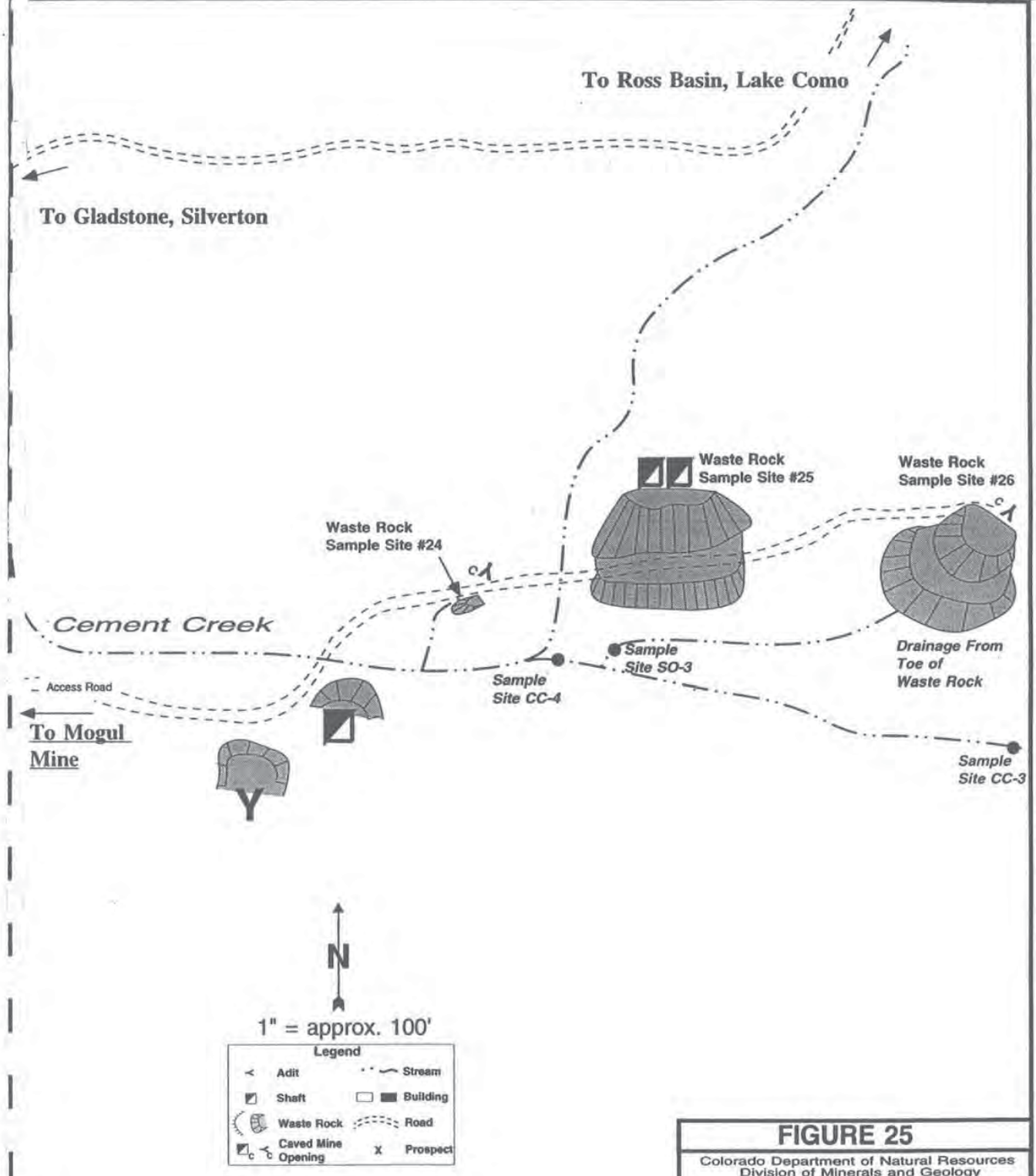

FIGURE 25

Colorado Department of Natural Resources
Division of Minerals and Geology

Inactive Mine Reclamation Program

Site Map - Cement Creek

Upper Mogul Area

Scale	Date	Sheet No.
as shown	2/2/98	1 of 1

Grand Mogul - East Adit Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
890	1,052

Historic Structures

There are no structures or equipment, other than scattered debris. There apparently was a shack or other structure on the dump in 1955, but it has since been destroyed by avalanches.

Geologic Constraints to Reclamation

This site is prone to avalanches and rockfalls from the steep slopes of Hurricane Peak above the site. There is a lot of loose talus and scree at the site, but no suitable soils or capping materials. Bedrock outcrops dominate the site. The extreme elevation makes revegetation difficult. Access is also somewhat difficult, and will need to be improved from the Mogul Mine, as only narrow jeep-type vehicles can pass through the narrow part of the canyon just above the Mogul.

Water Quality Impacts

The drainage from this mine site is one of the largest loaders of dissolved and total metals in the watershed. It is not known whether the source of discharge from the toe of the waste rock pile is mine drainage or is a spring under the waste rock pile. It appears more likely that the water source is mine drainage, due to the high metal content. The acid rock drainage is one of the three largest dissolved aluminum, cadmium, copper, lead and zinc loaders during low-flow and high-flow. Also, during high-flow, this drainage is one of the three highest iron and manganese loaders. Compared to all the other mine drainages, this site produces approximately 51% of the dissolved copper, 42% of the cadmium, 27% of the lead, 21% of the aluminum and 36% of the zinc at high-flow.

The measured loading at SO-3 during high-flow, was approximately 27 lb/day of zinc, 33 lb/day of iron and 5 lb/day of copper. At low flow, loading from this source dropped to 2 lb/day of zinc, less than 0.1 lb/day of iron and 0.3 lb/day of copper. Totaling all the metals measured, this site produces approximately 90 lb/day of dissolved metals during high-flow and approximately 4 lb/day during low-flow.

As would be expected from the water quality, the waste rock extract was high in copper and zinc. The waste rock is acid forming, within the range of other total acidity measurements for waste rock in the area. Snow drifting on the waste rock probably accounts for a portion of the drainage measured at high-flow.

Reclamation Options

Before any definite reclamation measures are developed, the source of the acid rock drainage flowing from the waste rock pile must be determined. This can be done by drilling into the mine workings or driving a well point through the collapsed adit to determine whether there is water in the adit. If the mine workings is the source of water, the adit should be opened up, so the drainage can be diverted from the waste rock pile and characterized. If the source of the drainage is a

000060

spring, either the waste rock must be moved to a relatively drier site, or the spring flow must be intercepted and diverted away from the waste rock.

If the source is mine drainage, it is likely that some type of alkaline addition will have to be done to raise the pH. The current pH is borderline for iron and copper to precipitate in a settling pond, and too low for a sulfate reducing wetland to be effective. Because of the elevation, it is doubtful that a sulfate reducing wetland would be an effective option at this site. Also, because of the remoteness and elevation of the site, there are few low-cost, low-maintenance options available.

With our present knowledge of the site, the most likely alternative is to construct a large anoxic limestone drain, followed by a settling pond. This system could be enhanced to provide for further metals removal by constructing a lime pond to add alkaline water to the settling pond. A portion of the relatively cleaner water from the stream above, can be diverted through a buried pipeline to the lime pond. The amount of water diverted should be roughly equal to the flow from the mine site. Based upon the flow measured in June 1997, the settling pond volume would have to be approximately 20,000 cu. yds. to attain a minimum residence time of 24 hours and allow for 50% sediment volume. To put this in context, the settling pond would have to cover slightly over 1.5 acres at 8 ft. in depth. There is sufficient area to construct a pond of this size in the area, but, because of the slope of the surrounding area, several ponds would have to be constructed. In addition, further disturbance would be required to construct the lime pond. The lime pond should have a minimum capacity of 1,000 cu. yds. to achieve a minimum water residence time of 2 hours, assuming that the pond is half-filled with lime. A smaller pond system could be constructed that will provide treatment for all the year except high-flow, and partial treatment during high-flow.

Because of the porous talus and scree above the mine site, the waste rock receives virtually no run-on. If a settling pond system is constructed, this pile can be covered with a portion of the waste rock, which should reduce the metals leaching from snowmelt and rain storms. There would be sufficient cover material generated by settling pond construction to cap all the waste rock in the immediate vicinity.

Grand Mogul Stope Complex

Location

This site is located in Ross Basin about 1/3 mile above the Mogul Mine near the base of the north basin wall at an elevation of 11,760 ft. It lies just west of the Grand Mogul - East Adit site described above. Access is via a narrow, steep 4-wheel drive trail which leads up Ross Basin from the Mogul Mine. This site is believed to be on the Grand Mogul and Narrow Gauge claims. The waste rock at this site was sampled as site #25 shown on Figures 6 and 25. The site is located at LAT. N37°54'40.1", LONG. W107°37'49".

Workings

A short adit driven northeast into the basin wall directly intersects stope workings on the Grand Mogul Vein, which is well exposed. The Grand Mogul strikes N.75°W., and has here been stoped to the surface along a distance of several hundred ft. Several levels of workings are visible within

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the stope. These workings extended northward and cross-cut over into the Ross Basin Fault, where they continue eastward to connect with the Brenneman and Washington ore shoots in the Sunnyside Mine on the 3D level. The workings also extend underground ½ mile westward to the main Mogul Mine portal. The lower parts of the workings are obscured by snow which remains throughout the year in the stope. Water from snowmelt on the south-facing slopes runs directly into the open stope, and there are several large areas of green, turquoise, and black colored oxidation stains associated with the seepage zones.

Mine Wastes

The dump at the portal and below the collar of the stope contains approximately 8,000 cu. yds. of fine to coarse sulphide mine waste consisting mostly of pyrite, rhodonite, and quartz. There are large cobbles and boulders of sulphide ore minerals and rhodonite below the collar of the stope. A kill zone extends outwards a little way from the dump, but because the dump is constructed on extremely permeable talus materials, most of the runoff and seepage from the wastes infiltrates rapidly.

Total acidity and sulfates are shown below. Although this dump has virtually the same mineralogy as the east dump discussed above, the waste rock is much coarser on the surface. This is the principal reason the total acidity and sulfates (shown below) are lower than the east dump.

Grand Mogul Stope Complex Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
360	536

Historic Structures

There are no structures or equipment, other than scattered debris. A few iron rings and drill steels have been set into the rock face of the vein footwall. An old ore car and tracks can be seen on one of the levels in the stope. This mine was reportedly worked mainly from 1900 to 1906 or 1907.

Geologic Constraints to Reclamation

This site is prone to avalanches from the slopes of Hurricane Peak. Access will need to be improved from the Mogul Mine, as only narrow jeep-type vehicles can pass through the narrow part of the canyon just above the Mogul. There is a lot of loose talus and scree at the site, but no suitable soils or capping materials. The extreme elevation makes revegetation difficult.

Water Quality Impacts

The principal identified water quality impact from this site is from the waste rock. Snowmelt and rain storms leach metals from the waste rock. A portion of the metals measured at water quality station SO-3 during high-flow were probably from this waste rock pile. The waste rock extract analysis shows this material is acid forming, with elevated levels of zinc and copper.

The stope at this site is filled with ice and snow during the winter. The snowmelt water is probably

a portion of the mine drainage that emits from the Mogul Mine, or may be the source of water flowing near waste rock sampling site #24 (Figure 6). If snow accumulation in the workings can be stopped, there should be a benefit to water quality.

Reclamation Options

The reclamation recommended for this site is to backfill the open stopes with the waste rock. Lime should be added to the stope over a period of several weeks before backfilling to help melt the snow and ice in the stope and neutralize the acidity. Initially, larger waste rock material must be placed in the bottom of the stope to wedge against the sides and form a stable plug. Lime and/or fly ash should be added as backfilling takes place to continue neutralizing the acidity and help to cement the backfill materials. At the top of the backfill, a lime-cement mixture should be added to reduce infiltration of water through the backfill. The final slope of the backfill should be at least 2h:1v to facilitate proper runoff.

Mine North of Mogul

Location

This site is located in Ross Basin about 1/4 mile above the Mogul Mine near the base of the north basin wall at an elevation of 11,700 ft. It lies just west of the Grand Mogul Stope Complex described above. Access is via a narrow, steep 4-wheel drive trail which leads up Ross Basin from the Mogul Mine. This site is believed to be on the Cross Cut claim. The waste rock at this site was sampled as site #24 shown on Figures 6 and 25. The site is located at LAT. N37°54'42.2", LONG. W107°38'02.3".

Workings

A short adit was driven northeast into the basin wall. The collapsed adit shows no signs of drainage, but a spring emits near the edge of the waste rock pile, across the access road. The flow from the spring had a pH of 5.4 and an electrical conductivity of 154 umhos/cm. The observed flow is between 5 and 10 gpm.

Mine Wastes

The waste rock pile contains approximately 400 cu. yds. of fine to coarse sulphide mine waste consisting mostly of pyrite and quartz. Total acidity and sulfates are shown below.

Mine North of Mogul Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
200	348

Historic Structures

There are no structures or equipment, other than scattered debris.

Geologic Constraints to Reclamation

This site is prone to avalanches from the slopes of Hurricane Peak. Access will need to be improved from the Mogul Mine, because only narrow jeep-type vehicles can pass through the narrow part of the canyon just above the Mogul Mine. There is a lot of loose talus and scree at the site, but no suitable soils or capping materials. The extreme elevation makes revegetation difficult.

Water Quality Impacts

Water quality impacts from this site are thought to be minimal. Extract analyses shows the waste rock is mildly acid forming, and is relatively low in metals compared to other sites in the area. The mine drainage or spring that emits from the edge of the pile has not killed the adjacent vegetation, and exhibits minor amounts of iron precipitate.

Reclamation Options

No reclamation is currently recommended at this site. If the Grand Mogul Stope Complex is reclaimed, the mining waste from this site could be consolidated with it. The spring/mine drainage should be monitored at least one time to determine whether any further investigations are warranted.

Queen Anne Mine

Location

This mine is located in the northern steep branch of Ross Basin 2-3/4 miles above Gladstone adjacent to County Rd. 10, just before Hurricane Pass. It lies at an elevation of 12,240 ft. This site is believed to be on the Queen Anne and Rose No. 1 claims. The mine drainage was sampled as station SO-1 shown on Figure 3. The waste rock was sampled as site #22 shown on Figure 6. These sample sites are also shown on the site map, Figure 26. The site is located at LAT. N37°54'53.0", LONG. W107°37'42.7".

Workings

The Queen Anne adit is driven on a N.14°E. trending vein, which intersects a second vein, striking N.50°E., dipping 75° SE, about 500 ft. from the portal. Where these veins intersected, a dog-leg shaped ore shoot with good values in silver and lead was mined. The adit portal is adjacent to a stream, and continues into the mountainside where it eventually crosses beneath this same stream. The portal discharges between 20 and 40 gpm of water into the top of a steep dump, where much of it infiltrates.

Mine Wastes

The dump at the portal is steep-sided, containing approximately 5,000 cu. yds. of bright yellow and orange fine to coarse sulphide mine waste consisting mostly of massive pyrite, with some rhodonite, calcite, and quartz. The dump lies on talus, and along the margin of a colluvial debris slope. Runoff and seepage from the wastes infiltrates rapidly into the surface, continuing a few yards downslope where it enters the headwater stream. Ore minerals in the waste rock include pyrite, galena and sphalerite, principally in a quartz matrix. Waste rock leachate analysis indicates that this waste rock is mildly acid forming, but compared to other waste rock in Cement Creek, it should be considered a low priority. Total acidity and sulfates are shown below.

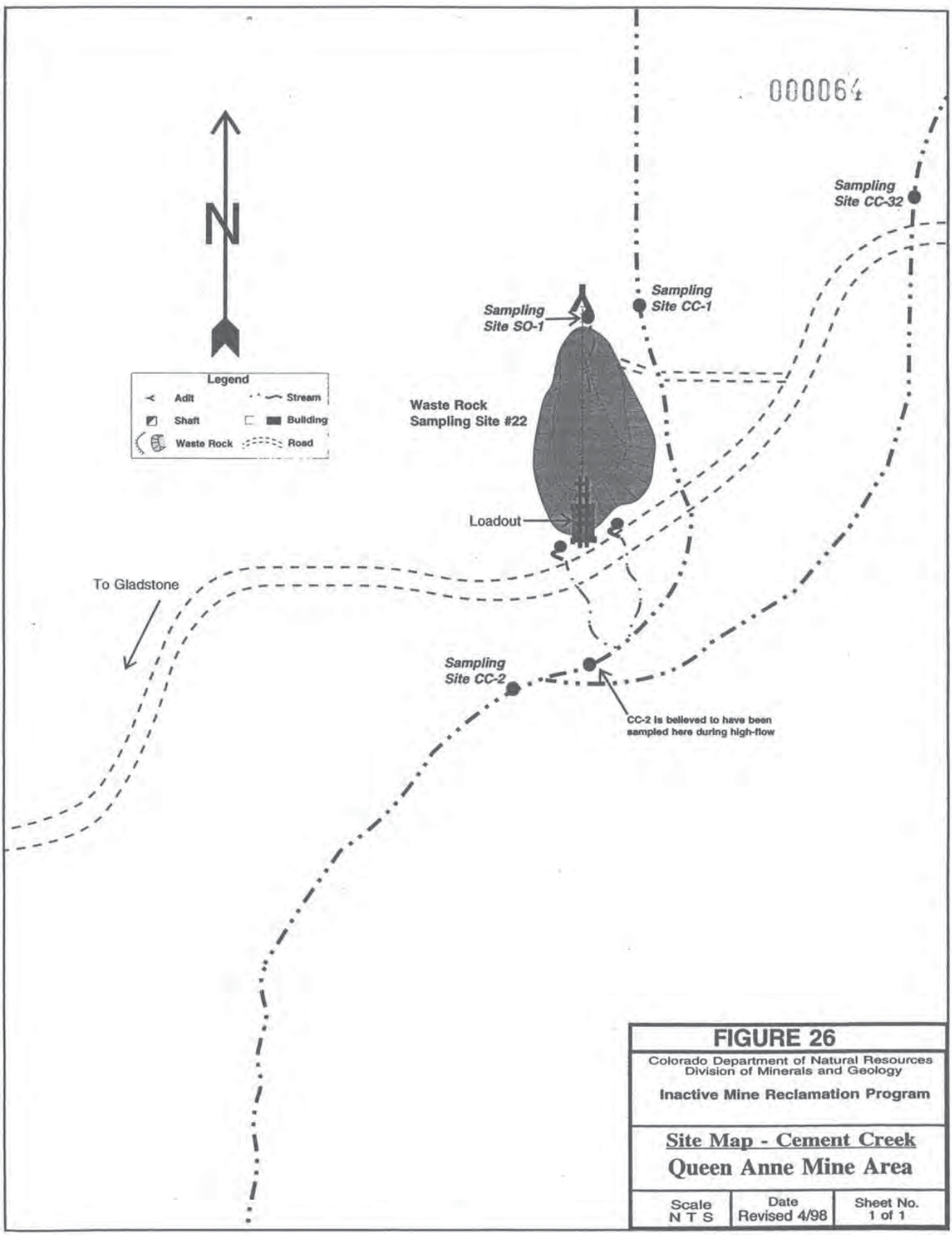

FIGURE 26

Colorado Department of Natural Resources
Division of Minerals and Geology

Inactive Mine Reclamation Program

Site Map - Cement Creek

Queen Anne Mine Area

Scale	Date	Sheet No.
N T S	Revised 4/98	1 of 1

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Queen Anne Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
560	274

Historic Structures

There is an ore bin and loadout structure standing at the end of the dump. Although it is currently in moderately good condition, it is steadily deteriorating. The structure is a favorite photo location for the thousands of tourists who pass by the site on 4-wheel drive tours each year. Tracks lead into the adit portal, but there are no other structures or equipment remaining on site.

Geologic Constraints to Reclamation

This site is generally outside of avalanche paths, being close to the top of Hurricane Pass. There is a lot of loose talus and scree at the site, but also some finer grained colluvium on the west margin of the site which might make a borrow area for suitable soils or capping materials. The extreme elevation makes revegetation very difficult.

The mine workings could be picking up water where they cross under the headwaters stream. Based on site geometry and the strike of the vein, the back (roof) of the adit appears to be less than 25 ft. beneath the stream bed, perhaps allowing near surface joints and fractures to deliver water into the workings.

Water Quality Impacts

The water quality impacts from the Queen Anne Mine site come from the waste rock pile and draining mine. The mine drainage flows over and into the waste rock pile. A portion of the mine drainage emerges at the toe of the waste rock pile and some flows under the road into the headwaters of Cement Creek. Compared to the other draining mines, this site produces less than 1% of the dissolved metals. At high flow, dissolved metals amounted to approximately ¾ lb/day. At low-flow, the amount of dissolved metals was approximately 1 lb/day. Dissolved zinc load made up more than 50% of the total load measured at the adit.

The waste rock is acid forming. Extract analyses show that the waste rock is a source of zinc, copper and iron. In-stream sampling at CC-2 indicates that there is an increase in concentration and loading of zinc and copper below this site during low-flow (Figures 12 and 13). At the time of the high-flow sampling, dilution from the surrounding undisturbed area greatly affected the results. The zinc load measured at site CC-2 is lower than what was measured at site CC-32, which is upstream. It is likely that the drainage at site CC-32 was not measured at site CC-2 at high-flow, because the CC-2 monitoring station had to be moved upstream due to deep snow. The high-flow CC-2 sampling site may have been above the confluence with CC-32. If this is true, the waste pile produces as much as 2/3 lb/day of zinc. This is consistent with the 3/4 lb/day of zinc indicated by the low-flow data. A portion of the unaccounted load at CC-2, during low-flow, probably comes from subsurface flow from the Columbia/Upper Queen Anne mine area, which is northeast of the Queen Anne Mine.

Reclamation Options

The first reclamation activity recommended for this site is to divert the mine drainage to the west around the waste rock. The mine drainage diversion would also act as a diversion for upland run-on water. Construction of the ditch should include installation of a culvert under the road below the mine site, to reduce "Texas Crossing" impacts by 4-wheel drive vehicles.

Mine drainage treatment at this site will be difficult because of access and the elevation of the site. The pH of the mine drainage is near neutral, so alkaline addition methods are probably not appropriate. The mine workings appear to be accessible, which would allow testing of the inflows to determine whether all or a portion of the sources in the mine could be sealed off. The water temperature at the adit is marginal, at best, for construction of a sulfate reducing system. In order to find sufficient space for construction of a sulfate reducing system, the mine drainage would have to be piped. There is insufficient area on the waste rock pile to construct a sulfate reducing system without destroying the historic loadout structure. Alternatively, the mine workings could be investigated to determine whether a sulfate reducing system can be installed inside the mine workings.

The waste rock at this site should be considered a lower priority than many others in the Cement Creek watershed. The only known reclamation option to treat the waste rock and maintain the historic loadout is to cement the waste rock in place.

Columbia Mine and Upper Queen Anne Complex

Location

This mine complex is located on top of Hurricane Pass, adjacent to County Rd. 10, at an elevation of 12,515 ft. This site is believed to be contained within the Columbia, Adelpheh, Alpha, Rose, and Queen Anne claims. Water quality station CC-32 is located approximately 1/4 mile below this mining complex. The site is in the area of waste rock sampling site #34 on Figure 6. Figure 27 is a site map. The site is located at LAT. N37°55'04.7", LONG. W107°37'37.4".

Workings

The Columbia Mine and adjacent mining sites consist of an adit and five shafts which developed silver-lead ores similar to those at the nearby Queen Anne Mine. The workings opened a series of steeply east-dipping intersecting spur veins which split northwards from the Queen Anne vein . The veins occur as mineralized faults which have offset and tilted the volcanic flows 25° to 35° NW in a series of narrow, north-trending fault blocks across the Hurricane Pass area. As in the Queen Anne, dog-leg ore shoots formed locally where north-northeast trending veins intersected and switched to more east-west trending fissures.

The upper Queen Anne adit drifted on the northeastern extension of the main Queen Anne vein, beyond where the Columbia vein complex branches off. Both the upper Queen Anne and Columbia adits are collapsed, and neither one is draining. The Columbia shafts have all been capped or backfilled.

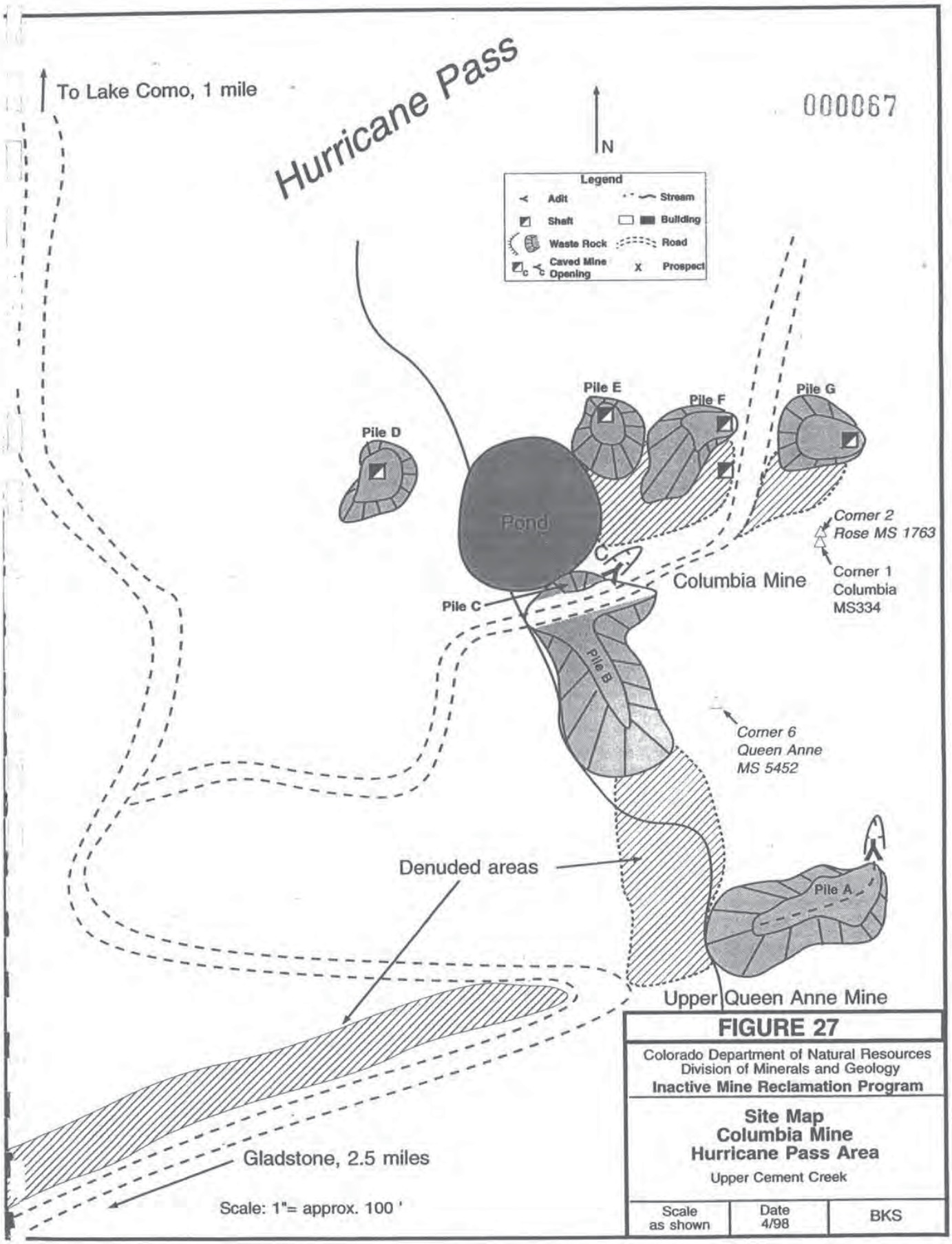

FIGURE 27

Colorado Department of Natural Resources
Division of Minerals and Geology
Inactive Mine Reclamation Program

Site Map
Columbia Mine
Hurricane Pass Area
Upper Cement Creek

Scale	Date	
as shown	4/98	BKS

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Mine Wastes

There are seven mine dumps at this site, as shown on Figure 27. The dumps associated with the shafts are small, the largest being only 1,500 cu. yds. (Table 2) The largest dumps are those of the Columbia and Upper Queen Anne adits.

Table 2. Hurricane Pass Mine Dump Data

Dump Map Designation	Approx. Volume (Cu. yds.)
Upper Queen Anne -A	900
Columbia Adit - B	2,000
Columbia Adit - C	300
Columbia Shaft - D	1,000
Columbia Shaft - E	1,500
Columbia Shaft - F	1,000
Columbia Shaft - G	700
Total Estimated Volume	7,400

The dumps are all of similar nature, and consist of bright yellow and orange fine to coarse sulphide mine waste composed mostly of pyrite, rhodonite, and quartz. Three of the shaft dumps lie adjacent to a small pond occupying a depression in the hummocky saddle of Hurricane Pass. The pond drains southwards into Ross Basin, running along the toes of both the Columbia and upper Queen Anne dumps. Runoff and seepage from the wastes runs into the pond and the pond outlet stream. There is a prominent kill zone below the Columbia adit dump, and a lesser one below the "G" shaft's dump.

Total acidity and sulfates of a composite sample from the dumps are shown below.

Columbia Mine and Upper Queen Anne Complex

Total Acidity (mg/l)	ICP Sulfate (mg/l)
1,390	1,441

Historic Structures

There are no structures or equipment remaining at these sites, only some scattered wooden and iron debris, and several posts marking claim corners.

Geologic Constraints to Reclamation

This site is generally outside of avalanche paths, being on top of Hurricane Pass in a flat saddle area. Bedrock is at or near surface over most of the site, though there is some loose talus and scree east of the site on the slopes of Hurricane Peak. There are no suitable soils or capping materials. The extreme elevation makes revegetation difficult.

Water Quality Impacts

The major area of concern is the complex of mine waste rock in and adjacent to the drainage. Because of the heavy snow pack, there is considerable leaching of the waste rock during the period of May through July. It is also likely that there is some leaching during thunderstorms and snowmelt events in the late summer and early fall. There are several perennial snowfields upstream of this site. During the June 1997 high-flow sampling event, the waste rock piles were completely covered with snow to depths exceeding 10 ft.

Sampling site CC-32 is located approximately ¼ mile downstream of the mining complex, east of the Queen Anne Mine. This sampling site is at the bottom of a large iron-stained kill zone below this area. The water quality data from June 1997 shows that this site was producing approximately 33 pound of metals per day including 8 pounds of zinc, 11 pounds of manganese, 11 pounds of aluminum, 1.5 pounds of copper and 1 pound of iron.

The waste rock analyses indicate that leachable copper and iron should be higher, but were probably diluted by adjacent snowmelt at the time of the water quality sampling. Also, the iron and copper may have been precipitating with all the dilution.

Reclamation Options

It is recommended that a combination of options, including consolidation and encapsulation of the waste rock or in situ cementation, be used for reclamation at this site. Because of the deep snow pack at this site, simple encapsulation and revegetation would not be completely effective in eliminating the source. In addition, this area is along one of the major 4-wheel drive roads in the area. To maintain the historic "flavor" of the area, the waste rock directly in the drainage should be consolidated with one or more of the upland piles. The waste rock pile should then be cemented in-place by injecting a cement/fly ash mixture. The consolidated piles could be treated as the material is moved. The cementation will limit the water and airflow through the pile, effectively eliminating this source. A thin veneer of waste rock will have to be left untreated to maintain the historic integrity of the site. Run-on controls should be constructed around the waste piles to limit the water/waste rock contact. The areas where waste rock is removed should be treated with agricultural grade limestone and revegetated.

Mogul Mine

Location

This mine is located just below Ross Basin about 1½ miles above Gladstone on the east side of Cement Creek at an elevation of 11,428 ft. Access is via a narrow, rocky 4-wheel drive trail, which

leads from Gladstone north along Cement Creek. This site is believed to be on the Theresa or Young claim. Drainage from the Mogul Mine was sampled as water quality station SO-5 and the waste rock was sampled as site #27, as shown on Figures 3 and 6. A site map is shown on Figure 28. The mine is located at LAT. N37°54'41.2", LONG. W107°38'19.4".

Workings

The Mogul Mine was an extensive operation which developed ore bodies in the Ross Basin Fault and branching Grand Mogul Vein. The main period of mining was from 1900 to 1907. A large mill, built at Gladstone in 1906, was connected to the Mogul Mine by an aerial bucket tram.

The main adit level drifted northeast on a spur vein striking N. 75° E., dipping 65° N., eventually intersecting the Grand Mogul Vein. The adit level totals about 2,800 feet of drifts on these geologic structures. A crosscut to the northeast, 2,400 ft. from the portal, connects to workings on the Ross Basin Fault in Ross Basin. The main Mogul level continues eastward on the Ross Basin Fault to connect with the Brenneman and Washington ore shoots in the Sunnyside Mine on the 3D level. There was reportedly over 20,000 feet of workings in the Mogul operation (Burbank and Luedke, 1969). The portal continues to drain 10-30 gpm of zinc-laden water, which runs along the edge of the dump into Cement Creek.

The Grand Mogul Vein, which is well exposed in Ross Basin, strikes N. 75° W. within the Eureka Graben. It has been stoped to the surface along a distance of several hundred feet near the Grand Mogul Stope Complex described above. Several levels of workings above the Mogul adit level are visible within the stope. The lower parts of the workings are obscured by snow which remains in the stope throughout the year. Water from snowmelt on the south-facing slopes of Ross Basin runs directly into the open stope, and presumably continues 1,600 ft. west to the Mogul portal.

There is an inclined shaft which may connect to the Mogul adit 850 ft. northeast from the portal. The shaft collar is 201 ft. above the Mogul level on the same vein. It was constructed adjacent to Cement Creek, and includes a diversion dam and pipe intake through its side which may have been used to deliver water for drilling to the main Mogul adit level, though this connection has not been verified. The shaft is still open, but the pipe intake has been disconnected. If this shaft connects to the Mogul, it could be allowing groundwater from Cement Creek 25 ft. away to enter the mine workings. The shaft and open stope described above are potential inflow sources to the Mogul workings, and should be investigated to determine if source control approaches are feasible. Source control approaches include methods of preventing water from flowing into the mine, such as stream diversion, lining the stream, or shallow fracture grouting.

Mine Wastes

The dump at the Mogul Mine was surveyed and found to contain approximately 25,000 cu. yds. of fine to coarse sulphide mine waste. The dump is constructed over talus and bedrock. Two large bedrock outcrops protrude from the lower dump slope below the access road.

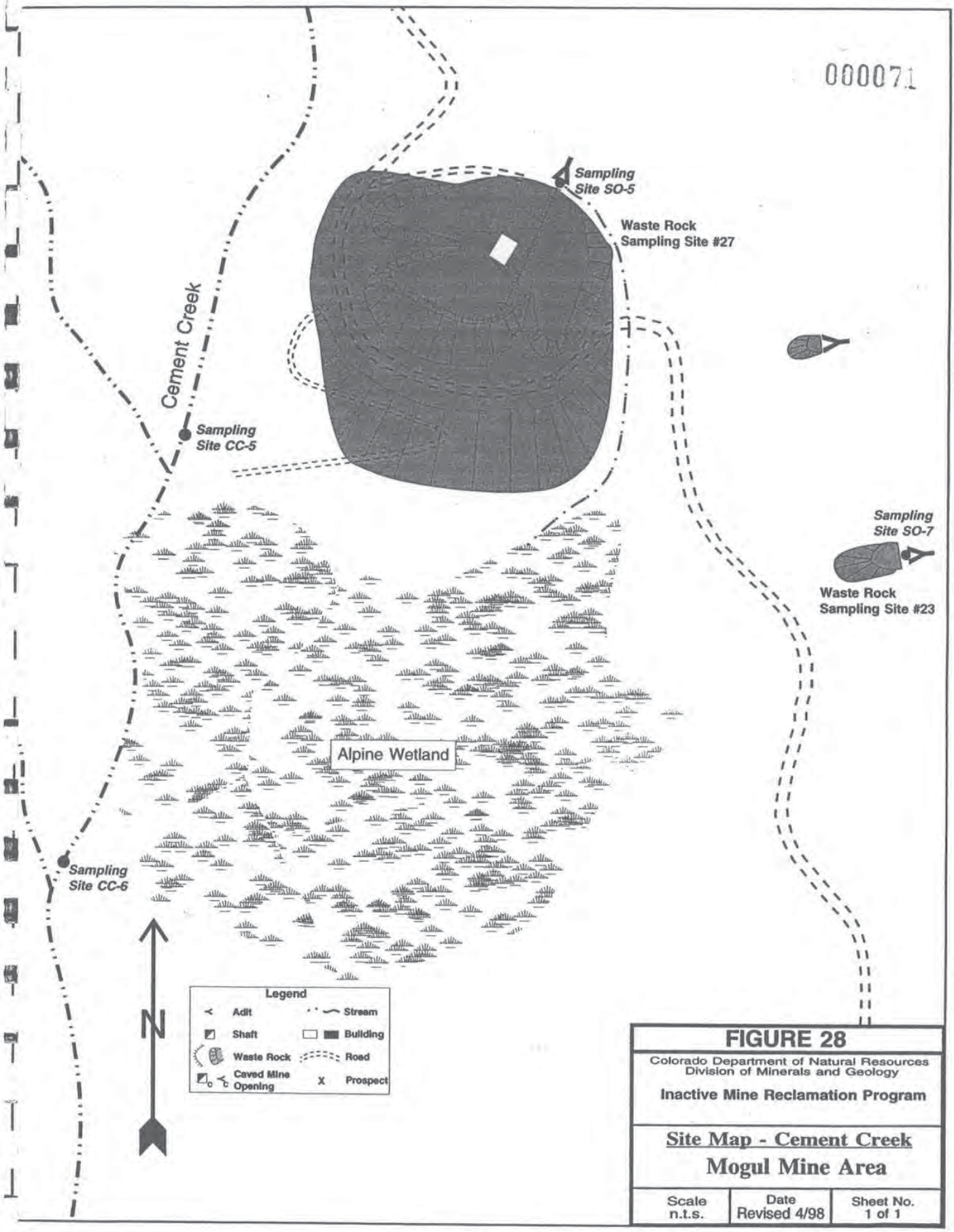

FIGURE 28

Colorado Department of Natural Resources
Division of Minerals and Geology

Inactive Mine Reclamation Program

Site Map - Cement Creek
Mogul Mine Area

Scale	Date	Sheet No.
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The ore from this mine was reportedly very high in pyrite and sphalerite, and difficult to mill profitably. This is reflected in the dump, which is largely pyritic, and contains large cobbles and boulders of pyrite, sphalerite, and galena in stockworks of quartz, rhodonite, and calcite. Some fairly high grade specimens of sphalerite remain.

A kill zone extends from the dump 150 ft. to the edge of a natural wetland. Flows from the Mogul portal and a collapsed prospect adit at the edge of a talus field 600 ft. south combine into a stream which runs along the margin of the natural wetland, eventually entering Cement Creek.

Total acidity and sulfates of the dump are reported below.

Mogul Mine Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
590	581

Historic Structures

There is a small, modern, sheet metal-clad tool shed near the mine portal, and an old foundation on the north edge of the dump. Tracks lead from the portal to the edge of the dump, where broken timbers and scattered wooden debris mark the former location of the loadout. There are no other structures or equipment, other than scattered debris, presumably marking foundations of collapsed buildings.

Geologic Constraints to Reclamation

This site is generally not prone to avalanches because there are no long continuous slopes above. Minor avalanches occur over the mine portal, which is commonly covered with snow through August. Sections of the 4-wheel drive road will need to be improved from Gladstone to allow equipment access. There is a lot of loose talus and scree at the site, but no suitable soils or capping materials. The large natural wetland area developed in gently sloping alluvial and colluvial materials below the mine dump on the banks of Cement Creek might be augmented, and useful as a potential passive treatment option. As with all the Ross Basin sites, extreme elevation makes revegetation difficult.

Potential surface water inflows to the workings via the open stope and shaft described above should be investigated. These features could be allowing water to directly enter the mine workings, significantly contributing to the total portal discharge.

Water Quality Impacts

The mine drainage from the Mogul Mine is one of the largest dissolved metals loaders in Cement Creek, compared to the other mine drainages. At low-flow, Mogul Mine drainage is the largest loader of dissolved copper, lead, cadmium and zinc, of all the mine drainages. At low-flow, the adit drainage contains about 13 pounds of metals per day including about 4 pounds of zinc, 6 pounds of iron, and 1 pound of copper per day. At high-flow, the mine drainage is one of the top three

loaders of copper, cadmium and zinc. At high-flow, the loading amounts jump to about 28 pounds of metals per day including about 8 pounds of zinc, 14.5 pounds of iron and 2 pounds of copper per day.

The mine drainage has recently been diverted around the mine waste by the owner. Prior to the diversion, the pH and electrical conductivity of the mine drainage worsened as it passed over and through the waste rock. The mine drainage flows into a large wetland area and enters the stream in numerous locations. By comparing the increase in metals loading at station CC-6 to the load at station CC-5 and the load from the Mogul Mine and draining mine south of the Mogul, the metals removal efficiency can be assessed. The results from both the low-flow and high-flow sampling indicate that the wetland is being effective in iron removal. At low-flow, lead is also apparently removed by the wetland, but appears to be subsequently flushed out during high-flow. All other metals appear to pass through the wetland. Aluminum appears to increase as the mine drainage passes through the wetland. This is probably due to leaching of the clays by the acidic water.

Extract analyses show that the waste rock is high in zinc, lead and copper. The lowest pH (1.2) of all the waste rocks analyzed in the Cement Creek area was from this site. The waste rock receives some upland run-on water and receives water from portions of the road into Ross Basin.

Reclamation Options

Eliminating contamination of run-on water should be the priority for reclamation at this site. Diversion ditches should be constructed on the northern side of the mine site. A portion of the diversion ditch would have to be constructed by hand because the slope is too steep for equipment. This will only stop some of the impacts of the waste rock at this site, because snow accumulation on the waste rock will continue to leach metals from the waste rock.

The Mogul Mine is very prominent and very visible from the 4-wheel drive roads across the canyon. As such, to maintain the historic flavor of the area, the waste pile should be left in place. To reduce the water quality impacts from the site, a cement/fly ash mixture can be injected into the waste rock to limit the infiltration of water. The same mixture can be applied to the surface of the waste rock. Some regrading of the pile will be necessary to allow for equipment access, but the final contours can be similar to the present contours. The waste rock that has eroded into the wetland should be moved onto the main pile.

The mine drainage from this site will be somewhat difficult to treat. The low pH of the mine drainage (2.6-2.9) eliminates many of the treatment options. The mine drainage is almost saturated with oxygen. In August 1996, the dissolved oxygen in the drainage was measured at 7.7 mg/l, with saturation at 8.7 mg/l. The high dissolved oxygen and low pH virtually eliminates the use of a sulfate reducing wetland for reclamation.

The pH of the mine drainage is very favorable for construction of an anoxic limestone drain. It has been reported that the majority of the mine drainage comes from one drift off the main haulage tunnel (Hennis, 1998). This drift could be filled with limestone and a bulkhead could be constructed to flood that portion of the mine workings. The bulkhead should reduce the oxygen supply to the

drainage, causing the water to become anoxic. At best, this may raise the pH of the drainage to the 4-5 range, which would be adequate to remove the iron, lead and a portion of the copper and zinc. This would also raise the pH to a level where a sulfate reducing wetland would function during at least part of the year. The temperature of the mine drainage is probably too low for optimal sulfate reducing bacteria activity during the winter months.

Another treatment option is to construct a pneumatically agitated limestone pond to raise the pH. This involves constructing a lined pond filled with limestone. The mine drainage is passed through the pond in an up-flow configuration. At the bottom of the pond, two sets of perforated pipes are placed under a coarse cobble layer. One set of pipes is to convey the mine drainage. The other set of pipes is attached to a large capacity air compressor, powered either by wind or solar, or possibly both. Periodically, the compressed air will be released, which will clean the metals that have accumulated on the limestone. The limestone pond must be followed by a settling pond. With sufficient residence time, the pH of the drainage should be brought to near neutral.

Mechanical injection of neutralizing agents is also an option that should be considered. This option would either require installation of electrical lines to the mine or construction of a small hydro-electric plant. There is sufficient elevation difference to pipe a portion of Cement Creek from above the mine site and power a small plant. A lime addition plant could be constructed with sufficient neutralizing agent volume to last for a whole year. The biggest drawback is that yearly or more frequent maintenance would be required.

Whatever system is constructed, the wetland presently receiving the mine drainage should be rejuvenated by adding limestone. The wetland can provide some additional treatment during the summer months. A low ground pressure spreader could possibly be used to spread limestone during the late summer or early fall, or the limestone could be spread by helicopter. There are several channels through the wetlands that should be blocked off, by hand, to prevent short-circuiting of the flow through the wetland.

Mine South of Mogul

Location
This site is located approximately 300 yards south of the Mogul Mine east of the access road to the Mogul at an elevation of 11,400 ft. Access is via a narrow, rocky 4-wheel drive trail which leads from Gladstone north along Cement Creek. This site is believed to be on the Gold Point claim. This mine was sampled as water quality station SO-7, shown on Figure 3, and the waste rock was sampled as site #23, shown on Figure 6. A map of the site is shown on Figure 28. The mine is located at LAT. N37°54'30.6", LONG. W107°38'16.2".

Workings
A short adit was driven northeast into the basin wall. The collapsed adit commonly drains about 13 gpm of metals-laden water from late spring through early summer.

Mine Wastes
The waste rock pile contains approximately 800 cu. yds. of fine to coarse sulphide mine waste consisting mostly of pyrite and quartz. The fine fraction of the waste rock contains some sphalerite and galena, and very little pyrite. The coarse material on the waste pile is estimated to be a minimum of 25% pyrite with some chalcopyrite. Total acidity and sulfates are shown below.

Mine Dump South of Mogul

Total Acidity (mg/l)	ICP Sulfate (mg/l)
200	236

Historic Structures
There are no structures or equipment, other than scattered debris.

Geologic Constraints to Reclamation
This site is prone to avalanches. Sections of the 4-wheel drive road will need to be improved from Gladstone to allow equipment access. There is a lot of loose talus and scree at the site, but no suitable soils or capping materials. The large natural wetland area developed in gently sloping alluvial and colluvial materials below the mine dump on the banks of Cement Creek might be augmented, and useful as a potential passive treatment option. As with all the Ross Basin sites, extreme elevation makes revegetation difficult.

Water Quality Impacts
The principal water quality impact from this site is the seasonal mine drainage. Compared to the other mine drainages, this mine produces about 1.5% of the metals. Of the principal metals of concern, this mine site produces 3% of the copper from all the mine drainages. The measured metal loading was about 1 pound of zinc, 8 pounds of iron and 1/4 pound of copper per day. The mine drainage flows from the mine adit into the surrounding talus, and enters the same wetland as the Mogul Mine. It is likely that there is more mine drainage than has been measured, since the collapsed portal is directly in the large talus. The mine drainage has cemented portions of the talus and waste rock with iron and manganese precipitates along the southern part of the waste pile. The talus is probably providing some treatment of the drainage.

Extract analyses show that the waste rock is mildly acid forming, and is relatively low in metals compared to other sites in the area. Most of the large pyritic materials show few signs of acid dissolution. There may be impurities in the pyrite that make it less prone to weathering. The waste rock at this site is thought to be a minor source of metals to Cement Creek. If the mine drainage is treated, the wetland below the site may treat any metal-laden drainage from the waste rock.

Reclamation Options
The mine adit should be reopened to determine if there is perennial drainage from the mine. The apparently seasonal drainage from this site makes it a lower priority than other perennially draining mines. If the Mogul mine drainage is treated, this drainage can be piped to the same treatment

system.

CEMENT CREEK- BONITA PEAK AREA

Location

The "Cement Creek-Bonita Peak area" as used here includes five sites on the west side of Bonita Peak, southwest of the Bonita Peak Fault. This area is just south of the previously described Ross Basin area, and much of the geologic setting is similar. Mine sites selected by DMG and ARSG for reclamation feasibility studies include the Adams Mine and Red & Bonita Mine on the east side of Cement Creek 1/2 mile above Gladstone on the west foot slope of the mountain, the Lead Carbonate Mine on the upper slopes of Bonita Peak in Minnehaha Basin, and the Black Hawk sites on the Middle Fork of Cement Creek. The locations of these sites are shown on Figures 3 and 6. The sites are situated on privately owned patented lode mining claims. Coordinates of each site are given in the individual site descriptions which follow below.

The area is characterized by rugged, steep, high alpine terrain just below timber line at the Adams and Red & Bonita sites, and well above timberline at the Lead Carbonate and Black Hawk mines. Winters are long with snow depths averaging 440 inches. The summer growing season is short. Average annual precipitation for the past 3 years is 45 inches, 37 inches occurring as snowfall (Sunnyside Gold Corporation, 1996).

Geologic Setting

The regional geologic setting of the Cement Creek area is discussed at the beginning of this report. More specific information about the Cement Creek-Bonita Peak area is included below.

Bedrock Geology

The Cement Creek-Bonita Peak area is situated near the center of the Silverton Caldera. Only the upper massive pyroxene-bearing member of the Silverton Group Burns Formation is present in the Cement Creek-Bonita Peak area. The upper slopes of Bonita Peak east and above the four sites are comprised of the overlying Henson Formation.

A highly mineralized volcanic breccia body lies just north of the Red & Bonita Mine and south of the Adams Mine on the east valley wall of Cement Creek. Exposures are poor due to overlying talus and colluvial deposits, however, the breccia body was reportedly exposed in mine workings (Burbank and Luedke, 1969). The country rock has been brecciated and highly pyritized within the pipe. Subsequent oxidation of this pyritized mass by groundwater is believed to be responsible for forming the unusual iron oxide deposits on the slopes and within the wetlands along Cement Creek near the Red & Bonita Mine.

Structural Geology

Structurally, the Cement Creek-Bonita Peak area lies in the north-central part of the Silverton Caldera, adjacent to the Eureka Graben (Burbank and Luedke, 1969). This boot-shaped graben is bounded by a series of major, steeply dipping mineralized faults which define and outline the down-

dropped structure within the caldera complex, (Figure 2), as described in the geology section at the beginning of this report.

The Bonita Fault forms the boot-shaped graben's "sole" on its southwest margin, and lies 2,500 ft. east of the Cement Creek sites, and 1,000 ft. east of the Lead Carbonate Mine. It trends northwest-southeast on a curving strike from the head of Gray Copper Gulch just north of the main Cement Creek valley, across Cement Creek near the Mogul Mine, and continues across the west shoulder of Bonita Peak just above the Lead Carbonate Mine. It terminates near the summit of Emery Peak 3,500 ft. northeast of the Black Hawk workings, where it forms a nearly right-angled junction with the northeast-trending Toltec Fault. Dips on the Bonita Fault are from 75° to 80° NE, with the northeast block (hanging wall), being downthrown.

The upper Burns Formation southwest of the Bonita Fault has been tilted southwestward, and is broken by numerous small faults and sheeted zones in parallel and diagonal orientation to the main Bonita structure. These types of mineralized fractures have been developed by mines in the area of upper Cement Creek, and in the Middle Fork area.

The Lead Carbonate vein lies in the footwall of the Bonita block (Figure 2), and trends northeastward, nearly perpendicular to the northwest strike of the Bonita Fault. Repeated downward movement of the Bonita block in the hanging wall is believed to have caused dilation of this major fracture, forming the structure for the Lead Carbonate ore body (Burbank, 1951).

Hydrothermal Alteration

All the volcanic rocks in the Cement Creek-Bonita Peak area were extensively propylitized and altered on a regional scale, prior to ore deposition. In this area of the Silverton Caldera, propylitic alteration is typified by the formation and addition of chlorite, calcite, and clays in weakly altered rocks, to epidote, albite, and chlorite in the stronger phases. Propylitic alteration has resulted in a dull green or greenish gray color to virtually all of the Burns Formation rocks.

Wall rock adjacent to the vein deposits has been subjected to more intense but localized alteration processes. Quartz, sericite, and pyrite are common mineralogical products of wall rock alteration associated with the siliceous sulfide veins in the Cement Creek-Bonita Peak area .

Manganese minerals, such as rhodonite and rhodocrosite, are also characteristic of alteration in wall rock of the major fault-fracture veins. Where weathered on the surface, these manganese-altered rocks often are conspicuous due to the characteristic black staining of manganese oxides (pyrolusite, psilomelane).

Ore Mineralization

Ore mineralization in the Cement Creek-Bonita Peak area occurs as quartz-pyrite veins associated with the system of open fissures created southwest of the Bonita block of the major Eureka Graben structure. Although the mineralized faults and fissures can often be traced for hundreds to thousands of feet, economic ore deposits or 'ore shoots' occur on a much more restricted basis due to localized influences of structure and mineralizing solutions.

The most common sulfide minerals of the veins are pyrite, chalcopyrite, sphalerite, galena, and tetrahedrite. Tennanite also occurs, and free gold is associated with localized shoots, and in the siliceous gangue minerals, such as rhodonite. Gold has also been found associated with the base metal sulphides in some veins. Silver is associated with argentiferous tetrahedrite, and sometimes with silver sulfo salts and sulfobismuthites (Burbank and Luedke,1969). The Adams Mine ores reportedly contained enough hübnerite, a sulfide of tungsten, to be mined profitably for a short time.

Gangue minerals associated with the veins consist dominantly of quartz, rhodonite, rhodocrosite, calcite, fluorite, and minor barite. Not all the veins have the manganese gangues, as these are preferentially found in the major fault structures.

Surficial Geology

Upper Cement Creek Sites

Cement Creek runs in a broad valley bordered by a nearly continuous apron of talus on both sides. The stream is braided in many sections, but has formed continuous alluvial deposits and low terraces through the area. There are some isolated ferricrete deposits, as well as extensive, boggy wetland areas developed on gentle colluvial slopes adjacent to the stream.

Slopes bordering Cement Creek are steep, but heavily timbered and generally outside of avalanche paths. The exception is a steep ravine coming down the west slope of Bonita Peak adjacent to the Adams Mine. It is a major avalanche track, and is also a source area for debris flows, which have formed a debris fan on the valley floor of Cement Creek.

Minnehaha Basin

Minnehaha Basin is a glacial cirque well above timberline with a steep west-facing head wall, and gently west sloping basin floor. The lower slopes below the steep rocky basin walls are covered with an almost continuous apron of loose, blocky talus. Glacial till and outwash mantle the gently sloping basin floor. These poorly drained unconsolidated clayey and gravelly deposits support a high-alpine wetland/ meadow community. A rock glacier, 700 ft. long, lies in the shadow of the south basin wall, and has moved out across the till deposit. Much of the upper basin is subject to moderate avalanche hazards, mostly from the head wall and off Bonita Peak.

Middle Fork Cement Creek

The Black Hawk sites lie above timberline in a steep walled northwest-facing basin. Most of the upper valley is choked with loose talus and scree which completely covers the valley floor and extends far up the basin walls. The stream flows subsurface beneath the talus field below the mine sites. An active debris flow fan is encroaching on the south side of the Black Hawk Dump. Rockfalls and talus flows continually block the access road to these sites. An active rock glacier also exists just south of the Black Hawk Mine on the north side of the creek.

Cement Creek-Bonita Peak Area Mine Site Descriptions

The mine sites included for reclamation feasibility assessments in the Cement Creek-Bonita Peak area are described below, and shown on Figures 3 and 6.

Adams Mine

Location

This mine is located one mile above Gladstone on the east side of Cement Creek. The portal elevation is 11,299 ft. Access is via a narrow, rocky 4-wheel drive trail which leads from Gladstone north along Cement Creek. This site is believed to be on the Adams and Horseshow claims. This site was sampled as waste rock site #15, as shown on Figure 6. The Adams mine is located at LAT. N37°53'59.3", LONG. W107°38'31.6".

Workings

The Adams Mine adit is an east-bearing crosscut which intersects two veins. The first strikes N.28°E., dipping 80° E., and is intersected a few feet inside the portal. This vein was only prospected a few feet. The second and main vein is intersected 225 ft. from the portal, and strikes north-south, dipping steeply east. It has been followed on both sides of the crosscut, and stoped above in places to a height of 25 ft.. The portal is open, intact, and was not draining when visited in mid August. Staining did indicate that it may drain in the spring during the runoff. The workings were generally dry, and in relatively stable condition.

Mine Wastes

The lower two-thirds of the 800 cubic yard dump consists of unmineralized country rock from development of the cross cut. The toe of the dump lies in the stream coming off the west slope of Bonita Peak, and is being eroded during high flows. There is a some sulphide ore and pyrite waste in the upper part and on top of the dump. Minerals found include pyrite, quartz, hübnerite, occasional sphalerite, and possibly adularia.

The dump is constructed over permeable talus and debris flow deposits. There is no kill zone or staining below, and most of the dump appears relatively benign. Total acidity and sulfate values (shown below) confirm this.

Adams Mine Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
60	49

Historic Structures

There are no structures remaining at the site. The portal gate has been vandalized, allowing access, and heavy rails still exist in the adit and out to the dump. The remains of a small shack are located just north along the access road in a forested area. There are a few timber props and

stulls in the stope workings, and a couple of old plastic buckets inside the northern drift. No historic structures were observed at two other nearby adits.

Geologic Constraints to Reclamation
This site is adjacent to a huge avalanche chute which probably runs most winters. The dump is usually littered with broken tree limbs and debris. Sections of the 4-wheel drive road will need to be improved from Gladstone to allow equipment access. There is a lot of loose talus and scree at the site, but no suitable soils or capping materials.

Water Quality Impacts
The waste rock extract analyses indicate that this site is a very minor source of metals to Cement Creek. The pH and electrical conductivity of the small stream that flows past the toe of the waste rock does not change as it passes this site.

Reclamation Options
This mine site does not warrant any reclamation at this time. The waste rock extract analyses show that the waste rock is similar to the surrounding undisturbed areas.

Red & Bonita Mine

Location
This mine is located just about ½ mile above Gladstone on the east side of Cement Creek just beyond the confluence of the North Fork of Cement Creek at an elevation of 10,948 ft. Access is via a fairly good 4-wheel drive road which leads from Gladstone north along Cement Creek. This site is believed to be on the Belcher claim. This site was bracketed by stream sampling sites CC-8 and CC-9, the mine drainage was sampled as water quality site SO-8 and the waste rock was sampled as site #13. Figures 3 and 6 show the locations of these sampling sites. The Red & Bonita adit is located at LAT. N37°53'51.3", LONG. W107°38'34.9"

Workings
The main Bonita adit was a cross cut driven eastward into the mountainside to explore and develop a series of veins in the ground southwest of the Bonita Fault. The veins strike north and northeast, and dip steeply west. Workings may also have explored and developed parts of the pyritized breccia pipe located some 600 ft. north of the portal, but this is conjectural, based on materials found in the dump.

Judging from the size of the dump, there were several thousand feet of workings. A second adit upslope and to the north at an elevation of 11,200 ft. may also have supplied ore to the operation, but its dump is relatively small, suggesting it was probably only a prospect. The mine included a mill situated in the wetlands area below the main portal, adjacent to the creek. Old maps indicate this mill was still standing in the 1930's.

The main adit has collapsed at the portal, but still drains approximately 5 gpm of zinc-laden water during high-flow. The flow quickly infiltrates into the top of the dump, continuing to Cement Creek

as subsurface flow. There are bright red and orange iron hydroxide precipitates along the surface drainage before it disappears.

Mine Wastes

The dump at the Red & Bonita Mine was surveyed, and is estimated to contain approximately 6,000 cu. yds., most of which appears to be coarse, pyritized and altered country rock. The bedrock here has been intruded by the volcanic breccia pipe and associated veins described above. The Bonita workings were apparently driven through large areas of pyritized and solfatarically-altered country rock associated with intrusion of the pipe. The ore from this mine was apparently high in pyrite, and there are parts of the dump which contain much finer-grained quartz-pyrite vein matter. Some galena and sphalerite can be found scattered in these finer grained wastes. There was almost no calcite or other buffering gangue minerals noted in the dump. A portion of the waste rock is country rock. Secondary sulfides and oxyhydroxides stain the country rock. There are some small trees growing in the portions of the pile containing principally country rock.

The dump itself is very permeable, and extends out over talus deposits. An extensive and visually striking kill zone extends from the toe of the dump 500 ft. through the wetlands area to Cement Creek. The wetland plant community has been completely destroyed, exposing extensive areas of natural iron oxide soils related to the geochemical weathering and oxidation of the nearby pyritized breccia pipe. Above and below this barren ferricrete area or kill zone, the wetland community reappears.

It is probable that much of the ferricrete area is related to tailings disposal from the Red & Bonita milling operations. The tails from the mill were simply run "out the back door" across the wetlands to the creek, consistent with general practice at the time. The oxidized tailings are difficult to distinguish from the underlying natural soils.

Total acidity and sulfates of the waste rock are reported below.

Red & Bonita Mine Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
620	581

Historic Structures

Not much is left at this site. There is a small timber-cribbed section of the dump adjacent to the road, and a few timbers in the dump mark the former location of the loadout. A small, square, hollow, timbered structure resembling a shaft collar exists on top of the dump on the extreme southern edge, but it is filled with dump debris a few feet down, and seems to have been a loading or sorting bin. There are no other structures or equipment, other than scattered debris, and tracks leading out of the collapsed adit. The remains of a mill, including scattered, burned wooden and

000082

iron debris along with some pyrite concentrates, are located approximately 50 yards south of the mine.

Geologic Constraints to Reclamation

This site is generally safe from avalanches. Slopes above are heavily timbered with mature spruce and fir. Access for equipment is good. There is a lot of loose talus and scree at the site, but no suitable soils or capping materials. The large natural wetland area developed in gently sloping alluvial and colluvial materials below the mine dump on the banks of Cement Creek, might be augmented and useful as a potential passive treatment option.

Water Quality Impacts

The Red & Bonita Mine appears to only have seasonal drainage from the mine adit. Although the metals concentrations are high, the overall load from the mine drainage is small. Compared to the other mine drainages in Cement Creek, the Red & Bonita produces less than 1% of the metals. The dissolved metal load at the adit during the high-flow sampling was about 1.5 pounds of zinc, 2.5 pounds of iron and less than 0.1 pounds of copper per day. The mine adit should be reopened to determine whether there is any perennial flow from this site.

As previously discussed, it appears that leachate from the mine wastes and/or mine drainage has killed the wetland vegetation over a large area below the mine site. Exposure of the ferricrete may be causing a larger impact. There is a noticeable increase in iron and zinc concentration as Cement Creek flows past the barren area during low-flow. The in-stream loading between sites CC-8 and CC-9 indicates that this site produces about 7 pounds of dissolved zinc per day during low flow. Most of the iron coming from this site appears to be particulate, based upon the differences between the total and dissolved fractions at the upstream and downstream sites. During high-flow, there is a slight increase in concentration of iron and zinc remains relatively unchanged. Samples should be taken from the main channel flowing from the ferricrete to determine what the metals loading is from this site.

The waste rock at this site is acid forming, and has elevated levels of copper, iron and zinc. The lead measured in the extract was one of the highest concentrations found in Cement Creek. There is probably some run-on water that flows through the waste pile from the slopes above.

Reclamation Options

It should be determined if there is any perennial flow from the mine workings. A well point could be driven through the collapsed portion of the mine, or the adit can be reopened. If the mine drainage is seasonal, reclamation of the barren ferricrete area can serve as the treatment system for this site. If there is perennial drainage, characterization of the drainage will be necessary before a treatment plan can be developed.

In addition, some of the drainage may be entering the groundwater system through the loose, unconsolidated colluvium and scree at the portal or through fractures in the mine tunnel rather than exiting the portal as surface flow. The mine workings should be reopened and investigated to determine the presence of additional flow and to assess whether it is necessary to capture and

treat that flow.

Diversions should be constructed to route upland runoff from the waste rock pile. The diversions should be constructed so the water exits onto one of the vegetated areas above and below the barren ferricrete area. In addition, ground limestone should be added to this pile or the pile should be injected with a mixture of fly ash and cement to reduce the spring snowmelt effects.

Even though the metals loading from the barren ferricrete is unknown, the approximately 4 acres of unvegetated area should be reclaimed. The reclamation would involve application of approximately 30 ton of lime per acre, application of approximately 6,000 cu. yds. of organic matter such as compost, or peat/manure mixture, and then revegetating the area. This would help prevent further dissolution of the ferricrete, and will provide some treatment for the mine drainage and direct runoff from the Red & Bonita Mine. It is recommended that the ferricrete area not be regraded, which will allow the eroded portions of the ferricrete to be covered to a greater depth with the chosen substrate. Sulfate reduction should occur in these deeper areas, which will remove metals from the drainage.

Lead Carbonate Mine and Mill

Location

This mine is located in Minnehaha Basin on its north side, one mile due northeast of Gladstone. The main portal is at an elevation of 11,856 ft. Access is via a fairly good 4-wheel drive road which leads up the mountain from Gladstone, then follows Minnehaha Creek into the cirque basin. This site is believed to be on the Lead Carbonate claim. This site was bracketed by water quality sites CC-14 and CC-15, and the waste rock was sampled as site # 17. These sites are shown on Figures 3 and 6. The Lead Carbonate Mine is located at LAT. N37°53'28.2", LONG. W107°37'55.1".

Workings

The Lead Carbonate Mine was first opened in the early days of mining in the district. A gold-bearing quartz vein striking northeast was prospected in the footwall of the Bonita Fault, but only a few hundred feet of workings were driven. The mine was reopened in 1946, and for several years after, was one of the only producers in the area. A 50 ton mill was constructed at the site in 1947. Ore from the Lead Carbonate averaged 0.79 oz gold, and 9.7 oz silver per ton, 6.05% lead, 5.9% zinc, and 1.03% copper (King and Allsman, 1950).

The main Lead Carbonate adit is a crosscut driven N.23°E. for a distance of 700 ft., where it intersects the Lead Carbonate vein. The Lead Carbonate vein was drifted in both directions from the cross cut, running 400 ft. northwest, and 150 ft. southeast, where it joins the Mocking Bird vein. (Burbank and Luedke, 1969)

Good ore was found in the Mocking Bird vein at the junction with the Lead Carbonate vein. The ore shoot here was developed on four internal levels, and stoped from 50 to 200 ft. above the main level along a 450-foot length. A winze developed this shoot on sublevels at 50 and 205 ft. below

the main level. (Burbank and Luedke, 1969)

The main adit level is caved at the portal, and is not draining. Several smaller upper prospect adits have also collapsed.

Mine Wastes

The dump at the Lead Carbonate Mine and mill site is estimated to contain 3,500 cu. yds., most of which appears to be fine, clayey to coarse sandy pyritic quartz waste. Some galena and sphalerite can be found scattered in these finer-grained wastes. There are some sections which contain coarse blocky pyrite and quartz. No calcite or rhodonite could be found on the dump.

The dump extends out across talus and into the glacial till on the basin floor. An extensive kill zone extends from the toe of the dump 500 ft. through the wetlands area to Minnehaha Creek. The wetland plant community has been completely destroyed and mantled with fine pyritic materials. Total acidity and sulfate values (shown below) confirm that the waste rock is acid forming.

Much of the kill zone appears related to tailings disposal from the small mill which crushed and processed ore in the late 1940s. The tails from the mill were simply run out into the wetland/ meadow area.

Lead Carbonate Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
1,440	1,210

Historic Structures

Part of the loadout structure remains on the dump, but the mill was dismantled and moved away. The loadout is of heavy timber construction, and is situated above a bench level in the dump, where the back of the mill may have been constructed. Alternatively, ore could have been loaded into trucks on this bench.

There are burned remains of an old stamp mill anvil. The stamp anvils are constructed of heavy timber clad with iron plates on the east end of the dump. The remains of a collapsed shack lie adjacent to the collapsed portal and tracks still lead from the portal out onto the loadout structure. Scattered wooden and metal debris litters the site.

Geologic Constraints to Reclamation

This site is generally safe from avalanches. Slopes above extend only 240 ft. higher, and do not collect much snow, or allow it to move very far. Access for equipment is good. There is a lot of loose talus and scree at the site. There are suitable soils for capping materials, but borrowing them would disturb the remaining wetlands/ meadow area which has developed on the glacial till and outwash.

Water Quality Impacts

The water quality impact from this site is from the waste rock and scattered mill tailings. The mill tailings are principally in the relatively flat meadow area, but have been deposited up to 1,500 ft. below the mine site. Stream sampling site CC-14 is a relatively undisturbed portion of the stream originating from above the Lead Carbonate Mine. Site CC-15 is below the confluence with the drainage that originates near the Lead Carbonate Mine and flows over and through the mill tailings. During the low-flow sampling, the flow at site CC-14 was too low to be sampled. It is thought that most years, there is perennial flow at this site. Most of the metals measured at site CC-15 during low-flow are thought to be directly attributable to the Lead Carbonate area. At low-flow, the metals load at this site was approximately 0.6 pounds of zinc and 0.25 pounds of iron per day. During high-flow, the metals loading was about 2.5 pounds of zinc, 4 pounds of iron, and 0.2 pounds of copper per day at this site.

Most of the waste rock is in a relatively high and dry location. A portion near the loadout is in the wetland area. The waste rock is acid forming with elevated levels of lead, copper, iron, and zinc.

Reclamation Options

The waste rock should be consolidated, along with the thicker portions of mill tailings, then covered with nearby colluvium, and revegetated. The mill tailings contaminated area should be amended with 40-60 mesh ground limestone, then revegetated. The reclamation can be completed without affecting the historic loadout structure.

Black Hawk Mine

Location

This mine is located on the north valley wall of the Middle Fork of Cement Creek, at a portal elevation of 11,563 ft. Access is via a fairly good jeep road which leads up the mountain from Gladstone to Minnehaha Basin, then on a poorly maintained, narrow jeep trail across steep talus slopes to the mine. This site is believed to be on the Black Hawk claim. The Black Hawk Mine drainage was sampled as site SO-12, immediately above the confluence with the Middle Fork of Cement Creek, as shown on Figure 3. The waste rock was sampled as site # 19, as shown on Figure 6. The Black Hawk Mine and an unknown mine to the south were bracketed by sampling stations CC-17 and CC-19 (Figure 3). A site map is shown on Figure 29. The Black Hawk mine is located at LAT. N37°52'55.3", LONG. W107°38'06.6".

Workings

The Black Hawk Mine opened a series of veins diagonally oriented to the Bonita Fault on the west shoulder of Emery Peak. The adit drifted on a vein striking N.84°E. dipping steeply north. This vein intersected three others within 600 ft. of the portal. These gold-bearing quartz veins lie in the footwall, 2,000 ft. south of the margin of the Bonita block, near the "heel" of the boot-shaped Eureka Graben (Figure 2). (Burbank and Luedke, 1969)

The adit is driven into the base of a nearly vertical slope just above the upper contact of the talus field, which blankets the entire valley floor. A second adit a few feet north of the main haulage adit

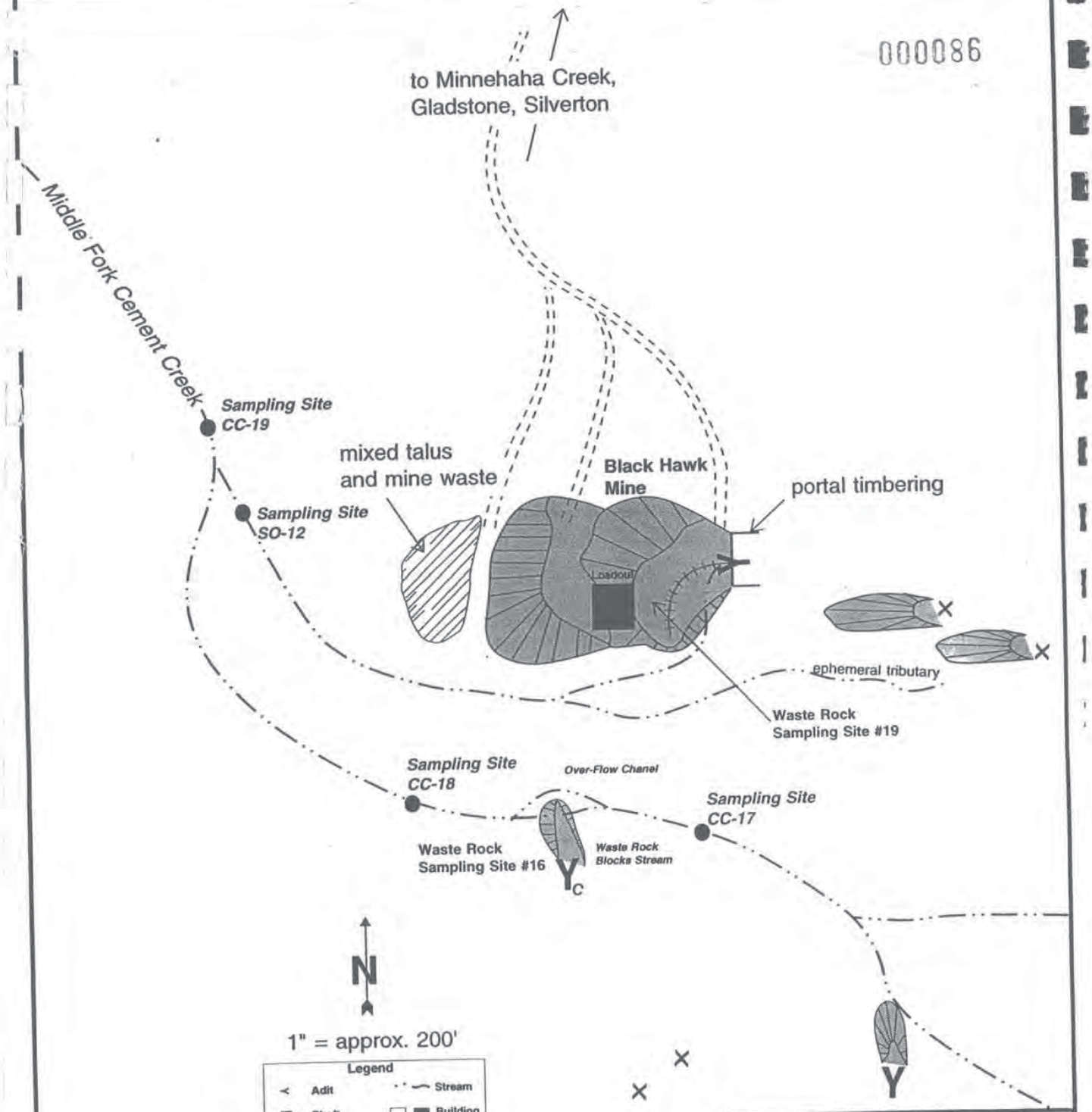

FIGURE 29

Colorado Department of Natural Resources
Division of Minerals and Geology

Inactive Mine Reclamation Program

Site Map - Cement Creek
Black Hawk Mine Area

Scale	Date	Sheet No.
as shown	Revised 4/98	1 of 1

may have been a manway or ventilation heading, and is thought to connect with the main haulage adit. Judging from the size of the dump, there were several thousand feet of underground workings.

The main adit is still open and draining. The second adit is caved, but still draining through the blockage. Both discharges join, flow over the dump and into the Middle Fork of Cement Creek. and Flow ranges from 90 to 380 gpm. The majority of flow is coming from the main adit.

Mine Wastes

The dump at the Black Hawk Mine is constructed in two levels or tiers, as shown on Figure 29. Survey work indicates it contains approximately 12,000 cu. yds., however, much of the lower tier appears to consist of native talus and slide rock. The upper level consists of coarse to fine sulfide mine waste, fine pyritic quartz waste, and some blocky stockpiled ore. Much of the lower level may be talus which was dozed and graded to create the lower bench for loading ore. This talus and slide rock has become mixed with mine wastes during handling and loading of ore.

The dump extends out across talus on the basin floor. Runoff infiltrates into the loose talus immediately, flowing beneath the talus field to the creek.

Total acidity and sulfates of the waste rock are shown below.

Black Hawk Mine Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
690	1,348

Historic Structures

Part of the loadout structure remains on the dump, as does a large, tipped-over steel ore bin. The loadout is of heavy timber construction, and is situated above the lower bench level in the dump. Tracks from the portal split at a switch, with one track leading to a waste dump on the south end of the upper dump level, and the other spur leading out onto the loadout structure.

Geologic Constraints to Reclamation

This site is prone to severe avalanche hazards. An active debris flow ravine borders the dump on the south side, and it is also an avalanche path in winter. Rockfalls and talus slides are common occurrences, often closing the access road. The entire site area is situated in loose, blocky talus deposits. There are no soils or stable areas nearby. Access is poor from Minnehaha Creek, and would have to be improved for equipment to reach the site.

Water Quality Impacts

The Black Hawk Mine drainage is a minor source of metals. During low-flow, the mine drainage contributes less than 1% of the metals from draining mines, and during high-flow, supplies less than 2% of the metals. During low-flow, the mine drainage and drainage from the waste rock

measured at station SO-12 was about 0.6 lb/day. Iron and copper loadings were less than 0.05 lb/day. During high-flow, the loadings at station SO-12 were approximately 1.3 pounds of zinc, 0.4 pounds of iron and 0.1 pounds of copper per day. The metals concentrations in the drainage are generally low, in comparison to other mine drainages, but because of the high- flow, the metal load, particularly for zinc, is higher than some.

The waste rock extract for this site had the highest concentrations of aluminum and manganese, and had the second highest lead levels. Copper and zinc levels were elevated. There should be very little run-on water from the slopes above, due to the coarse talus. There is probably less leaching of the waste rock at this site than most of the other waste piles. Even though the highest aluminum and manganese concentrations were found in this waste rock, there was virtually no aluminum in the drainage, and manganese was below NEC concentrations. This waste pile is thought to be a minor water quality problem. The mine drainage crosses only a small portion of the waste rock. The flow channel seems to be well cemented. The mine drainage is probably not leaching much heavy metal from the waste rock.

Reclamation Options

No reclamation of the waste rock is currently recommended. The mine drainage, as discussed above, is felt to be a minor source of metals. If any treatment is to be done, it is recommended that a settling pond be constructed above the confluence of the mine drainage with the Middle Fork. At this point, the mine drainage has become aerated by the steep, rocky channel. Most of the iron, copper, and a portion of the zinc can be removed in the pond. Because of the large volume of drainage, the pond will have to have a capacity of approximately 3,000 cu. yds.

Unknown Mine South of the Black Hawk Mine

Location

This mine site is located on the headwaters of the Middle Fork of Cement Creek, 500 ft. southwest of the main Black Hawk Mine. The portal elevation is 11,480 ft. Access is via a fairly good jeep road which leads up the mountain from Gladstone to Minnehaha Basin, then on a poorly maintained, narrow 4-wheel drive trail across steep talus slopes to the mine. This site is believed to be on the Black Hawk or an unpatented claim. The waste rock pile was sampled as site # 16 shown on Figure 6. A site map is shown on Figure 29. The mine site is located at LAT. N37°52'45.3", LONG. W107°38'16.2".

Workings

This adit developed a quartz-pyrite vein in the footwall of the Bonita block, 4,000 ft. southwest of the Bonita Fault. The mineralized fracture forms an upside-down Y-shaped structure in plan view. The adit drifted south along the stem of the Y for roughly 500 ft., at which point it split into southwest-striking and southeast-striking branches. The dip on the structure in the "stem" progressively increases from 50° west at the split, to 70° west in the southwest branch. Dip in the southeast striking branch is 80° west. Extensions of this southeast striking vein structure can be traced on the surface along the west side of the upper headwaters of the Middle Fork, and through the saddle at the top of the valley into the headwaters of the South Fork of Eureka Gulch to the

east. Based on the size of the dump, it is estimated that there was only 600 to 700 ft. of drift workings on this vein structure.

The adit portal is heavily timbered, but is being overwhelmed by talus moving down from the slopes above. It is in bad shape, too shaky to permit inspection, and about ready to cave. There is only a small opening remaining. The adit does not have a surface discharge, because the outer part is driven through talus and any flows are infiltrating before they get to the portal.

Mine Wastes

The dump at this mine is approximately 1000 cu. yds. and is composed mostly of fine to gravelly-sized pyrite and quartz vein waste from drift development. There is only a minor component of country rock materials. The multi-lobed dump extends out across talus on the basin floor. The Middle Fork of Cement Creek runs along the entire northern toe of the waste, and is visibly eroding materials at two locations. The stream continues north and enters the talus field which blankets the valley floor.

Total acidity and sulfates of the waste rock are reported below.

Dump at Unknown Mine South of Black Hawk Mine

Total Acidity (mg/l)	ICP Sulfate (mg/l)
880	1,061

Historic Structures

Only tracks leading from the portal remain at this site. Everything else has been destroyed by avalanches. There is scattered wood and metal debris on the dump.

Geologic Constraints to Reclamation

This site is prone to severe avalanche hazards. An active debris flow ravine borders the dump on the north side, and has completely buried and destroyed the last section of access road to the site. Avalanches run down the valley wall and impinge directly on the site. Rockfalls and talus slides are common occurrences. The entire site area is situated in loose, blocky talus deposits. There are no soils, borrow areas, or stable slopes nearby.

Water Quality Impacts

The waste rock pile at this site completely blocks the main drainage channel of the headwaters. During high-flow, a portion of the streamflow bypasses the blockage through a side channel. The stream was observed to have iron precipitate below the blockage. Sampling sites CC-17 and CC-18 were chosen to determine the metals loading from this site. However, at the time of the low-flow sampling, all the flow at these two sampling sites was underground. The stream surfaced above the confluence with the Black Hawk Mine drainage and increased in flow up to that confluence. At the high-flow sampling, station CC-18 was under approximately 20 ft. of snow, from an earlier avalanche.

By subtracting the high-flow load measured at stations CC-17 and SO-12 from the load measured at CC-19, we should get an indication of the metals loading from this site. Those data indicate that about 1.5 pounds of zinc, 3 pounds of iron, and 0.2 pounds of copper per day are contributed by this site. Much of the increased zinc loading at station CC-19 during low-flow is probably attributable to this site. The waste rock extract analyses do not show any exceptionally high metals, but given the location of this waste pile, do confirm the water quality data.

Reclamation Options

The obvious solution to this metals source is to remove the mine waste from the stream channel. The reclamation can be done either as partial removal or complete removal. If partial removal is chosen, the portion of the waste in the stream channel should be consolidated with the main part of the pile. If complete removal is chosen, the most obvious location to put the waste rock is at the Black Hawk Mine. If a settling pond is constructed for the Black Hawk Mine, the excavated material can be used to cap the waste rock at this site or the consolidated waste rock at the Black Hawk.

SOUTH FORK AREA

Location

The "South Fork area" as used here includes two mines on the South Fork of Cement Creek one mile south of Gladstone. The South Fork area is just south of the previously described Cement Creek-Bonita Peak area, and much of the geologic setting is similar. Mine sites selected by DMG and ARSG for reclamation feasibility studies include the Big Colorado and Silver Ledge Mines. These sites are shown on Figures 3 and 6. The sites are situated on privately owned patented lode mining claims. Coordinates of each site are given in the individual site descriptions which follow below.

The South Fork of Cement Creek sites are characterized by rugged, steep, high alpine terrain just below timber line. Winters are long with snow depths averaging 440 inches. The summer growing season is short. Average annual precipitation for the past 3 years is 45 inches, 37 inches occurring as snowfall (Sunnyside Gold Corporation, 1996).

Geologic Setting

The regional geologic setting of the Cement Creek area is discussed at the beginning of this report. More specific information about the South Fork area is included below.

Bedrock Geology

The South Fork area is situated near the center of the Silverton Caldera. Only the upper massive pyroxene-bearing member of the Silverton Group Burns Formation is present in the South Fork area. The summit of the 12,164 ft. unnamed peak above the Big Colorado Mine is comprised of the overlying Henson Formation, which strikes east-west and dips 15° south in that area.

Structural Geology

Structurally, the South Fork area lies in the north-central part of the Silverton Caldera, in an area between two major structural elements. It is one mile east of the southwest margin of the Eureka Graben, defined here by the Bonita Fault, and 3 miles east of the ring-fault structure which defines the western margin of the caldera along Mineral Creek. Figure 2 shows these structures in relation to the South Fork area. (These structures have been described above in the geology section at the beginning of this report.)

Strikes and dips of planar flow structures in the upper Burns Formation in the South Fork area are varied over short distances. Dips range from 10° NW at the Big Colorado Mine, to 36° SW at the Silver Ledge Mine. At the Silver Ledge Mine, the rocks have been broken by numerous small faults and sheeted zones, in roughly parallel and diagonal orientation to the main Bonita structure one mile east. At the Big Colorado Mine, several fractures and faults are oriented on a trend which extends westward into the Prospect Gulch fault structure, which forms the south margin of the Red Mountain block. These fractures were subsequently mineralized, and have been mined in the South Fork area.

Hydrothermal Alteration

All the volcanic rocks in the South Fork area were extensively propylitized and altered on a regional scale, prior to ore deposition. In this area of the Silverton Caldera, propylitic alteration is typified by the formation and addition of chlorite, calcite, and clays in weakly altered rocks, to epidote, albite, and chlorite in the stronger phases. Propylitic alteration has resulted in a dull green or greenish gray color to virtually all of the Burns Formation rocks.

Wall rock adjacent to the vein deposits has been subjected to more intense but localized alteration processes. Quartz, sericite, and pyrite are common mineralogical products of wall rock alteration associated with the siliceous sulfide veins in the South Fork area.

Ore Mineralization

Ore mineralization in the South Fork area occurs in similar fashion as that previously described for the Cement Creek-Bonita Peak area. Numerous quartz-pyrite veins have been formed in the system of open fissures created southwest of the Bonita Fault block of the major Eureka Graben structure. Although the mineralized faults and fissures are generally less persistent in length here, probably because of greater distance from the graben structure, they can often be traced for hundreds of feet. Economic ore deposits within the veins are also less frequent, occurring on a much more restricted basis than in areas more closely associated with the major fault structures farther north and east.

The most common sulfide minerals of the veins are pyrite, chalcopyrite, sphalerite, galena, and tetrahedrite. Tennanite also occurs, and free gold is associated with localized shoots, and in the siliceous gangues, such as rhodonite, though these are much less common in veins of the South Fork area. Gold has also been found associated with the base metal sulphides in some veins. Silver is associated with argentiferous tetrahedrite.

Gangue minerals associated with the veins consist dominantly of quartz, rhodonite, rhodocrosite, calcite, fluorite, and minor barite. Not many of the veins in the South Fork area have the manganese gangues, as these are preferentially found in and near the major fault structures bounding the Eureka Graben.

Surficial Geology

The South Fork of Cement Creek lies in a steep narrow valley bordered by a nearly continuous apron of talus and coalescing debris-flow fans. The stream is so choked and constantly overrun with talus and debris flow sediments that it does not form a true alluvial channel until nearly reaching Gladstone. Just below the Silver Ledge Mine on the east valley wall, a landslide deposit has moved into the valley, deflecting the creek westward into talus deposits.

South Fork Area Mine Site Descriptions

The mine sites included for reclamation feasibility assessments in the South Fork area are described below, and shown on Figures 3 and 6.

Big Colorado Mine

Location

This mine is located one mile southeast of Gladstone on the south side of the South Fork of Cement Creek. The portal elevation is 11,059 ft. Access is via a jeep road which leads from Gladstone southeast up the creek valley. This site is believed to be on the Elkton Millsite and Gold Thread claim. This mine drainage was sampled at station SO-17, shown on Figure 3. This site was bracketed by surface water sampling sites CC-21 and CC-22, also shown on Figure 3. The waste rock was sampled as site #21, shown on Figure 6. A site map is included on Figure 30. The Big Colorado Mine is located at LAT. N37°52'40.3", LONG. W107°38'44.5".

Workings

The Big Colorado adit is a west-bearing drift which opened at least two and possibly three vein structures. The main vein strikes northwest and branches into a closely spaced cluster of north, northeast trending spur veins. The second and possibly third veins strike west and N.66°W., respectively. The size of the dump and nature of the materials suggest an extensive amount of underground workings, most of which appear to have been driven in barren country rock, probably exploring for ore bodies.

The adit is completely collapsed at the surface, but still draining 7 to 18 gpm across and into the dump. Metal sulfates have built up travertine-like terraces of precipitates radiating outward from the collapsed portal.

Mine Wastes

The double-lobed dump at the Big Colorado is one of the largest in the Cement Creek drainage.

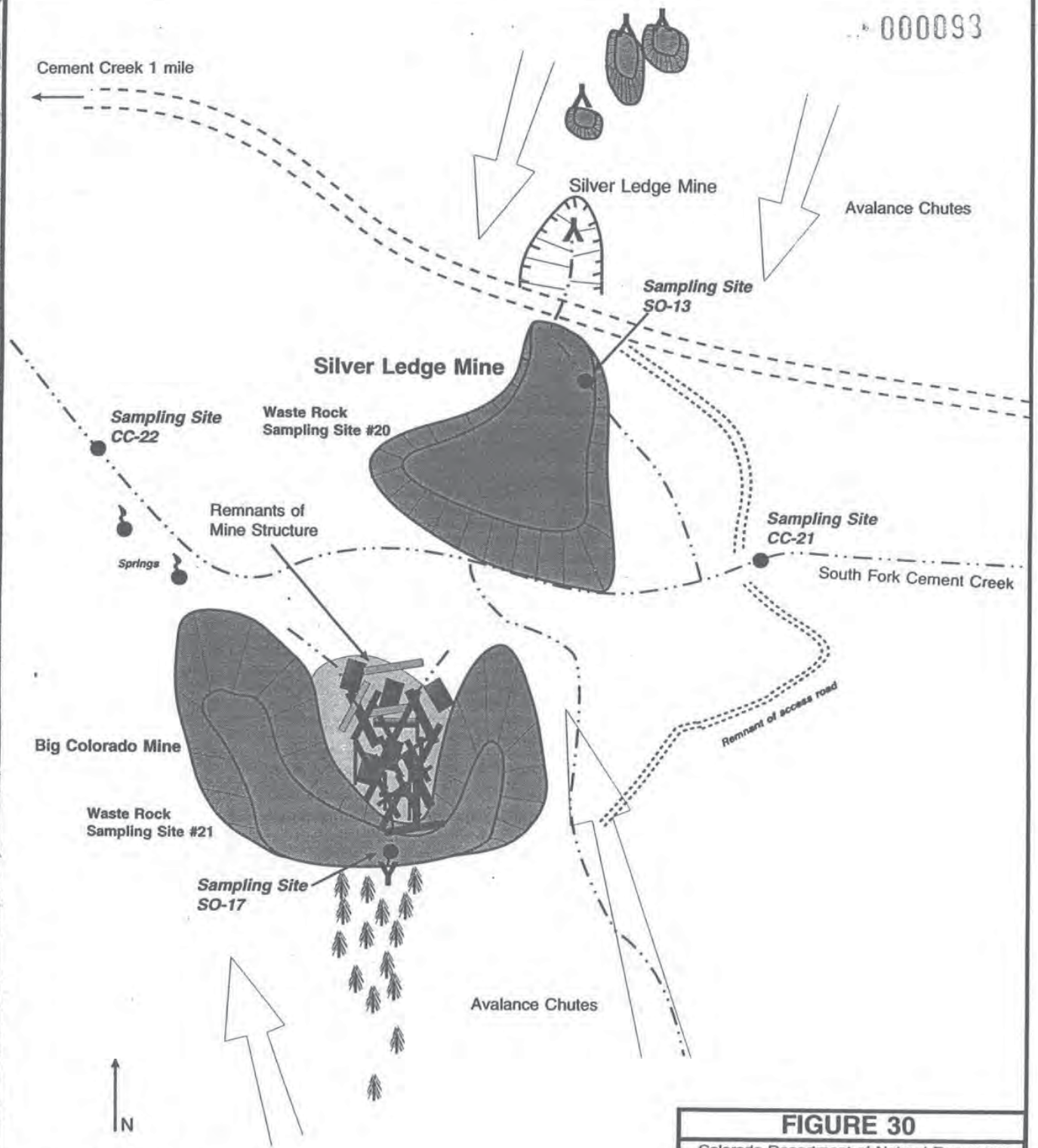

FIGURE 30

Colorado Department of Natural Resources
Division of Minerals and Geology

Inactive Mine Reclamation Program

Site Map - Cement Creek
Big Colorado and
Silver Ledge Mine Area

Scale	Date	Sheet No.
as shown	Revised 4/98	1 of 1

Survey work indicates there are approximately 27,000 cu. yds. of waste rock. The dump is dominantly unmineralized country rock, containing a disproportionately small amount of sulphide vein waste. A mill was constructed at the mouth of the portal in the center of the two waste rock lobes on either side, but very few mill tailings materials are present. This suggests either the mill was destroyed by avalanches before much ore was processed, or more likely, this mining operation never succeeded in producing economic ore values. There is some sulphide ore and pyrite waste in the upper part and on top of the dump. Minerals found include pyrite, quartz, hübnerite, occasional sphalerite, and possibly adularia.

The dump is constructed over permeable talus and debris flow deposits. There is no kill zone or staining below, and most of the dump appears relatively benign. Total acidity and sulfate values, shown below, confirm this.

Big Colorado Mine Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
30	62

Historic Structures

There are no standing structures at the site. The mill has been completely flattened by massive avalanches moving down the steep slopes above the site. A large pile of rotting timber and boards, scattered debris, and iron artifacts are all that is left of the structure.

Geologic Constraints to Reclamation

This site is situated between two major avalanche chutes. Avalanches have repeatedly destroyed mining structures. An active debris fan encroaches on the eastern lobe of the dump, and causes problems for access to the portal area. There is a lot of loose talus and cobbly debris at the site, but no suitable soils or capping materials. Almost all the areas in this valley are subject to geologic hazards of some type.

Water Quality Impacts

The mine drainage from this site is principally an iron source. Iron precipitates as the drainage flows down the slope. Travertine-like iron deposits have built up near the collapsed mine adit and on the collapsed remains of the loadout structure. The mine drainage has never been observed to flow on the surface to the creek. There is also no iron staining to indicate that the drainage has ever reached the South Fork as surface flow. The drainage splits into numerous small channels and infiltrates the colluvium.

At low-flow, the measured loads at the adit were approximately 0.2 pounds of zinc, 14.5 pounds of iron and less than 0.1 pound of copper per day. The dissolved metals sample from high-flow leaked in transport, so no analyses were possible. However, the total recoverable metals concentrations were similar to those found at low-flow. Flow measurement was difficult at the high-flow sampling. The mine drainage was flowing from numerous points around the collapsed adit. It

is thought that the actual flow was in excess of the amount measured. The flow from this adit appears to remain stable throughout the year.

The waste rock at this site is lower in metals than some of the natural sites. There is very little mineralization in the waste rock. It appears that most of the material in the waste pile is country rock.

Reclamation Options

Because the mine drainage infiltrates into the colluvium and debris flow materials, virtually all the iron is probably removed, before the water enters the stream. Probable sites where the water enters the stream are moss-covered, with significant manganese precipitate. This tends to indicate that the mine drainage is being effectively treated naturally. If manganese is dropping out, there is a strong probability that most of the zinc is dropping out also. Also, the waste rock does not appear to be a significant source of metals. Therefore, it is recommended that this site be eliminated from consideration for treatment.

Silver Ledge Mine

Location

This mine is located one mile southeast of Gladstone on the north side of the South Fork of Cement Creek, directly across from the Big Colorado Mine. The site is located at LAT. N37°52'39.1", LONG. W107°38'38.6". The portal elevation is 11,000 ft. Access is via a jeep road which leads from Gladstone southeast up the creek valley. This site is believed to be on the Silver Ledge Millsite claim. This mine drainage was sampled at station SO-13, shown on Figure 3. The site was bracketed by stream stations CC-21 and CC-22, also shown on Figure 3. The waste rock was sampled as site # 20, shown on Figure 6. A site map is shown on Figure 30.

Workings

The Silver Ledge adit is an east-bearing crosscut which opened at least two vein structures. The main vein strikes N.10°W., dipping 75°W, and branches on its southern end into a closely-spaced set of short east-west striking vein clusters. The second vein set strikes northwest and dips 77°SW.

The adit is heavily timbered and still open. The portal has partially collapsed back into the slope about 30 ft., and continues for at least another 50 to 70 ft. through unconsolidated colluvium and glacial debris before reaching bedrock. It is clogged with debris and precipitates, but still partly open near the top of the timbering. This adit is the lower level of the mine; a second adit level 220 ft. above is completely collapsed at the surface.

The lower adit is draining up to 700 gpm of metals-laden water. This discharge is sufficient to wash out the collapses which have occurred near the portal. The mine drainage flows across the dump before entering the creek. Interestingly, this adit is shown with a stream flowing out of it on 1935 USGS topographic base maps.

Mine Wastes

The Silver Ledge dump is quite large, and spread out along the creek banks. Because the adit is only 35 ft. above creek level, it forced the miners to spread material out over a larger area, and dump materials directly into the stream. The South Fork of Cement Creek runs through the toe of this waste material for over 270 ft. Much of the original wastes have been eroded by the creek. Survey work indicates there are approximately 6,800 cu. yds. of waste rock. The dump contains a lot of clayey and sandy quartz-pyrite sulphide vein waste mixed with altered country rock. Minerals found include pyrite, quartz and occasional sphalerite.

The dump is constructed over permeable talus and debris flow deposits. Total acidity and sulfates are reported below.

Silver Ledge Mine Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
290	276

Historic Structures

There are no structures or equipment at this site. Some partial foundations were found on a lower terrace northwest of the portal.

Geologic Constraints to Reclamation

This site is situated below a timbered area which is not prone to snow slides, however, the dump is in the run out zone for avalanches moving down the south side of the creek. An active debris fan encroaches on the southern end of the dump. There is a lot of loose talus and cobbly debris at the site. An area of unconsolidated soils exists upslope of the dump, and could possibly be a source of capping materials, or a potential repository area for at least part of the dump.

Water Quality Impacts

The Silver Ledge Mine is the largest mine drainage source of metals identified in Cement Creek. At low-flow, the mine drainage produces about 80 pounds of metals per day, including about 3.5 pounds of zinc, 61 pounds of iron, 11 pounds of manganese, and 3.5 pounds of aluminum per day. At low-flow, the Silver Ledge is a minor source of copper. The mine drainage accounts for over 38% of all the metals from draining mines in Cement Creek.

At high flow, the mine drainage produces about 400 pounds of metals per day, accounting for almost 55% of the metals from draining mines in Cement Creek. The measured daily load included about 22 pounds of zinc, 304 pounds of iron, 1.5 pounds of copper, 38 pounds of aluminum, and 32 pounds of manganese per day.

The in-stream effects from this mine drainage at both low-flow and high-flow are dramatic. The zinc concentrations increase at site CC-21 from 47 ug/l to 441 ug/l at low-flow and from 31 to 291 ug/l at high-flow. The iron concentrations are more dramatic, increasing by two orders of

magnitude between the upstream and downstream stations. Even though there was a drop in the measured flow between stations CC-21 and CC-22, there was still a greater load than can be accounted for by the mine drainages from the Silver Ledge and Big Colorado Mines. This may be due to inflows from iron springs in the vicinity of the Silver Ledge Mine.

The mine waste is in direct contact with the stream, and the stream actively erodes the pile during high-flow. There is very little, if any, run-on water that contacts the pile, because the South Fork road intercepts most of the drainage. There is probably some leaching of metals through the pile. There were some secondary sulfide deposits that were observed in August 1996 near the edge of the stream. Other than the portion being eroded by the stream, there is probably little water quality degradation from this waste pile.

Reclamation Options

The waste rock in direct contact with the stream should either be removed, or buttressed with riprap, cribbing, or otherwise protected from erosion by the stream. Construction of erosion protection is probably the most cost effective method.

The mine drainage can be treated by constructing a series of sediment ponds. The high ratio of iron to zinc will aid precipitation of zinc along with the iron. A series of ponds with a total capacity of approximately 6,000 cu. yds. would have to be constructed to allow 24 hours minimum residence time, plus half the volume for sediment accumulation. This would allow for approximately 3 years of sediment volume, assuming no consolidation of the sediments. The estimated sediment volume per year is 600 cu. yds. Aeration drops should be included between the settling ponds. Where the drop is steep enough, limestone can be added to the channel to provide a small amount of additional alkalinity.

PROSPECT GULCH-GEORGIA GULCH AREA

Location

The headwaters of Prospect Gulch begin 1½ miles west of Cement Creek, and drain the south slopes of Red Mountain No. 3. Elevations in the Prospect Gulch drainage range from 12,890 ft. on Red Mountain No. 3, to 10,360 ft. at the confluence with Cement Creek one mile southwest of Gladstone. Georgia Gulch has similar elevations and aspect, and lies south of Prospect Gulch below McMillan Peak.

Mine sites selected by DMG for reclamation feasibility studies include the Upper Prospect Gulch Adit, Galena Queen, Hercules, Lark, Henrietta, and Joe & Johns sites in Prospect Gulch, and the Kansas City Mines in Georgia Gulch. These sites are shown on Figures 4 and 7.

The area is characterized by rugged, steep, high alpine terrain at and above timber line. Winters are long with snow depths averaging 440 inches. The summer growing season is short. Average annual precipitation for the past 3 years is 45 inches, 37 inches occurring as snowfall (Sunnyside Gold Corporation, 1996).

Geologic Setting

The regional geologic setting of the Cement Creek area is discussed at the beginning of this report. More specific information about the Prospect Gulch-Georgia Gulch area is included below.

Bedrock Geology

The Prospect Gulch-Georgia Gulch area is situated just inside the northwestern margin of the Silverton Caldera. Caldera rocks in the Upper Prospect Gulch-Georgia Gulch area consist dominantly of medium to dark brown and black, thick, massive rhyodacite and dacite flows and flow breccia of the Silverton Group Burns Formation, and rhyodacitic flows, breccias and tuffs of the overlying Henson Formation, which form the slopes and summit of Red Mountain No. 3 in the upper drainage basin.

Two late-stage intrusive quartz latite porphyry plugs lie northeast of the Hercules and Galena Queen Mines on the south upper slopes of Red Mountain No. 3. The intrusive plugs lie on and adjacent to the bounding fault of the down-dropped "Red Mountain Block", (Burbank and Luedke, 1969), and are similar in structure and nature to the other numerous late-stage intrusive plug-type quartz latite bodies associated with the margin of the Silverton Caldera and Red Mountain block structure.

A highly mineralized volcanic breccia pipe lies beneath the Hercules and Galena Queen Mines These volcanic breccia pipes are the hosts for rich silver sulphide ore deposits known in the Red Mountain Pass district. The pipe and several associated veins were developed by the Hercules and Galena Queen workings. The Henrietta workings also reportedly developed a blind (not exposed at the surface) breccia pipe known as the "Surprise Chimney" (Steve Fearn, Personal Communication, 1994.)

Structural Geology

Structurally, the Prospect Gulch-Georgia Gulch area lies within the Silverton Caldera on its northwest margin, one mile east of the complex system of ring-fracture faults related to its subsidence, and adjacent to the south margin of the down-faulted Red Mountain block, as shown on Figure 2. Numerous mineralized faults (veins) in upper Prospect Gulch trend parallel or sub-parallel to the main ring fault trend of N.22°E.

A curved fault forming the southern margin of the Red Mountain block runs along the north side of Prospect Gulch, crossing below the main Prospect Gulch road just above the Lark Mine. Springs and boggy areas between the main road and access road to the Henrietta 7 appear to delineate a branch off this fault, which continues along the north bank of the creek to just below the Joe & Johns Mine. The main fault strikes N.50°W. along the north bank of the gulch above the Lark Mine, swinging to N.85°W near the Lark Mine. The Lark Mine portal lies just south of the surface fault trace, and the adit probably cuts the fault within 300 ft. from the portal. This unmineralized fault separates down-dropped rocks of the highly-altered Henson formation to the north from less

altered Burns formation rocks. Dips could not be measured, but the fault appeared to be near vertical to steeply dipping to the north. There may be from 600 to 1000 ft. of downward displacement on this fault, as reported by Burbank and Luedke (1969). This structure may extend eastward down the gulch, crossing Cement Creek into the South Fork/ Big Colorado area, as indicated by a series of mineralized fractures which follow this trend.

Within the down-dropped Red Mountain block, and truncated by the curved boundary fault described above, is a complex of small quartz latite intrusive bodies cut by a set of northwest trending veins. These veins were prospected by several adits and shallow pits. The veins appear to be a mineralized set of closely-spaced faults, each with a downward sense of movement to the northeast.

An intrusive clastic dike, which strikes N.47°W. and dips 55°N., cuts across the easternmost vein in this series, near the portal of a prospect adit above the Lark Mine. This dike has sharp contacts, and consists of a fracture filling of rounded to angular fragments of country rock and Precambrian basement clasts. These clastic dikes are believed to have been formed by explosive, forceful injection of debris during the waning stages of volcanic activity (Burbank and Luedke, 1969).

Hydrothermal Alteration

Due to the proximity of the caldera structural margin within a mile to the west of the Prospect Gulch-Georgia Gulch area, much of the rockmass here has been highly altered by solfataric and hydrothermal processes. Solfataric processes have subjected the rock to attack and leaching by hot sulphurous gases and solutions moving upwards along the structural margin of the Silverton Caldera and Red Mountain graben. These hydrothermal processes have leached and "stewed" most of the base minerals from the rocks, as described in the geology section in the beginning of this report. Volcanic flows within the Red Mountain block forming the northern side of Prospect Gulch were so strongly altered and leached that little remains except silica, kaolinite, and sulfate and sulfide alteration products. Virtually all potential buffering minerals in the country rock have been leached away.

Ore Mineralization

Ore mineralization in the upper Prospect Gulch breccia pipes and associated veins is typical of the Red Mountain Pass District one mile to the west. These features can be considered as belonging to that district from an ore geology perspective. The pipes are reflective of the quartz-alunite epithermal deposits. The most common ore minerals include enargite, pyrite, sphalerite, galena, bornite, chalcopyrite, proustite, pyargerite, stromeyerite, covellite, and chalcocite (Burbank, 1951). Sulphide minerals found on the mine dumps of the Galena Queen/ Hercules and Henrietta Mines include pyrite, enargite, covellite, and chalcopyrite. The deposits were mined in veins, breccia pipes, and as disseminations in wall rock, intensely altered to silica, alunite, and clays.

Gangue minerals associated with the chimney sulphides consist dominantly of barite, fluorite, and the products of rock alteration, namely clays, quartz, and heavily pyritized wall rock. Virtually all potential buffering minerals have been leached away.

The Lark, Joe & Johns, and Kansas City Mines developed vein deposits within somewhat different mineralization than found in the chimney/ breccia pipe deposits. Vein ores consist of pyrite, chalcopyrite, sphalerite, and galena, sometimes with tetrahedrite and tennanite. Silver was associated with argentiferous tetrahedrite, and less commonly with silver sulfo salts. Free gold occurred in shoots scattered in siliceous gangues, or associated with the base metal ore minerals. (Burbank and Luedke, 1964)

Gangue minerals associated with veins in the area normally include quartz, rhodonite, rhodochrosite, calcite, fluorite, and barite. There is generally more potential for the presence of buffering minerals in vein deposits, but because the Prospect Gulch-Georgia Gulch area has been so heavily altered by solfataric processes near the margins of the caldera structure, the veins here are mineralogically similar to the chimney ores, and buffering minerals are often depleted. (Burbank and Luedke, 1964)

Surficial Geology

Slopes around upper Prospect Gulch-Georgia Gulch are steep, and prone to avalanches and debris flows. Several steep ravines between the Lark and Joe & Johns Mine sites have well-formed debris cones where they impinge on the main gulch. The upper slopes of Red Mountain No. 3 are mantled with thick aprons of scree and talus, which feed the source areas for the debris flow ravines. Much of the area around the Lark Mine is composed of colluvial debris transported down from the slopes of Red Mountain No. 3. Because this material is stained bright red and yellow, it resembles oxidized mine dump material. In actuality, it is a natural highly oxidized and leached deposit. Tests show this colluvial material to be so highly leached and oxidized through geologic time, that it is not a source of significant metals release. There is actually much less mine waste at the Lark Mine site than it appears, because of the naturally red-colored debris around the site. This gravelly, cobbly debris could be a source for fill or construction materials, though it would not make suitable capping material unless heavily amended for vegetation.

The avalanche danger in Prospect Gulch and Georgia Gulch is high to moderate. Several avalanche chutes exist on the south side of Prospect Gulch in the area of the Henrietta Mine. It appears that past avalanches have damaged or destroyed structures on the Henrietta 7 dump, and also at the Henrietta 10 dump. Most, if not all, the slopes above timberline in the upper basin are subject to avalanches in the winter, as are the debris flow ravines near the Lark and Joe & Johns Mine sites.

Slopes below McMillan Peak in Georgia Gulch at the Kansas City Mines are extreme avalanche hazard areas. No structures remain standing, and avalanches often run all the way down Georgia Gulch to Cement Creek. Access to the Kansas City Mines is usually blocked well into mid-August by the melting remains of snow slides in the upper part of the gulch.

Extensive boggy, colluvial deposits exist around the Galena Queen/ Hercules site where the basin slopes are less steep, and the gulch widens out into a cirque-like basin. These deposits are characterized by thick, black soils developed on fine to coarse gravelly and cobbly colluvial materials. Colluvial and alluvial soils exposed along some of the upper slopes and along first order

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streams in the upper "cirque" basin have locally been cemented with iron oxide, forming ferricrete deposits.

Thin, patchy alluvial gravels are present along Prospect Gulch, but are generally just a discontinuous veneer on bedrock.

Prospect Gulch-Georgia Gulch Mine Site Descriptions

The volcanic caldera flows and intrusive quartz latite plugs in upper Prospect Gulch are cut by numerous mineralized faults, fissures (veins), and breccia pipe bodies which have been prospected and mined for sulphide ores. The mine sites included for feasibility assessments are described below, and shown on Figures 4 and 7.

Upper Prospect Gulch Adit

Location

This mine is located in upper Prospect Gulch about 1/4 mile above the Galena Queen Mine on the lower south slope of Red Mountain No. 3. It lies at an elevation of 11,880 ft., at the end of County Rd. 35. This site is believed to be on the J.S.P. claim. The waste rock at this site was sampled as site #6, shown on Figure 7. Water quality sampling site PG-20 was located below the site and above the Hercules mine, to measure the effects from this waste pile (Figure 4). This site is located at LAT. N37°53'40.0", LONG. W107°41'23.6". The site is shown on Figure 31, which is entitled 'Site Map - Galena Queen and Hercules Mine Area'.

Workings

An adit driven N.80°W. prospected two closely-spaced sulphide veins which strike N.21°E., and dip 71°NW. Drifts were apparently driven at almost right angles off the adit on these veins. There is no surface discharge from the collapsed adit portal, which is situated adjacent to a local first order stream.

Mine Wastes

The dump at the portal contains approximately 300 cu. yds. of fine to coarse sulphide mine waste consisting almost entirely of pyrite and quartz, along with galena, covellite, and some sphalerite. A kill zone extending 170 ft. downslope from the dump has completely destroyed the vegetation, exposing 2 ft. of thick, black organic soils. The dump was placed across a small stream, which has incised through the northern side of the dump. Dump sulfides are continuing to be eroded by the stream. Total acidity and sulfates are reported below.

Dump at Upper Prospect Gulch Adit

Total Acidity (mg/l)	ICP Sulfate (mg/l)
1,426	1,908

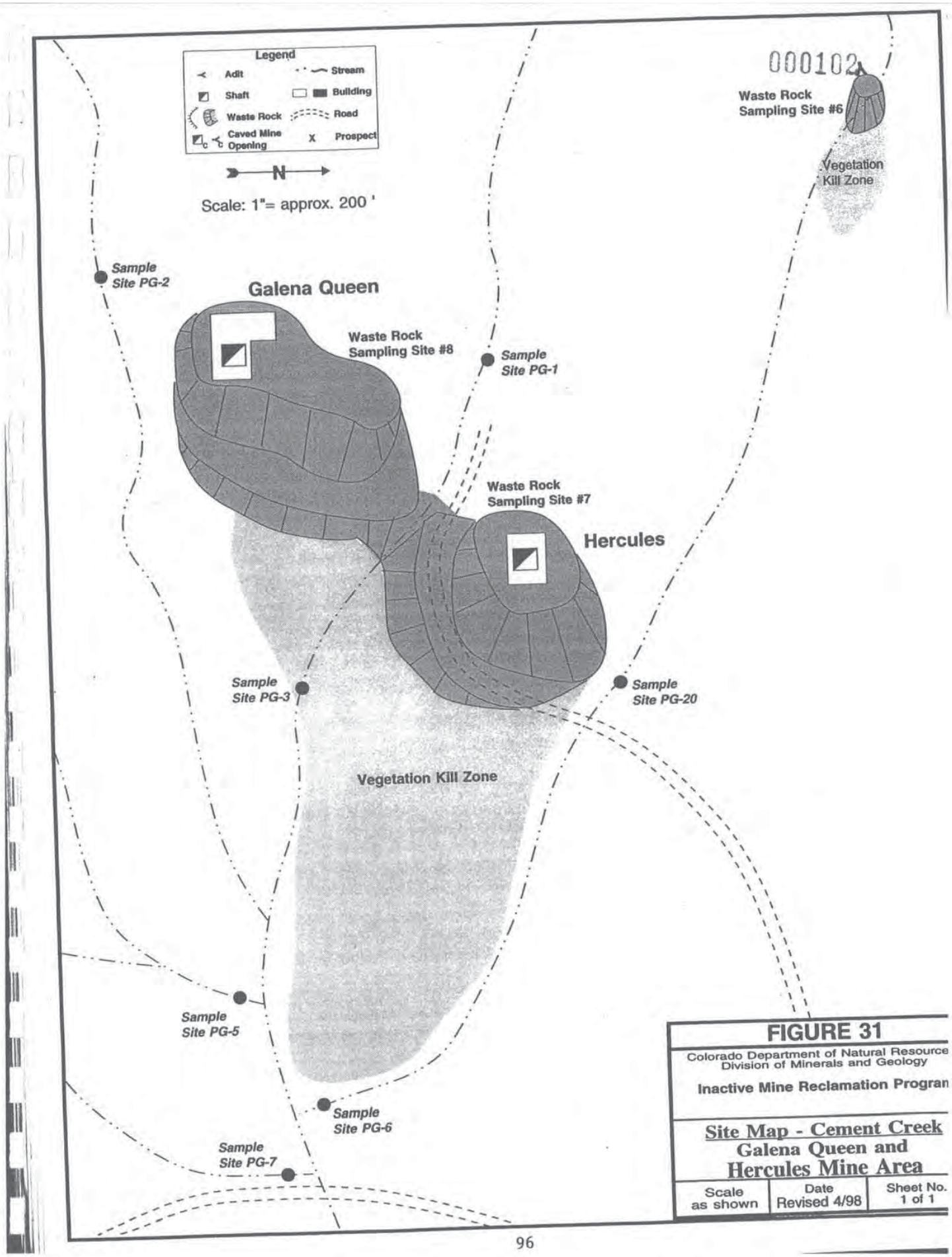

FIGURE 31

Colorado Department of Natural Resource
Division of Minerals and Geology

Inactive Mine Reclamation Program

Site Map - Cement Creek
Galena Queen and Hercules Mine Area

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Historic Structures

There are no structures or equipment at this site except for an old steel tank of welded construction which lies below the dump. This tank may have rolled down or been discarded from the road to the summit of Red Mountain No. 3 above the site, and may not be related to the mining at this site.

Geologic Constraints to Reclamation

This site is prone to avalanches from the slopes of Red Mountain No. 3. There is no access beyond the Galena Queen Mine except by trail. Access would have to be improved from the Galena Queen.

Water Quality Impacts

This waste rock pile completely blocks the small first order tributary to Prospect Gulch. At low-flow, the effects of this blockage are measured at sampling site PG-6, because the Hercules Mine is dry. During high-flow, when there is drainage off the Hercules waste pile, the effects from this site are measured at station PG-20. At low-flow, zinc, iron and copper concentrations are elevated far above background levels, but the flow is so low that the loads are in grams per day. During high-flow, dissolved iron loading from this site is about 0.5 lb/day, while copper and zinc loads are about 20 grams per day.

Although the loading from this site appears small, the loading amount per unit area or volume is great. Waste rock analyses show this site to have one of the three highest extract concentrations of copper in the Cement Creek area.

Reclamation Options

Reclamation at this site is straight-forward. The waste rock must be removed from the stream channel. A disposal area can be excavated on the ridge above the mine site, then covered with the excavated material, or be moved to a constructed disposal area.

Galena Queen/ Hercules Mine Sites

Location

The Galena Queen/ Hercules Mine sites are located in upper Prospect Gulch near the end of County Rd. 35 at LAT. N37°53'31", LONG. W107°41'17". The mines lie at an elevation of 11,660 ft. The Galena Queen Mine is believed to be on the Galena Queen claim. The Hercules Mine is believed to be on the Galena Queen and Hercules claims. The Galena Queen Mine is bracketed by surface water stations PG-1 and PG-3. The surface water effects from the Hercules Mine are bracketed by stations PG-20 and PG-6 and also to some extent by stations PG-3 and PG-8. These sampling site locations are shown on Figure 4. The Galena Queen waste rock was sampled as site #8. The Hercules waste rock was sampled as site #7. Both these waste sampling sites are shown on Figure 7. A site map is shown on Figure 31.

Workings

Mining at this site developed a breccia pipe "chimney" ore body through two vertical shafts, the eastern shaft known as the Hercules, and the upper western shaft called the Galena Queen.

000104

Stoping west of the Galena Queen shaft indicates that a west-striking vein associated with the chimney was drifted on underground. Interestingly, this same vein can be traced west across the ridge about one mile, where it was worked by the San Antonio Mine at the Carbon Lakes site (not discussed in this report).

A large prospect pit was also excavated on the northern edge of the mineralized outcrop adjacent to the Hercules dump. Swirling water can be seen and heard about 50 ft. down in the Hercules shaft.

Mine Wastes

As the site lies on gentle ground near the center of the upper basin, a roughly circular mine dump has been built up and out from the collar of each shaft. The toe of the upper Galena Queen dump encroaches on the lower Hercules dump such that the footprint of mine waste has the form of a figure eight. Survey work measured the dump volumes at 7,200 cu. yds. for the Galena Queen, and 4,680 cu. yds. for the Hercules. Materials are highly pyritic, and there is a distinct kill zone below the combined dump footprint. The largest kill zone is below the Hercules pile.

The Galena Queen is aptly named. The gray waste rock contains significant quantities of both massive and disseminated galena and sphalerite. The waste containing disseminated galena and sphalerite often is associated with pyrites, enargite and covellite. The waste rock is highly cemented where dry. Popcorn sulfur was observed on the top of the waste pile. Sodium sulfate salts were also quite common. The temperature generated by acid production results in this site being snow-free before the surrounding area. Downstream from where the stream flows over and through the waste rock in between the two piles, there is considerable iron staining on the streambed.

The gray waste rock at the Hercules Mine contains pyrite, galena, enargite and sphalerite in a quartz matrix. The only secondary sulfides observed were on the top of the waste pile, although there appears to be some free sulfur. When dry, this waste pile is almost completely cemented with sulfate salts.

Total acidity and sulfates for both the Galena Queen and Hercules dumps are shown below.

Galena Queen and Hercules Dumps

Site	Total Acidity (mg/l)	ICP Sulfate (mg/l)
Galena Queen	1,676	5,153
Hercules	1,604	5,033

Historic Structures

There are timber head frames remaining at both shaft collars. The Galena Queen's shaft house, complete with boiler and steam hoist, still remain, though all in poor condition. The shaft house structure is timber-framed, covered with relatively new corrugated sheet metal. A lot of the metal

siding and roof are missing. Both shafts have been capped with steel grating. Some cribbing in the surface expression of the stope also remains.

Geologic Constraints to Reclamation

This site is situated near the center of the gently-sloping upper basin area. It is just beyond the run out zones for most avalanches, which is why the shaft head frames are still standing. Access for equipment would have to be improved across the stream just below the Hercules dump. If the dumps are ever removed, they could be reconstructed to preserve historic values using the red and yellow colored native debris from the foot slopes near the Lark Mine. Most visitors would never know the difference.

Water Quality Effects

All the water quality effects from these mines is the result of water interaction with the waste rock. Between stations PG-1 and PG-3, the small stream passes over and through a portion of the waste rock from the Galena Queen Mine. At PG-3, the metals concentrations, at both low-flow and high-flow, increase by 2 to 3 orders of magnitude. At low-flow, the metals loadings are minimal (zinc-0.2 lb/day, iron-0.1 lb/day, and copper-0.02 lb/day). At high-flow, the loading from this site increases to about 5 pounds of zinc, 5 pounds of iron, and 0.5 pounds of copper per day.

At low-flow, there is very little metals loading from the Hercules waste pile, except during thunderstorms. At high-flow, the metal loading attributable to the Hercules is about 1 pound of zinc, ¾ pound of iron, and less than 0.03 pounds of copper per day. At the time the high-flow samples were taken, the waste rock was completely snow-free. The heat generated by acid formation makes snow on these waste piles melt earlier than the surrounding areas. The metals loading from these waste piles during snowmelt is probably much greater, earlier in the season. Also, during thunderstorms, the metals loading from these piles probably increases greatly. To date, there have been no storm-flow samples taken from this site.

There are some probable effects due to run-on water from the slopes above. There probably is more water entering the Galena Queen dump than the Hercules dump. The Hercules waste pile is near the top of a ridge, so receives little run-on water. The Galena Queen pile receives some additional water that flows down an old road onto the pile.

The Galena Queen waste rock extract had the highest concentrations of cadmium, copper, and zinc of all the waste piles sampled in the Cement Creek area. Also, the arsenic, iron, nickel, sulfur, and vanadium concentrations were in the top three highest measurements.

The Hercules waste rock extract had arsenic and zinc concentrations in the top three measurements. The copper concentrations were also very high.

Reclamation Options

To eliminate the run-on water effects, diversion ditches should be constructed around both of the waste piles. A portion of the diverted water will have to outlet in the stream between sampling stations PG-1 and PG-3. The waste rock in that stream channel must be removed and

consolidated within the existing pile. Presently, DMG plans to remove this material and construct the diversion ditches during the summer of 1999 under a federal Office of Surface Mining grant.

The possibility of processing the wastes in these piles to remove the heavy metals should be investigated. Although the metals values are probably too low to completely pay for the processing, they may offset the overall cost of reclaiming this area. There is no apparent evidence of ground water flows through either pile. Therefore, the waste can be reclaimed in-situ. If processing is not feasible, the surface pile could be mixed with fly ash to reduce leaching, or a fly ash-cement mixture could be injected into the waste rock. The scattered waste rock would have to be consolidated with the main pile, and the slopes would have to be reduced to allow for equipment operation.

Henrietta Mine

Location

The Henrietta Mine is located on the south side of Prospect Gulch and is accessible from County Rd. 35. There are portals into at least six levels of this mine, including the 100, 200, 300, 700, 800 and 1000 levels. These portals and the associated waste dumps will be denoted in one of two ways in this report. As an example, the 800 level of the Henrietta Mine will be referred to as either the Henrietta 8 or the 800 level. Other levels within the mine are labelled accordingly. The Henrietta 7 (700 level), which is the main entrance to the mine, is located at LAT. N37°53'31.8", LONG. W107°40'58.1". The locations of some of the portals are labelled on Figure 4.

The Henrietta 7 mine drainage was sampled at station SO-4 and is bracketed by stream stations PG-11 and PG-16. The Henrietta 7 waste rock was sampled as site #3. The Henrietta 8 (800 level) waste rock was sampled as site #2. The Henrietta 3 (300 level) waste rock was sampled as site #10. The locations of water and waste rock sampling sites at the Henrietta Mine are shown on Figures 4 and 7 respectively. These sites are also shown on Figure 32.

It should be noted that the flow measurements for sites PG-16 and PG-18 were improperly taken. Therefore, the flow measurements and loading values reported in the appendix are based on addition of the measured in-flows at stations PG-14 and PG-17 to the flow at station PG-15.

The Henrietta 7 and 8 level adits are believed to be on the Mineral King claim. The waste rock from the Henrietta 7 and 8 is believed to be partially on the Mineral King claim and partially on unpatented claims. The Henrietta 3 is believed to be on the Lizzie claim. The Henrietta 1 and 2 levels are believed to be on the Henrietta claim.

Workings

The main or 700 level portal is on the south side of Prospect Gulch at an elevation of 11,360 ft. The 800 level portal is topographically below and slightly north of the 700 level portal on the same side of Prospect Gulch. The 300 level portal is located near the very top of the valley wall 400 ft. higher on the same vein. The 100 and 200 level adits, located south and topographically above the 300 level, are both collapsed. The 1000 level portal is located east and downstream of the

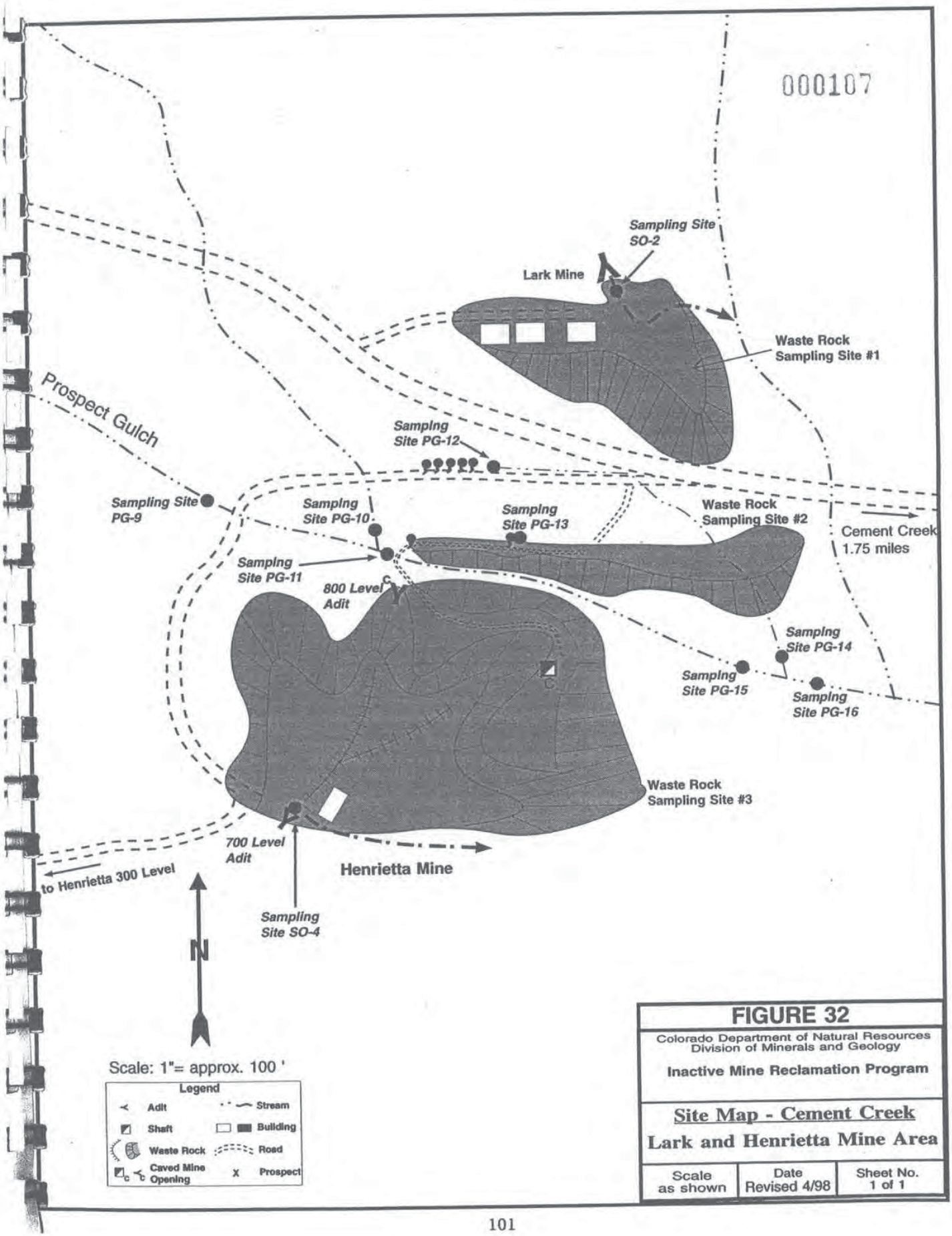

FIGURE 32

Colorado Department of Natural Resources
Division of Minerals and Geology

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Site Map - Cement Creek

Lark and Henrietta Mine Area

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Henrietta 7 also on the south side of Prospect Gulch. Because of the map scale, the 100, 200, 300 and 1000 level portals are not shown on Figure 32. They are shown only on Figures 4 and 7.

The Henrietta Mine developed a set of veins and a hidden (blind) "chimney" ore body through a series of adits driven southwest on at least 4 levels. The mine followed two steeply-dipping main vein structures, one striking about N.18°W., and the other roughly N.20°E. This latter vein continues to the southeast into Georgia Gulch, where it was also prospected by the upper workings of the Kansas City Mines.

According to local workers familiar with the mine, a chimney-type ore body which did not crop out on the surface was encountered in the workings on the 700 and 800 levels. Known as the "Surprise Chimney", it caused some excitement and sparked renewed interest and exploration of the property. In 1977, a full face-tunnel boring machine ("Alpine Miner") was used to bore a 5 ft. wide by 7.5 ft. high tunnel, 1,800 ft. into a new level designated the Henrietta 10, located ¼ mile downstream, and 200 ft. lower in elevation than the main 700 level. This cross cut was designed to get under and develop the Surprise Chimney, however, no ore was ever milled before funds ran out (Marshall, Zanoni, and Melcher, 1996).

Mine Wastes

A large compound dump is located at the adit portals of the 700 and 800 levels. Prospect Gulch divides the dump into two parts. Most of the dump lies on the south side of Prospect Gulch below the 700 level portal (denoted here as the 'south pile'). A smaller part of the dump lies to the north of Prospect Gulch (denoted here as the 'north pile'). The entire dump was surveyed and is estimated to contain approximately 30,000 cu. yds. of waste materials. The dump is made up of at least three different ages of materials from the two portals, as indicated by relative weathering and oxidation of the different parts of the dump. Older materials are located near the creek level and around the lower caved 800 level portal. Newer waste rock dating from the last operations in the 1970's have been placed on the upper east side of the dump at the 700 level.

Waste rock materials are highly pyritic, and include some small areas of base-metal and possibly silver ores which were never shipped. An access road traverses up the dump in a set of switchbacks to the 700 level portal. Loadouts from the 700 and 800 levels extend out to the access road.

The north pile is located at Lat. N37°53' 30.3" Long. W107°40' 53.7". The north pile is long and narrow and lies along the north banks of Prospect Gulch. The toe of the waste rock is in Prospect Gulch for approximately half the length of the pile. Two perennial springs saturate approximately 1/3 of this pile. In addition, two intermittent drainages flow onto and through this pile. One of the drainages is fed by a series of springs along the access road to the Henrietta 7 Mine. During most years, these springs have been observed to flow throughout the summer months. However, in 1996, the springs were virtually dry in August, September and October. The spring and runoff water visually appears to be degraded as it passes through the waste rock.

Waste rock sample #2 is a composite sample taken in 10 locations from the north pile. The north

000109

pile waste rock contains considerable country rock at the surface. Much of the country rock contains fine disseminated pyrite. Sphalerite and galena were present in the mineralized portion of the waste rock. Secondary iron sulfides were observed in most of the samples.

The south pile is located immediately north of the Henrietta 7 adit at Lat. N37° 53' 31.8" Long. W107° 40' 58.1". There are three distinct lobes to this waste pile. The lower lobe is principally coarse material on the surface containing disseminated sphalerite. The middle lobe is finer-textured on the surface with abundant secondary sulfides. The upper lobe is fine-textured, with one area containing low grade lead-zinc ore. Waste rock sample #3 is a composite sample taken in 11 locations at the south pile. The northwest portion of this pile is directly in contact with the stream near the 800 level adit. The drainage from the mine apparently infiltrates quickly into a drainage ditch and passes through the waste rock. A spring located on the west side of the pile appears to partially flow through the pile.

The main 700 and 800 level dumps are steep, and are being eroded by the creek. Some sections appear to be over steepened by erosion at the toe, and subject to mass failure into the creek.

There is also a waste rock dump at the Henrietta 10 portal at an elevation of 11,080 ft. This dump is estimated to originally have contained around 2,500 cu. yds. of waste rock from the cross cut tunneling operation mentioned above. However, due to the position of the portal in a steep-walled section of the gulch, much of the waste had to be dumped directly into the stream, and was washed away. At this time, only about 650 to 700 cu. yds. remain at this site. This waste rock was not sampled.

There are also some older, very steep, but smaller waste piles high on the valley slope at the Henrietta 1, 2 and 3 portals. The Henrietta 1 and 2 waste rock piles were not sampled. The Henrietta 3 portal is located adjacent to an active avalanche chute/drainage southwest of the Henrietta 7, at Lat. N37° 53' 18.5" Long. W107° 41' 01.7". This waste rock appears to be similar to the Henrietta 1 and 2 piles located above this site. The volume of waste rock is difficult to estimate at this site since portions of the pile have been covered with excavated surficial material, however, there appears to be less than 2,000 cu. yds.. Much of the waste pile is at the angle of repose resting on a very steep slope. The waste rock is a combination of grey and yellow material. The gray areas contain galena with some sphalerite and covellite. The yellow areas contain pyrite, principally in 1 mm crystals.

Total acidity and sulfate values for the dumps sampled are shown below.

000110

Henrietta Mine Dumps

Site	Total Acidity (mg/l)	ICP Sulfate (mg/l)
Henrietta 3 level	1,116	2,960
North Pile	70	76
South Pile	836	923

Historic Structures

A partially collapsed portal shed and damaged shack of lumber and corrugated tin still exist at the 700 level portal. Heavy snows and avalanches have smashed most of the structures so that the top of the dump is covered with wooden debris. Pipes, rail, and other metal parts and debris litter the dump. Rails still lead out of the grated 700 level portal onto the timber cribbed tipping point/ loadout structure. There are also two timber crib walls constructed in the dump to hold the access road slopes open.

The timber portal shed at the Henrietta 10 has been damaged by avalanches and the portal is collapsed just beyond it. Heavy rail still exits the portal and leads to the dump point right in the creek.

Geologic Constraints to Reclamation

The Henrietta 7 and 10 level areas are subject to moderate avalanche danger. Structures at both locations appear to have been damaged or destroyed by snow slides in the past. The gulch begins to take on a narrow, steep-sided canyon form near the Henrietta 7, forcing the mine dumps to be very steep, somewhat unstable, and spread out along the valley slopes. There is little room available between the portals and the creek for regrading, or run-on and runoff controls. The entire toe length of the waste rock piles encroaches into Prospect Gulch, and would have to be moved and excavated upwards to clear the stream channel.

Collection of the water flowing from the 700 level adit for treatment could be problematic. The fractured, jointed, highly altered nature of the bedrock could be allowing seepage from the adit to enter the groundwater system. It may be necessary to re-enter the adit to some point beyond fracture influences to place a grout-sealed bulkhead water-inlet where water can be collected. This could prevent infiltration of adit flows into fractured bedrock.

Water Quality Impacts

There are several separate sources of heavy metals from this site. The principal water quality impact seems to come from the waste piles. The overall effect between sampling stations PG-11 and PG-16 is metals loading of about 0.4 pounds of zinc, 0.6 pounds of iron, and 0.15 pounds of copper per day at low-flow. At high-flow, the loading through this segment increases to about 12 pounds of zinc, 122 pounds of iron, and 2 pounds of copper per day. Most of the low-flow metals loading is thought to come from the north waste pile. This pile is kept continually saturated by springs and seeps.

The Henrietta 7 Mine apparently only drains during the spring. As discussed above, there may be some perennial flow from the adit through fracture systems. During high-flow, the adit drainage was measured to load about 2 pounds of zinc, 27 pounds of iron, and 0.1 pounds of copper per day. The mine drainage quickly infiltrates the diversion around the waste pile, and likely flows through the waste pile. Based upon the waste rock extract analyses, the mine drainage probably leaches additional metals from the waste rock.

Waste rock analyses show that there are more leachable metals in the south pile than the north pile. The north pile contains more country rock on the surface. Chemical analysis of the waste rock indicates that both waste rock piles contain relatively low metals compared to all the other sample sites. However, because of continuous contact with water, this site is a priority for reclamation.

As previously stated, there are several springs and seeps that flow through the north waste rock pile, and at least one spring that flows onto the south pile. In addition, there is considerable upland runoff that flows over and through the waste piles. The effect of one of these springs was measured by sampling stations PG-12 and PG-14. The loading differential between these two sites shows a loading of about 2 pounds of zinc, 3 pounds of iron, and 0.2 pounds of copper per day.

The Henrietta 3 waste rock pile had a higher acid forming potential than the waste from the north and south piles. The water quality effects from this pile are leaching of metals from upland runoff. A small stream fed by a permanent snowfield flows onto and through this pile. The steep slope of the pile and the steep slopes below the pile made it impractical to sample the small stream below the pile. The Henrietta 1 and 2 waste rock piles are located directly in the small drainage that flows into Prospect Gulch below the Henrietta 10 portal.

Reclamation Options

The most cost-effective measure to control metals pollution from this mine site is to construct diversion ditches. The metals contribution from the Henrietta 3 pile can be virtually eliminated by constructing a diversion above the site. Diversions can be constructed by hand methods above the Henrietta 1 and 2 waste piles. Much of the flow from the slopes above the Henrietta 7 portal is currently intercepted by the mine drainage diversion ditch. However, water flows down the Henrietta 3 access road onto the south waste pile. Drainage ditches along the road have become ineffective, and should be improved to carry all the flow.

Diversion ditches could be constructed to intercept the upland flow and spring flow above the north pile, but portions of the ditches would probably become maintenance nightmares. Therefore, it is recommended that the waste rock in the north pile be completely removed. This waste can be consolidated in the south pile. After revegetation, the low-flow metals loading should be virtually eliminated.

The portion of the south pile that is in continual contact with the stream should be moved. To

000112

maintain the historic appeal of this site, it is recommended that the consolidated waste pile be cemented in place, by injection of a fly ash/cement mixture. This will significantly reduce water and air flow through the waste rock.

The Henrietta 800 level adit should be investigated to determine if there is mine drainage flowing underground from the collapsed portal.

Treatment of the mine drainage from the Henrietta 7 adit is somewhat problematic because of the apparent seasonal nature of the drainage. At a minimum, the existing diversion ditch should be lined to prevent the mine drainage from flowing through the waste rock. A combination anoxic limestone drain and sulfate reducing system would likely become ineffective, because the limestone would become coated as the flow ceases, and the metals removed by the sulfate reducing system would re-oxidize when the flow ceased. A small neutralization system can be constructed with a flow sensor to treat the mine drainage during the spring months. The system would probably have to be electrically powered, so the electrical lines to the mine would have to be repaired. A small settling pond could be constructed in the forested area east of the mine adit.

Lark Mine

Location

The Lark Mine is located on the north side of Prospect Gulch, 1½ miles up County Rd. 35 from Cement Creek. It is north of the north waste pile at the Henrietta Mine at an elevation of 11,320 ft. The portal is at LAT. N37°53'35.9", LONG. W107°40'49.6". The Lark adit is believed to be on an unpatented claim. The mine drainage was sampled at station SO-2 during high-flow, and the waste rock pile was sampled as site #1. These sampling locations are shown on Figures 4 and 7 and on the site map on Figure 32.

Workings

The Lark adit was driven northwards under Red Mountain No. 3 to explore steeply-dipping veins and disseminated mineralization within the highly altered Red Mountain structural block. The adit is estimated to have penetrated the near vertical to steeply north-dipping bounding fault of this structure within 300 ft. from the portal. There are many other prospect pits and adits, and even some modern drill holes higher up the slopes on the Lark property, however, it is believed these operations never progressed much beyond an exploration effort. There appears to have been at least two other older portals developed during past operations at this site, both of which are now totally collapsed and difficult to locate.

The newest adit was constructed through a long section of loose, unconsolidated scree and colluvium which mantles the lower foot slopes of Red Mountain No. 3. The adit was open and was grated by DMG in the late 1980's. Although now collapsed, the adit still drains a small amount of water, which quickly seeps into the colluvium and scree. Numerous springs and boggy areas at the base of the mountain slope suggest the unmineralized bounding fault structure which runs through the site may be a source of groundwater seepage to Prospect Gulch.

Mine Wastes

The apparent size and nature of the Lark "mine dump" is misleading to the untrained eye. What at first appears to be a large and extensive dump with several structures built on top of it is actually the outslopes of a bench cut into the red and yellow-stained colluvium and scree which thickly mantle the foot slopes of Red Mountain No. 3. True mine waste materials here are confined to the smaller amount of light gray to white material located around the tipping point or "loadout" east of the mine buildings. The buildings and all of the bench are constructed on graded, native colluvial materials stained bright red and yellow through weathering and oxidation processes described above.

Mine wastes around the loadout were surveyed and measured to determine volume. There are approximately 3,500 cu. yds. of sulphide mine waste, including some relatively high grade-looking base metal ores. A composite sample was taken at 10 sites where waste rock was not mixed with colluvium. Sphalerite, galena, silver sulfides, and fine disseminated pyrite and chalcopyrite were present in the waste rock. The waste pile is located on a relatively dry south-facing slope. The east toe of the dump encroaches into a debris flow ravine on the east side of the site.

Total acidity and sulfates of the waste rock are shown below.

Lark Mine Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
842	935

Historic Structures

Three timber, log, and tin-clad shacks remain on the Lark site. One of these was last used as a core storage shed for drilling done on the slopes above during the late 1970's (dates on core boxes). There is also a timber-cribbed structure at the dump tipping point. The absence of any signs of track or ties, coupled with the shape of the dump suggest the last operations were conducted with modern rubber-tired diesel equipment.

Remains of an old tram line lead from the Lark Mine upslope to a higher level collapsed portal. This tram line is marked only by old cables lying in the heavy pine forest above the site, and the nearly obliterated remains of a terminal facility. There are no towers still standing, and the tram line is very short by San Juan standards.

Geologic Constraints to Reclamation

The Lark site is generally safe from avalanches, as is evident from the structures which remain. A heavy stand of mature spruce and fir exist on the slopes above the mine, indicating that snow slides generally do not affect the site.

There is an abundant supply of unconsolidated gravelly scree and colluvium, and bedrock appears to be relatively deep. The bench area is large enough, and could be a favorable, protected site in

000114

which to develop a waste repository for other mine dumps in upper Prospect Gulch (although probably the Henrietta waste dumps would include too much material to deposit in this area). These native colluvial materials are highly permeable, however, and would have to be amended or sealed to provide capping or liner materials.

Springs and wet, marshy areas are prevalent west of the waste dump. These suggest that there is a natural ground water system at this site, possibly related to the major fault structure which lies beneath the area. This could be problematic for a waste repository, and groundwater conditions would have to be evaluated during a siting study.

Water Quality Impacts

The principal water quality effect from this mine is the seasonal mine drainage. Although the flow from the adit was low, the mine drainage had one of the highest concentrations of zinc, iron, and copper. Compared to the other mine drainages as high-flow, the Lark produced slightly over 1% of the dissolved metals, but produced almost 5% of the zinc and 7.5% of the copper. The mine drainage flows into the small tributary to the east before contacting any of the waste rock. The mine adit should be reopened to determine whether there is any perennial flow from this site.

There was little visual evidence that leaching and runoff from the waste rock represents a significant water quality problem. An intermittent drainage, located immediately east of the waste rock pile, does not appear to be impacted. Waste rock at the Lark Mine dump had one of the highest lead concentrations in the extract in the Cement Creek area. Copper and zinc concentrations were also high.

Reclamation Options

The seasonal nature of the mine drainage from the Lark Mine makes treatment somewhat problematic, similar to the drainage situation at the Henrietta Mine (700 level). In that case, a neutralization treatment system was suggested as the only known viable treatment method. This type of system should also work for the drainage from the Lark Mine.

In addition, some of the drainage may be entering the groundwater system through the loose, unconsolidated colluvium and scree at the portal or through fractures in the mine tunnel rather than exiting the portal as surface flow. The mine workings should be reopened and investigated to determine the presence of additional flow and to assess whether it is necessary to capture and treat that flow.

The waste rock does not appear to be a significant source of heavy metals. It is recommended that no reclamation be performed on the waste rock pile.

Joe & Johns Mine

Location

The Joe & Johns Mine is located 1½ miles from Cement Creek adjacent to the Prospect Gulch road (County Rd. 35). The portal is at an elevation of 11,200 ft., at LAT. N37°53'28.6", LONG.

W107°40'43.4". It is east-southeast of the Lark Mine. The mine drainage from the lower adit was sampled as station SO-6, and the waste rock was sampled as site #4. The waste rock from the upper adit was sampled as site #14. These sampling sites are shown on Figures 4 and 7.

Workings

An adit was driven north into the valley wall to explore a steeply-dipping vein system striking almost due north. The adit is thought to have penetrated the near vertical to steeply north-dipping bounding fault of the Red Mountain block about 600 ft. from the portal. There are a cluster of other adits higher up the slopes on the Joe & Johns claims, and it is possible that the workings were interconnected. At one time, the main Joe & Johns adit was used for supplying drilling water to nearby mining operations (BLM permit records).

At present, the collapsed adit drains an average of 2 to 15 gpm of metals-contaminated water.

Mine Wastes

Most of the waste rock from this mine has been eroded and/or covered with debris flow material. The quantity of waste rock can only be determined by exploratory drilling or excavation. The waste pile is located directly in an intermittent drainage. A composite waste rock sample was taken from 10 locations over an area of approximately 20 ft. x 30 ft. at one exposure south of the Prospect Gulch road. The waste rock was highly cemented, making sampling difficult. The waste rock was observed to contain sphalerite and galena.

The upper Joe & Johns Mine dump is located in the same drainage as the lower mine. The toe of the waste pile extends to the thalweg of the intermittent stream/avalanche chute. There is evidence of erosion of the mine waste in the drainage channel. The mineralogy of this mine waste is very similar to the lower dump. Total acidity and sulfates are shown below.

Joe & Johns Mine Dumps

Site	Total Acidity (mg/l)	ICP Sulfate (mg/l)
Upper Joe & Johns	890	1,085
Lower Joe & Johns	588	614

Historic Structures

A timber engine house and Imperial type 10 steam engine remain on the Joe & Johns site.

Water Quality Impacts

At both the low-flow and high-flow sampling, the zinc, iron, and copper concentrations of the mine drainage were extremely high. The low-flow loadings from this mine drainage were all less than 0.05 lb/day. At low-flow, the Joe & Johns produced only 0.02% of the dissolved metals from mine drainages. At high-flow, the metal loadings were about 2 pounds of zinc, 11 pounds of iron and 0.2 pounds of copper per day. At high-flow, this mine drainage produced approximately 2% of the dissolved metals from mine drainages in Cement Creek.

The mine drainage flows down a channel into the road drainage ditch and enters the tributary to the east of the mine site. Sampling site PG-17 actually measures the effects of the waste pile blocking the stream and possibly some effects from the upper Joe & Johns waste pile. At low-flow, there was only seepage at PG-17. At high-flow, the metals loading from this small tributary was about 0.5 pounds of zinc, 11 pounds of iron, and 0.05 pounds of copper per day. Most of this probably comes from the lower Joe & Johns waste pile.

The waste rock from both the upper and lower piles had the highest extract concentrations of silver in the Cement Creek area. Both waste rock piles were also high in zinc and copper.

Reclamation Options

The Joe & Johns site is slated for initial reclamation work in 1998. A contract to open the collapsed portal, collect the flow and direct it east around the waste rock pile has been awarded. This will be followed by more in-depth characterization of the mine drainage.

The recommended treatment for this mine drainage is a combination of an anoxic limestone drain, settling pond and sulfate reducing wetland. A bulkhead should be constructed in the adit after it is opened. Limestone should be placed behind the bulkhead. The mine workings will be flooded behind the bulkhead, which should make the drainage anoxic. Prior to opening the adit, the dissolved oxygen content of the mine drainage should be measured to determine if it is currently anoxic. The anoxic limestone drain should raise the pH high enough for sulfate reducing bacteria to survive. From the bulkhead, the mine drainage should be piped to the ridge below the road, where a settling pond can be constructed. Most of the iron and some of the other metals should precipitate in the settling pond. Since most of the metals loading occurs during the warmer months, the temperature of the water should be warm enough to "polish" the metals with a sulfate-reducing wetland. During the winter months however, the sulfate reducing wetland will probably not function, due to cold temperatures. It is recommended that the system be set up to bypass the settling pond during the winter months. This would allow warm water to flow straight to the sulfate-reducing wetland and may enable it to function during the winter.

The waste rock in the drainage at the lower site should be removed. One possibility for a disposal area is at the Lark Mine. A disposal area near the Lark Mine adit could be excavated, then the consolidated mine waste covered with the excavated material. The portion of the upper Joe & Johns waste pile in the stream channel should be removed and consolidated with the portion of the pile outside the stream channel.

Kansas City Mines

Location

The Kansas City Mines are located near the head of Georgia Gulch on the steep north face of McMillan Peak. The site lies at an elevation of 11,768 ft. at LAT. N37°52'55.3", LONG. W107°41'05.0". The site is accessible via a long access road constructed up Georgia Gulch from the Cement Creek road. This site is believed to be on the Kansas City and Henrietta claims.

000117

Two draining mine adits at the main level, referred to as the Kansas City #1, were sampled at stations SO-20 (main adit) and SO-21 (sublevel adit), shown on Figure 5. Station SO-22 at a prospect also shown on Figure 5, was not sampled, because mine drainage was not observed in the fall and was covered by snow in the spring. Three of the four waste rock piles were sampled at sites # 37, 38, and 41, and are shown on Figure 8. A site map on Figure 33, also shows these sampling sites.

Workings

The Kansas City Mines developed a set of veins through a series of adits driven southwest on at least 3 levels. The portal on the main level (Kansas City #1) is on the south side of Georgia Gulch at an elevation of 11,768 ft. A sublevel adit is northeast and below the main level adit at the same site. The upper level portal (Kansas City #2) is located approximately 500 ft. north-northwest of the main adit, 200 ft. higher up the slope. A fourth prospect adit is still farther northwest, adjacent to Georgia Gulch, at an elevation of 11,880 ft.

The individual adits followed three steeply-dipping parallel vein structures. The main level and sub level adits drifted S.32°W. on a vein dipping steeply east. Both portals are still open and discharging mine drainage.

The upper level 200 ft. higher drifted S.32°W. on the extension of the Henrietta 7 vein, which can be traced from Prospect Gulch into this area of Georgia Gulch, and continues through McMillan Peak. This adit is collapsed at the portal. The prospect adit highest up the gulch drifted S.32°W. on a vein dipping 85° east. This adit contains standing water.

Mine Wastes

A moderately-sized combined dump is located at the adit portals of the main and sublevels. This dump is estimated to contain approximately 5,000 cu. yds. of waste materials. The dump is composed of oxidized highly pyritic waste materials, and includes some small areas of base-metal ores. There is a significant kill zone below this set of dumps. This pile was sampled as waste rock sampling site #38.

The waste rock dump at the upper level (Kansas City #2), at an elevation of 12,000 ft. is estimated to contain about 2,500 cu. yds. of fine, clayey oxidized and leached vein materials from the drift workings. A large kill zone extends for about 200 ft. below this pile to just below the access road. This pile was sampled as waste rock sampling site # 37.

The prospect adit dump is estimated to contain about 1,000 cu. yds. of materials similar in nature to the dump just described at the upper level. The toe is being eroded by the creek in Georgia Gulch, which runs along its toe for approximately 50 ft. Some sections appear to be oversteepened by erosion at the toe, and subject to sliding into the creek. The alpine vegetation grows up to the toe of this pile, although there are visible signs that the vegetation within about 50 ft. of the pile is stressed. This pile was sampled as waste rock sampling site #41.

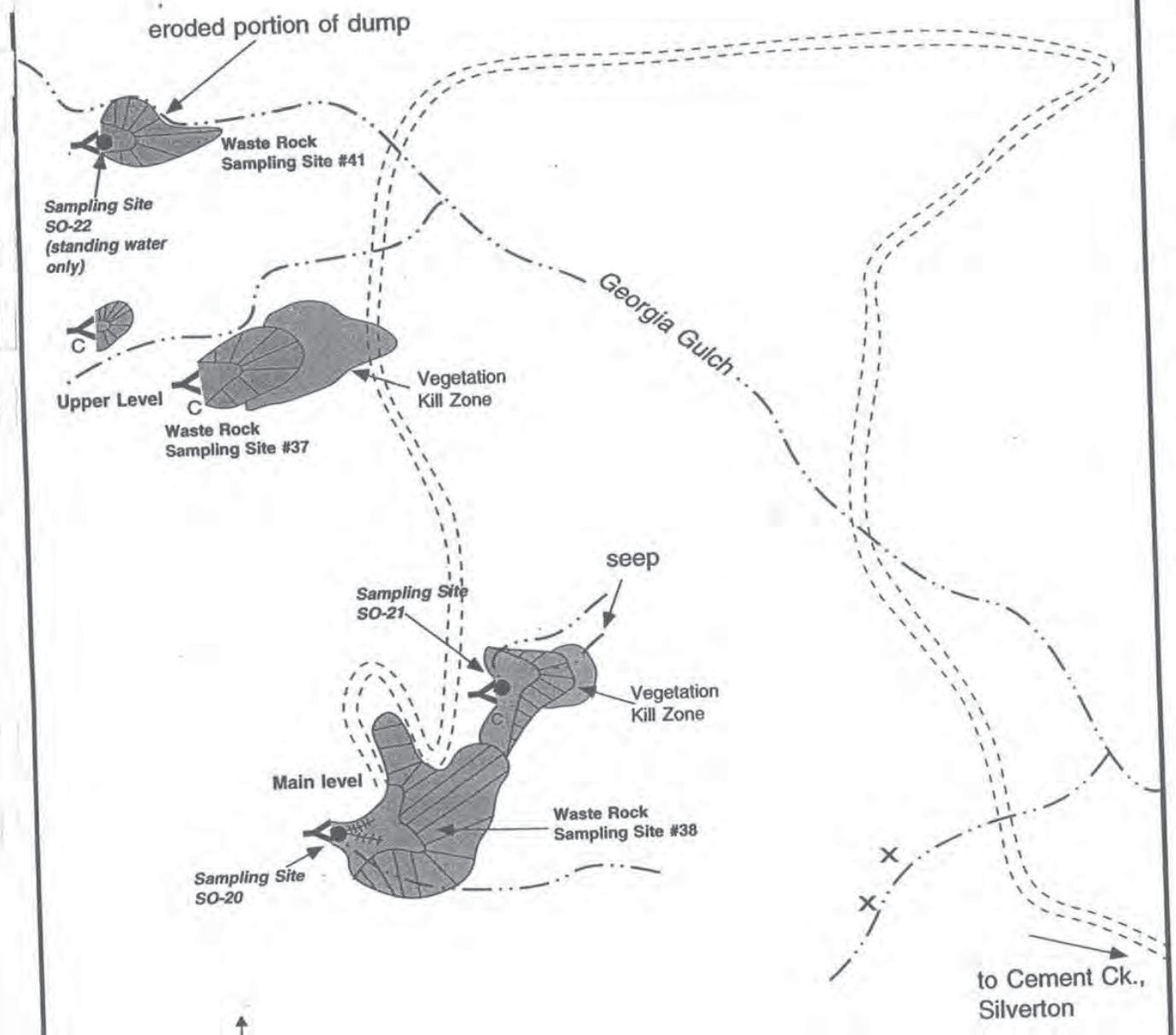

FIGURE 33

Colorado Department of Natural Resources
Division of Minerals and Geology

Inactive Mine Reclamation Program

Site Map - Cement Creek
Kansas City Mine Area

Scale	Date	Sheet No.
as Shown	Revised 4/98	1 of 1

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Total acidity and sulfates for each waste pile are reported below.

Dumps at Kansas City Mines

Site	Total Acidity (mg/l)	ICP Sulfate (mg/l)
Kansas City #1 (Main level)	1,440	1,926
Kansas City #2 (Upper level)	4,800	5,992
Kansas City Prospect	480	1,872

Historic Structures

There are no structures or equipment at any of the Kansas City portals. Anything left has been destroyed by avalanches. Pipes, rail, and other metal parts and debris litter the dump. Tracks still lead out of the main level portal onto the dump. The remains of a house are located across the stream, north of the upper level adit.

Geologic Constraints to Reclamation

The Kansas City Mines area is subject to extreme avalanche danger. Nothing is left at any of the portals due to snowslides in the past. The narrow, steep-sided canyon is exposed to rockfalls and avalanches from all sides. Slopes are steep, and bedrock is shallow. Access is good at the present time, however the road cannot be expected to last many years, and is beginning to wash out in several areas. The road is normally blocked by the remains of snowslides well into August.

Water Quality Impacts

Water quality analyses indicate that these mines are not a significant source of metals to Cement Creek. The metals loading measured at the adits during low-flow and high-flow are all below 0.1 lb/day. However, near the mouth of Georgia Gulch, the zinc loading at high-flow was about 17 lb/day. A large portion of this is probably due to background, but it is also likely that leaching of metals from the waste rock during snowmelt is responsible for much of the zinc loading.

Additional sampling will be necessary to determine the metals contribution from this site. It is recommended that two additional sites be sampled during high-flow. The upper site should be above the prospect adit, and the lower site in the canyon above the alluvial fan. A large portion of the flow from this area is thought to flow underground through the alluvial fan. Furthermore, at the June 1997 sampling, the mine adits were still completely covered with snow. It is likely that the mine drainage increases in quantity after the adits are snow-free. It is thought that the mine drainage was diluted by snowmelt water when sampled in June 1997.

The Kansas City #1 (waste rock sampling site #38) and Kansas City #2 (waste rock sampling site #37) had some of the highest metals concentrations found in the waste rock extracts in the Cement Creek area. The Kansas City #2 dump extract had one of the highest total acidity measurements in the area studied. The waste pile at the prospect adit had much lower metals concentrations in the extract, and had the highest calcium content of any of the dumps sampled.

000120

Reclamation Options

No treatment of the mine drainages is currently recommended. Reclamation of the waste rock piles at the main level and sublevel will be difficult due to the extremely steep slopes. Both waste piles lay on the edge of a cliff. A portion of the waste rock has been dumped over the cliff or washed over the cliff by avalanches.

Consolidation of the mining wastes at the four adits appears to be the best solution to this possible metals source. The best location for disposal is on the south side of the canyon at approximately the same elevation as the waste piles. The scree/colluvium can be excavated on one of the gentler slopes to form the disposal site. The excavated material can then be used to cover the waste rock. The waste rock at the prospect adit should probably be used as a bottom and top layer. This waste rock is relatively fine, and much less acid forming. The prospect waste rock should be amended with lime or limestone.

LOWER CEMENT CREEK AREA

Location

The Lower Cement Creek area as used here includes several sites along the main stem of Cement Creek between Gladstone and Silverton. Mine sites along Lower Cement Creek selected by DMG and ARSG for reclamation feasibility studies include the Galty Boy, Evelyne Mine, Mammoth Tunnel, BLM Adit, Anglo Saxon and Gold Hub Mines. The locations of these mines are shown on Figures 5 and 8. These sites are situated on privately owned patented lode mining claims. Coordinates of each site are given in the individual site descriptions.

The area is characterized by rugged, steep, high alpine terrain below timberline. Winters are long with snow depths averaging 440 inches. The summer growing season is short. Average annual precipitation for the past 3 years is 45 inches, 37 inches occurring as snowfall (Sunnyside Gold Corporation, 1996).

Geologic Setting

The regional geologic setting of the Cement Creek area is discussed at the beginning of this report. More specific information about the Lower Cement Creek area is included below.

Bedrock Geology

The Lower Cement Creek area is situated 2½ miles east of the western margin of the Silverton Caldera. Caldera rocks in the Lower Cement Creek area consist dominantly of medium to dark, brown and black, thick, massive rhyodacite and dacite flows and flow breccia of the Silverton Group Burns Formation, and rhyodacitic flows, breccias and tuffs of the overlying Henson Formation, which form the slopes and summits of some of the higher peaks above the valley.

Structural Geology

Structurally, the Lower Cement Creek area lies within the Silverton Caldera. The area parallels

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Mineral Creek, 2½ miles to the west, which marks the zone of a complex system of ring-fracture faults related to caldera subsidence. Widely scattered mineralized stringers and faults (veins) in the Lower Cement Creek area trend parallel or sub-parallel to the main ring fault trend of N.22°E. Because the area is south of the complex structure and fracture systems associated with the Eureka Graben, and several miles west of the caldera margin, there are far fewer principal veins and mineralized structures, which limited economic mining activities.

Hydrothermal Alteration

All the volcanic rocks in the Lower Cement Creek area were extensively propylitized and altered on a regional scale, prior to ore deposition. In this area of the Silverton Caldera, propylitic alteration is typified by the formation and addition of chlorite, calcite, and clays in weakly altered rocks, to epidote, albite, and chlorite in the stronger phases. Propylitic alteration has resulted in a dull green or greenish gray color to virtually all of the Burns Formation rocks in the Lower Cement Creek area.

Due to the proximity of the caldera structural margin to the west of Cement Creek, many local areas of the rockmass in the upper headwaters of tributary streams draining the west side of the valley have been highly altered by solfataric and hydrothermal processes. Solfataric processes have subjected the rock to attack and leaching by hot sulphurous gases and solutions moving upwards along the structural margin of the Silverton Caldera. These hydrothermal processes have leached and "stewed" most of the base minerals from the rocks. Volcanic flows in the Ohio Peak - Anvil Mountain area and on the northern side of Prospect Gulch were so strongly altered and leached that little remains except silica, kaolinite, and sulfate and sulfide alteration products. Virtually all potential buffering minerals in the country rock have been leached away, leaving the quartz-allunite-pyrite alteration assemblage characteristic of the Red Mountain District. Bleaching of the rocks and subsequent surficial oxidation of the solfataric pyrite through geologic time has resulted in the brilliant red, orange, and yellow staining which characterizes these areas of alteration.

Ore Mineralization

Economic ore mineralization in the Lower Cement Creek area veins is typically weak, compared to other areas farther north and northeast in the Cement Creek watershed. The veins in solfatarically altered areas are reflective of the quartz-alunite epithermal deposits. The most common ore minerals include enargite, pyrite, sphalerite, galena, bornite, chalcopyrite, proustite, pyargerite, stromeyerite, covellite, and chalcocite (Burbank, 1951). Sulphide minerals found on the mine dumps of the Anglo Saxon include pyrite, enargite, covellite, and chalcopyrite. The deposits were mined in veins, and as disseminations in wall rock, intensely altered to silica, alunite, and clays.

Gangue minerals associated with veins in solfatarically-altered areas consist dominantly of barite, fluorite, and the products of rock alteration, namely clays, quartz, and heavily pyritized wall rock. Virtually all potential buffering minerals have been leached away.

Vein ores in Lower Cement Creek area in non-solfatized rock consist of pyrite, chalcopyrite, sphalerite, and galena, sometimes with tetrahedrite and tennanite. Occasional silver was

associated with argentiferous tetrahedrite, and less commonly with silver sulfo salts. Very rare free gold occurred in isolated shoots scattered in siliceous gangues, or associated with the base metal ore minerals.

Gangue minerals associated with veins in the Lower Cement Creek area normally include quartz, rhodonite, rhodochrosite, calcite, fluorite, and barite. There is generally more potential for the presence of buffering minerals in vein deposits which are not associated with solfatized rocks. Solfataric processes near the western margins of the lower Cement Creek valley watershed have depleted base mineral constituents in the country rocks, and buffering minerals are depleted.

Surficial Geology

Slopes around Lower Cement Creek are steep, and prone to avalanches and debris flows. Almost all the steep ravines between Gladstone and Silverton have well-formed debris cones and fans where they impinge on Cement Creek. The upper slopes of Ohio and Storm Peaks are mantled with thick aprons of scree and talus, which act as source areas for debris flows moving down the many steep gulches and ravines which empty into Cement Creek. Much of this natural talus and slope debris material is stained bright red and yellow, resembling oxidized mine dump material. Tests show most of this colluvial material to be so highly leached and oxidized through geologic time, that it is not a source of significant metals releases.

The avalanche danger in Lower Cement Creek is high to moderate. Numerous avalanche chutes exist on both the east and west sides of the creek almost all the way down to Silverton. Snowslides often run all the way down to Cement Creek in several areas, though they are more prevalent in the upper parts of the tributaries above the valley.

Extensive boggy, colluvial and landslide deposits exist in the upper reaches of Porcupine and Ohio gulches below Ohio Peak. These deposits are characterized by thick, black soils developed on fine to coarse gravelly and cobbly and bouldery colluvial materials. Colluvial and alluvial soils exposed along some of the upper slopes and along first order streams in the upper tributary gulches have locally been cemented with iron oxide, forming ferricrete deposits, as have many of the terrace gravels and colluvial deposits along Cement Creek.

Alluvial gravels are present along Cement Creek. Ferricrete deposits have resulted from iron-rich groundwater redepositing hematite and other iron compounds in the interstitial spaces of alluvial and terrace gravels. The "cemented" nature of gravel and colluvium outcrops along the creek gave rise to its name.

Lower Cement Creek Mine Site Descriptions

The mine sites included for feasibility assessments are the Galty Boy Mine, Evelyne Mine, Mammoth Tunnel, BLM adit, Anglo Saxon and Gold Hub Mines. These are described below and shown on Figures 5 and 8.

Galty Boy Mine

Location
The Galty Boy Mine is located on the west side of Dry Gulch 1/4 mile above Cement Creek, where County Rd. 35 crosses the stream channel of Dry Gulch. The mine is at an elevation of 10,980 ft. at LAT. N37°53'31.9", LONG. W107°39'52.2". This site is believed to be on the Gold Dollar claim. The waste rock pile was sampled as site #40, shown on Figure 7.

Workings
A collapsed adit was driven west into the hillside approximately 50 ft. above Dry Gulch. There is no visible drainage from the mine adit.

Mine Wastes
The Galty Boy Mine dump was estimated to contain approximately 1,000 cu. yds. of material. The toe of the waste pile is located in the streambed, and a portion has been eroded away. It also appears that some of the waste rock has been moved downslope by avalanches. The waste rock contains some pyrite and hübnerite.

Total acidity and sulfates are shown below.

Galty Boy Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
110	76

Historic Structures
There are no structures at this site. There is some wooden debris and metal on the mine dump.

Geologic Constraints to Reclamation
The Galty Boy site is prone to avalanches. The large, steep open slope above the site could result in some large destructive slides, as evidenced by the apparent movement of waste rock down the slope. Rockfalls and talus slides are common occurrences, as shown by slides into the old access road. The entire site area is situated in loose, blocky talus deposits. There are no soils or stable areas nearby. Access is poor from the Prospect Gulch road, and would have to be improved for equipment to reach the site.

Water Quality Impacts
Water quality impacts from this site are minimal. The waste rock analyses indicate that there are very few metals leached from this pile. The material eroded into Dry Gulch probably does provide some metals, but Dry Gulch has surface flow for only a short period during the spring.

Reclamation Options
This site has minimal impacts to water quality. Any work done on the waste pile would be costly,

000124

since the access road into the site is overgrown, filled in, and washed out in places. The entrance to the road, from the Prospect Gulch road, is now a 20 foot vertical face. The waste rock does not appear to be a significant source of heavy metals. It is therefore recommended that no reclamation be performed on the waste rock pile.

Evelyne Mine

Location
The Evelyne Mine is located on an unpatented claim on the west side of Dry Gulch approximately 100 yards above where County Rd. 35 crosses the stream channel of Dry Gulch. The mine is at an elevation of 10,600 ft. at LAT. N37°53'03.3", LONG. W107°39'17.9". The mine drainage was sampled as station SO-24, shown on Figure 5. The waste rock pile was sampled as site #39, shown on Figure 8.

Workings
An adit was driven west into the hillside approximately 100 ft. above Dry Gulch. The mine adit drains approximately 2-60 gpm of iron-rich water.

Mine Wastes
A small waste pile, consisting mostly of country rock, is located along the steep slope outside the adit. Much of the waste rock has been cemented with iron oxyhydroxides from the mine drainage. Very little mineralization was found in the waste rock. The waste rock extract analyses, a portion of which are shown below, indicate that the metals concentrations, in general, are only slightly above background samples. The only remarkable characteristic of this dump is that the waste rock had one of the higher chromium concentrations found in Cement Creek.

Evelyne Mine Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
90	64

Historic Structures
There are no structures at this site. There is some wooden debris on the mine dump.

Geologic Constraints to Reclamation
The Evelyne site is not prone to avalanches. The slope above the site is forested with mature spruce and fir. The entire site area is situated in steep, loose talus and colluvium. There are no soils or stable areas nearby. Access is poor from the Prospect Gulch road and would have to be improved for equipment to reach the site.

Water Quality Impacts
Water quality impacts from this site at low-flow are minimal. At low-flow, the adit drains approximately 2 gpm. This flow increases to about 60 gpm during high-flow. At high-flow, the

SDMS-1260037
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metals loading from the adit were about 0.6 pound of zinc, 18 pounds of iron, and 0.2 pound of copper per day. The mine drainage quickly infiltrates the waste rock and talus/colluvium below the mine site. No surface flow has been observed to enter Dry Gulch.

The waste rock analyses indicate that there are very few metals leached from this pile.

Reclamation Options

During most of the year, this site has minimal impacts to water quality. Much of the iron is probably removed by flowing through the talus/colluvium, even at high-flow. Treatment of this drainage is somewhat problematic because the adit is located on a steep slope. There are no areas nearby, without crossing the Dry Gulch channel, where a treatment system could be constructed. If a suitable site can be located, most of the metals in the mine drainage can be removed with a settling pond. The mine drainage would have to be piped down the steep slope to the settling pond, or follow the old access road to the southwest. Another option to be considered is bulkheading the adit. The surrounding rock appears to have many fractures, but the rock inside the adit may be tighter. The mine workings should be investigated to determine if this is an option.

The waste rock does not appear to be a significant source of heavy metals. The waste rock appears to be removing metals from the mine drainage. It is recommended that no reclamation be done on the waste rock pile.

Mammoth Tunnel

Location

The Mammoth Tunnel is located on the west side of Cement Creek near the mouth of Georgia Gulch. The road to the Kansas City Mines crosses this mine site. The Mammoth Tunnel is at an elevation of 10,400 ft. at LAT. N37°52'42.3", LONG. W107°40'10.7". The tunnel is believed to be on the Dooley claim. The mine drainage was sampled as station SO-18, shown on Figure 5. The waste rock pile was sampled as site #32, shown on Figure 8.

Workings

An adit was driven west into the hillside approximately 100 ft. above Cement Creek. The mine adit drains approximately 20-30 gpm of iron-rich water. This adit is a cross cut, reportedly driven to intercept lower levels of ore at the Henrietta Mine. According to verbal reports (Fearn, 1994), the tunnel was abandoned before reaching the Henrietta.

Mine Wastes

As would be expected, the waste pile consists mostly of country rock. The waste rock is very coarse with iron oxyhydroxide staining on the exposed portions. Very little mineralization was found in the waste rock. The waste rock extract analyses, a portion of which are shown below, indicate that metals concentrations, in general, are only slightly above background samples. The only remarkable characteristic of this dump is that the waste rock had one of the higher cobalt concentrations found in Cement Creek.

Mammoth Tunnel Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
5	86

Historic Structures

There is one small wooden building covered with corrugated sheet metal on the waste pile. There is some wooden debris on the mine dump.

Geologic Constraints to Reclamation

The Mammoth Tunnel site is not prone to avalanches. The slope above the site is forested with mature spruce and fir. The entire site area is situated in steep, loose talus and colluvium. There are some debris flow materials nearby that could be used as a cover material. The slopes below the mine are fairly gentle.

Water Quality Impacts

Dissolved zinc and iron loadings from this site remain fairly constant throughout the year. It is likely that the tunnel intercepted a fracture or series of fractures that connect to the natural iron springs. The zinc load from this drainage is about 0.5 lb/day, while the iron load ranges from 20 to 30 lb/day. The copper load from this site is less than 0.1 lb/day. Since the metal load varies very little through the year, the overall effect of this site is the greatest at low-flow. At low-flow, this mine contributes the second highest dissolved metal load of all the draining mines (approximately 11%), including about 15% of the iron and 16% of the nickel. At high-flow, this site contributes the third highest dissolved metal load (approximately 4.5 lb/day) in the Cement Creek area The mine drainage flows over the waste rock onto the alluvial fan at the mouth of Georgia Gulch. Most of the mine drainage infiltrates into the fan material before it reaches Cement Creek.

The waste rock analyses indicate that there are very few metals leached from this pile. Visual observations indicate that the waste rock is supplying some treatment to the mine drainage.

Reclamation Options

The majority of the metals in this mine drainage can be removed by constructing a series of settling ponds. The high ratio of iron to zinc and other metals should aid in co-precipitation of the other metals. The mine drainage is anoxic as it wells up from the top of the collapsed adit. The dissolved oxygen measured in August 1996 was 0.6 mg/l with saturation at 7.6 mg/l. It is recommended that a lined channel be constructed with a series of drops to aerate the drainage. This should be followed by a series of settling ponds connected by a channel with aeration drops. The settling ponds should have a combined capacity of approximately 400 cu. yds.. The estimated amount of sediment generated each year is 70 cu. yds., assuming no consolidation. The settling pond system should be set up to allow one pond to dry each year. The sediment volume should shrink by 80 to 90 % upon drying. After the sediment has dried, it can either be removed, or left to accumulate over a period of years. If additional metals removal is desired, the effluent from the last sediment pond can be passed through a sand/limestone filter. This will remove most of the

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remaining zinc and manganese, and increase the pH of the final effluent.

It is recommended that no reclamation be done on the waste rock pile. The waste rock does not seem to be a significant source of heavy metals and actually appears to be removing metals from the mine drainage.

BLM Adit Near Fairview Gulch (Elk Tunnel)

Location

This mine is located on an unpatented claim on the west side of Cement Creek near Fairview Gulch. A side road on the west side of Cement Creek between Georgia Gulch and Minnesota Gulch is used to access this site. The mine is at an elevation of 10,200 ft. at LAT. N37°52'9.0", LONG. W107°40'27.4". The mine drainage was sampled at water quality sampling station SO-19, shown on Figure 5. The waste rock pile was sampled as sites #33 and #49, shown on Figure 8.

Workings

An adit was driven west into the hillside approximately 100 ft. above Cement Creek. The mine adit drains approximately 170 gpm of iron-rich water. This adit is suspected to be a cross cut to a vein located further up the slope.

Mine Wastes

The waste pile is approximately 1,100 cu. yds. and consists mostly of country rock. The waste rock is very coarse with iron oxyhydroxide staining on the exposed portions. Very little mineralization was found in the waste rock. The waste rock extract analyses, a portion of which are shown below, indicate that the metals concentrations, in general, are within the range of background samples. The only remarkable characteristic of this dump is that the waste rock had one of the higher antimony concentrations found in Cement Creek. Combined with the high arsenic in the water, these facts suggest that the ore mined here was probably an arsenic/antimony sulfide such as enargite or tetrahedrite.

Dump at BLM Adit

Total Acidity (mg/l)	ICP Sulfate (mg/l)
3	26

Historic Structures

There is one small wooden building on the mine dump. The building is in the process of collapsing. Most of the roof has already collapsed. There is some wooden debris on the mine dump.

Geologic Constraints to Reclamation

This site is not prone to avalanches. The slope above the site is forested with mature spruce and fir. The entire site area is situated in steep colluvium. There are debris flow materials nearby that could be used as a cover material.

Water Quality Impacts

Like the Mammoth Tunnel to the north, dissolved zinc and iron loading from this site remains fairly constant throughout the year. It is likely that the mine tunnel intercepted a fracture or series of fractures that connect to the natural iron springs. The zinc load from this drainage ranges from about 0.4 to 0.7 lb/day, while the iron load is about 7 lb/day. The copper concentrations in the mine drainage are below detection limits. Since the metal load varies very little through the year, the overall effect of this site is the greatest at low-flow. At low-flow, this mine contributes about 5% of the metals from all the draining mines, including about 21% of the arsenic and 9% of the manganese. At high-flow, this site contributes about 1.5% of the metals from draining mines, including 9% of the arsenic and 4.5% of the manganese. The mine drainage flows over a portion of the waste rock onto colluvium, down a steep iron-stained channel into Cement Creek.

The waste rock analyses indicate that there are very few metals leached from this pile.

Reclamation Options

The majority of the metals in this mine drainage can be removed by constructing a series of settling ponds. A series of ponds could be constructed along the historic access road to the site. The high ratio of iron to zinc and other metals should aid in co-precipitation of the other metals. The settling ponds should have an aggregate capacity of approximately 1,300 cu. yds.. The estimated amount of sediment generated each year is 20 cu. yds., assuming no consolidation. The settling pond system should be set up to allow one pond to dry each year. The sediment volume should shrink by 80 to 90 % upon drying. After the sediment has dried, it can either be removed, or left in the bottom to accumulate over a period of years. If additional metals removal is desired, the effluent from the last sediment pond can be passed through a sand/limestone filter. This will remove most of the remaining zinc and manganese, and increase the pH of the final effluent.

The waste rock does not appear to be a significant source of heavy metals. It is recommended that no reclamation be performed on the waste rock pile.

Anglo Saxon Mine

Location

The Anglo Saxon Mine is adjacent to State Route 110 on the west side of lower Cement Creek about 3 miles upstream from Silverton. This mine consists of two adits, a main adit and the Porcupine Gulch adit. The main adit is located at LAT. N37°51'25.5", LONG. W107°40'40.5" at an elevation of 10,080 ft. The main mine adit drainage was sampled as station SO-16. The waste rock at the main adit was sampled as site #28. The Porcupine Gulch adit is located at LAT. N37°51'32.3", LONG. W107°40'46.6" in Porcupine Gulch, approximately 500 ft. above the Cement Creek Road, at an elevation of 10,200 ft. The Porcupine Gulch adit was sampled as station SO-23. The waste rock at the Porcupine Gulch adit was sampled as sites #36 and 44. These sites are bracketed by water quality sampling stations CC-29 and CC-31 along Cement Creek.

The Anglo Saxon adits are believed to be located on the Anglo Saxon Placer and Anglo Saxon 1, 2

and 3 claims. Locations of water quality sampling sites are shown on Figure 5. Locations of waste rock sampling sites are shown on Figure 8. A site map is shown on Figure 34.

Workings

This site includes two adits driven northwest, which prospected quartz-sulphide veins. The main adit, just above the road level, is collapsed at the surface, but still discharges about 40-60 gpm of metals-laden water. The discharge flows across a partly eroded dump, then cascades down to the road, flowing under it in a culvert to a constructed settling pond, before continuing to Cement Creek. The second adit is about 500 ft. up Porcupine Gulch on the north side, 200 ft. higher than the main adit in elevation. This adit has been buried by talus and colluvium. A spring issues from the collapsed portal, discharging 40-55 gpm. Most of the water in Porcupine Gulch during low-flow periods is discharge from this mine portal.

Mine Wastes

The dump at the main portal contains approximately 2,200 cu. yds. of mostly fine to medium grained sulphide mine waste consisting almost entirely of pyrite and altered country rock, mixed with quartz. Cribbing supports the dumps "toe", preventing it from falling into the road, which runs adjacent to it.

A thick deposit of orange ferric hydroxides has formed on the main adit dump where discharge from the portal has flowed across it. This orange sludge deposit continues over the dump, then under the road, where it has settled out in a constructed pond, and in natural wetland areas along Cement Creek.

The dump at the Porcupine Gulch adit has steep sides, contains about 1,600 cu. yds., and is being eroded by Porcupine Gulch during high flows. The top portion of the dump is principally crystalline iron pyrite. The side slopes are primarily country rock, with massive crystalline pyrite, along with some hübnerite and fluorite.

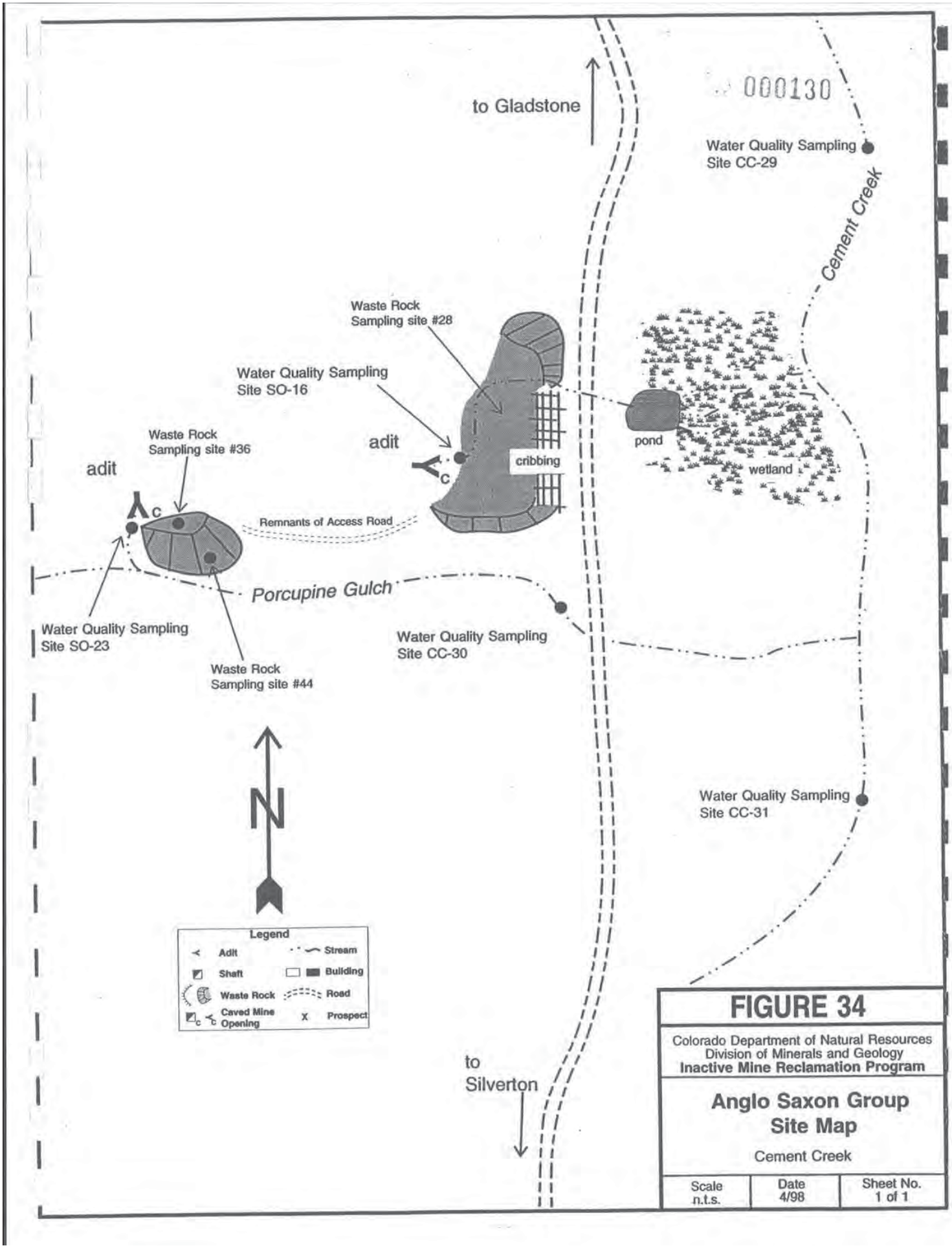
Total acidity and sulfates for the waste piles are reported below.

Anglo Saxon Mine Dumps

Site	Total Acidity (mg/l)	ICP Sulfate (mg/l)
Main Adit	1,840	2,004
Porcupine Adit-Top of Pile	1,380	1,219
Porcupine Adit-Side slopes	640	659

Historic Structures

There is an old shack and collapsed portal shed on the lower dump at the main adit. The shack appears to be fairly modern, constructed of 2x4 boards and corrugated tin. The portal shed, of timber post and cap construction and lagged on the inside, has collapsed. The cribbing which


000130
to Gladstone
Water Quality Sampling
Site CC-29
Cement Creek
Waste Rock
Sampling site #28
Water Quality Sampling
Site SO-16
adit
cribbing
pond
wetland
Waste Rock
Sampling site #36
adit
Remnants of Access Road
Porcupine Gulch
Water Quality Sampling
Site SO-23
Waste Rock
Sampling site #44
Water Quality Sampling
Site CC-30
Water Quality Sampling
Site CC-31
N
Legend
Adit
Stream
Shaft
Building
Waste Rock
Road
Caved Mine Opening
Prospect
to
Silverton
FIGURE 34
Colorado Department of Natural Resources
Division of Minerals and Geology
Inactive Mine Reclamation Program
Anglo Saxon Group
Site Map
Cement Creek
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supports the dump along the road appears to be leaning outward, and is in a deteriorating condition. Rails lead out from the collapsed portal.

There are no structures at the Porcupine Gulch portal.

Geologic Constraints to Reclamation

This site is generally outside extreme avalanche danger. Exceptionally large slides might move down Grassy Gulch on the opposite side of the valley and run across Cement Creek, but this would be an unusual occurrence.

There is a large, active debris fan at the mouth of Porcupine Gulch, immediately adjacent to the site. This debris fan runs occasionally, and is a maintenance problem for road crews. It does not directly affect the lower site, except potential access routes and areas on the south side of the lower site. It does complicate access to the upper adit site, as it would have to be crossed at some point, and such a crossing and adjacent roads would eventually be destroyed by debris flows.

Water Quality Impacts

The drainage from the main adit is the third largest loader of dissolved metals during low-flow, and the fourth largest dissolved metals loader during high-flow. The majority of the dissolved load is iron. During low-flow, the dissolved metal load is about 21.5 lb/day, including about 1.5 pounds of zinc and 7 pounds of iron per day. There is very little copper in the mine drainage. At high-flow, the main adit produces about 31 pounds of dissolved metals per day, including about 2 pounds of zinc and 23 pounds of iron per day. During low-flow, it appears that the wetland and small settling pond remove most of the iron. However, during high-flow, there appears to be no attenuation of iron.

The drainage from the Porcupine Gulch adit produces about 16.5 pounds of dissolved metals per day at low-flow, including 1 pound of zinc and about 10 pounds of iron. During low-flow, most of the iron and about half the zinc precipitates in the stream channel of Porcupine Gulch. At high-flow, the mine drainage produces about 25 pounds of dissolved metals per day, including 2 pounds of zinc, 13 pounds of iron and 0.1 pounds of copper.

The waste rock analyses show that the waste rock at the main adit is acid forming, high in iron and zinc, and high in copper, which does not show up in the mine drainage. The waste rock also had high titanium and vanadium concentrations. There does not appear to be much upland runoff that flows onto the waste pile. Most of the material above this site is highly porous.

The waste pile at the Porcupine Gulch adit is, overall, similar to the main level waste pile. The mine waste is high in iron, zinc, and copper. However, there is probably some upland runoff that flows onto the waste rock at this site. In addition, some of the waste rock has been eroded from the toe of the pile in the past.

Reclamation Options

The majority of the metals in both mine drainages can be removed by constructing a series of

settling ponds. The high ratio of iron to zinc and other metals should aid in co-precipitation of the other metals. The settling ponds at the main adit should be constructed southeast of the adit, near Porcupine Gulch. The main adit will have to be opened here to allow the drainage to oxygenate in the workings. With the adit collapsed, the mine drainage is anoxic. There is insufficient room at this site to aerate the water before it enters the settling pond. The settling ponds for the Porcupine Gulch adit can be constructed along the terrace toward the main adit. The settling ponds at the main adit should have an aggregate capacity of approximately 600 cu. yds.. The settling ponds at the upper adit should have an aggregate capacity of approximately 500 cu. yds.. The estimated amount of sediment generated each year is about 60 cu. yds. at the main adit and about 50 cu. yds. at the upper adit, assuming no consolidation. The settling pond system should be set up to allow one pond to dry each year. The sediment volume should shrink by 80 to 90 % upon drying. After the sediment has dried, it can either be removed, or left to accumulate over a period of years. If additional metals removal is desired, the effluent from the last sediment pond can be passed through a sand/limestone filter. This will remove most of the remaining zinc and manganese, and increase the pH of the final effluent.

If settling ponds are constructed at these mines, the excavated material can be used to cover the mine waste. At the main adit, it is recommended that only the top of the mine waste be reclaimed. This site is viewed by many tourists during the summer. Leaving the slopes in their present condition will maintain the historic flavor of this site. The entire waste rock pile at the Porcupine Gulch adit should be covered and revegetated, after moving about 300 cu. yds. of waste rock from the toe of the slope. Upland diversions should also be constructed at this site.

Gold Hub Mine

Location

This mine is at an elevation of 10,080 ft. at LAT. N37°51'3.6", LONG. W107°40'31.5". It lies on the east side of lower Cement Creek along State Route 110 about 2½ miles upstream from Silverton. Access is via an old bridge across Cement Creek. The mine drainage at this site was sampled at water quality sampling station SO-14, shown on Figure 5. The waste rock at this site was sampled at station #29, shown on Figure 8. These sites are also shown on the site map on Figure 35.

Workings

The adit at this mine appears to be a crosscut driven east beneath Storm Peak to explore mineralized veins. Little is known about the workings, other than that they are extensive, based on the size of the dump and mining infrastructure at the site. The portal is intact, but flooded to a depth of 2½ ft., discouraging access. Water flows out of the portal in a pipe to a ditch constructed on the top of the dump, then drains back into the adit, where a sump has been constructed just inside. This sump collects the mine water, then runs it underground in a pipe, to a discharge point in Illinois Gulch adjacent to the site. Discharge from this adit was measured at about 550 gpm.

Mine Wastes

A large dump at the portal contains approximately 18,000 cu. yds. of mostly altered and barren country rock. It has some areas mixed with sulphide vein wastes, particularly near the mill. There

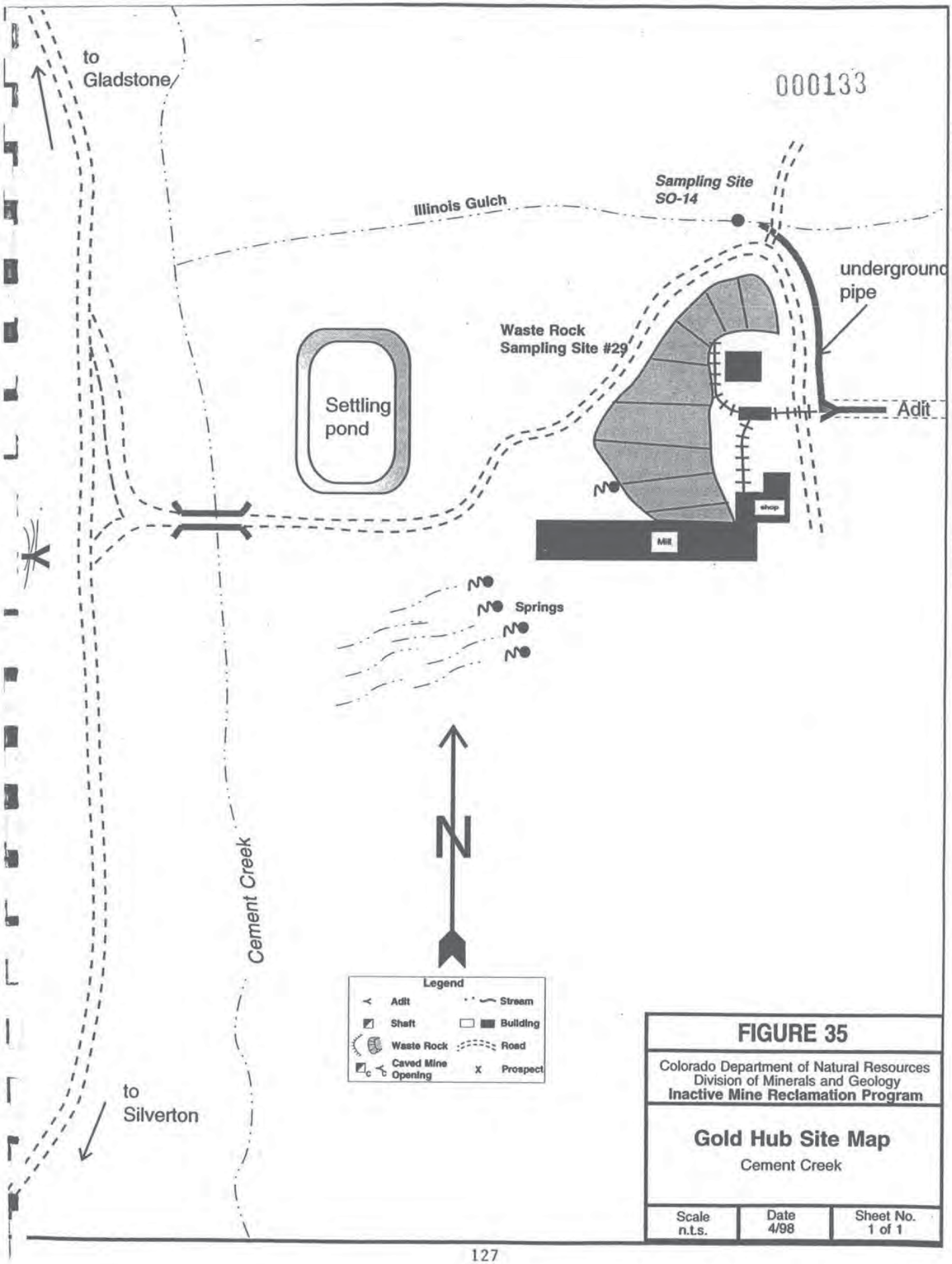

FIGURE 35

Colorado Department of Natural Resources
Division of Minerals and Geology
Inactive Mine Reclamation Program

Gold Hub Site Map

Cement Creek

Scale	Date	Sheet No.
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are also some small stockpiles of base-metal sulphide ores on top of the dump, near an ore shed.

Much of the waste pile is wet throughout the year. Several springs issue from below the waste pile. These springs may be the result of water leaching through the waste pile. Water from the springs was not sampled.

Waste rock extract analyses were conducted on a composite sample containing both country rock and ore waste. Total acidity and sulfates of that composite sample are shown below.

Gold Hub Mine Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
20	97

A thick accumulation of orange ferric hydroxides has been deposited in a series of settling ponds constructed below the dump, adjacent to Cement Creek, as shown on Figure 35. The portal discharge used to flow through this pond, but has since been diverted to Illinois Gulch. It is not clear whether the ponds were constructed as part of the milling operation, or for settling and treatment of the mine discharge.

Historic Structures

There is a fairly intact set of mine buildings and infrastructure at this site. A large modern multi-level sheet-metal clad mill exists on the south side of the dump. A maintenance shop and motor storage shed has partially collapsed near the portal. Tracks lead from the portal to the top of the mill, as well as out to the dump tipping area. An open storage shed is constructed on the north side of the dump, adjacent to the ore stockpiles. There is also an empty steel fuel tank, and scattered lumber and metal debris. The mine appears to have been in operation in the recent past, so there may be little historical value in the remaining structures.

Geologic Constraints to Reclamation

This site is generally outside avalanche danger areas. A heavy, mature forest covers the steep west-facing slopes above the property. Snowslides are not known to move down Illinois Gulch.

There is a small active debris fan at the mouth of Illinois Gulch, immediately to the north of the site. This debris fan runs occasionally, but does not directly affect the site.

A moderate to high potential for fracture-flow groundwater-minepool interactions might complicate the potential mine drainage reclamation strategies at this site. The fractured, jointed, highly altered nature of the bedrock could be allowing seepage from the adit to enter the groundwater system. If a treatment system is contemplated to address adit discharges, it will be necessary to determine any potential groundwater loadings which leave the site and are not seen as surface flows at the portal. Collection of these water flows from the adit for treatment could also be problematic. If this is the case, it may be necessary to re-enter the adit to a point beyond fracture influences and place

a grout-sealed bulkhead water-inlet to collect the flow before it escapes into the fractured bedrock.

Water Quality Impacts

The amount of drainage from this mine is very high, but, in general, the heavy metal concentrations are low. The exception is iron concentrations at low-flow. At low-flow, the mine drainage produces about 7% of the dissolved metals from draining mines in Cement Creek, and about 1% during high-flow. At low-flow, the dissolved metals amount to about 17 lb/day including 0.6 pounds of zinc and 7 pounds of iron per day. At high-flow, the mine drainage produces about 7 pounds of dissolved metals, including 1 pound of zinc and 2 pounds of iron per day.

The waste rock sample taken at this site was a composite sample including both the country rock and ore waste. Waste rock extract analyses show that the metals content of the waste rock is generally low. However, it is likely that the ore waste is considerably higher in heavy metals than what is reported here for the combined material.

Much of the waste rock pile is wet throughout the year. Runoff from the area above the mine site has been observed to flow onto the waste rock during snowmelt and thunderstorms. This water plus the mine drainage or spring flow could have a greater overall effect on water quality than the mine drainage. Water quality samples should be taken at the springs below the waste pile to determine the metals loading from this source.

Reclamation Options

This mine was active in the recent past and the DMG has revoked the reclamation bond for this site. However, the amount of money in the reclamation bond probably will only cover proper securing of the mine adit.

The only treatment recommended for the mine drainage is to clean out the existing settling pond, and divert the mine drainage into it through lined drainage ditches. This should remove most of the iron and aluminum and a portion of the zinc and manganese. Diversion ditches should be constructed to route upland flow away from the waste rock pile.

OTHER SITE OF INTEREST

Corkscrew Pass Mine

Location

This unnamed mine is located near the top of Corkscrew Pass on the Cement Creek side at LAT. N37°54'26.9", LONG. W107°39'35. The mine is located on the drainage divide, near two alpine ponds. The west pond flows into Red Mountain Creek, and the east pond flows into Cement Creek. The collapsed adit has not been observed to drain. Leachate from the waste rock colors the water in the east pond red. This pond is fed by a snowfield on the talus slope above the mine. During snowmelt, the pond overflows into a tributary of Cement Creek. During late summer and early fall, the water level in the pond slowly drops. The waste rock at this mine was sampled as

site #11 and 50, shown on Figure 6. The mine site is believed to be on the Judson or Newport claim.

Workings
An adit was driven north into the hillside at the base of talus near the top of Corkscrew Pass. The adit is collapsed and not draining.

Mine Wastes
There are approximately 1,300 cu. yds. of waste rock at this site. The principal mineral found in the waste pile was iron pyrite. The pyrite is often in 1-5 mm crystals. There is some sphalerite, enargite, arsenopyrite and galena in the waste rock.

Total acidity and sulfates for this waste pile are reported below. The leachate from this waste pile had the greatest acidity of all the waste piles tested in Cement Creek. Arsenic and iron levels were the highest of all the samples tested. The leachate showed that copper and aluminum levels are also high.

Corkscrew Pass Dump

Total Acidity (mg/l)	ICP Sulfate (mg/l)
7,610	7,160

Historic Structures
There are no structures at this site. The remains of a building rest at the adit entrance.

Geologic Constraints to Reclamation
This mine sits near the top of a ridge on the south slope of Red Mountain No. 1, so there is not much avalanche danger. The mine site is situated in rocky outcrops, talus, and large blocky colluvial material. There are no suitable cover materials or topsoil nearby. Access is poor, and would have to be improved for equipment to reach the site.

Water Quality Impacts
Because of the distance to Cement Creek, natural attenuation of metals probably makes this site a minor source. There is some visual evidence that the metal-laden drainage in the alpine pond occasionally does overtop and flow toward Cement Creek.

Reclamation Options
This site is an excellent area to test cementation of waste rock in-place. The access to the site is the only problem. Equipment to cement the waste rock will have to be carried in a small truck. The water quality in the pond should be tested before any work is done on this site to determine reclamation success.

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RECOMMENDATIONS FOR FURTHER INVESTIGATION

This investigation focused only on the metals contributions of surface mine waste and surface mine portal discharge sources in the Cement Creek basin. The mining-related groundwater sources were not considered here and have not, as yet, been investigated. Groundwater flow from the mines currently provides an unquantified pathway for contamination to enter the creek. Data on groundwater quality and quantities are essential to understand the hydrologic system and metals migration in Cement Creek. It is therefore recommended that drillholes and wells be placed near some of the mines exhibiting likely interactions with the groundwater system to collect additional data. Some of the mines in this category include the Grand Mogul-East Adit, Mogul Mine, Mine South of Mogul, Red & Bonita Mine, Henrietta Mine, Lark Mine, Georgia Gulch and Evelyne Mine.

Several unanswered questions also remain about some of the mining sites discussed. These issues were discussed in the narrative for each individual site in this report. In most cases, the unanswered question must be investigated prior to a final decision on the best reclamation option. In many cases, the answer to the question may simply involve a water sample. However, in some cases, the answer may be more involved to better understand the site hydrology. For easy reference, these questions are consolidated and reviewed below.

Upper Cement Creek - Water quality sampling stations CC-5 and CC-6 are in Upper Cement Creek and bracket the Mogul Mine and the unknown mine sampled at site SO-7 (Figure 3). Between stations CC-5 and CC-6, dissolved copper concentrations increased during low-flow and high-flow. At low-flow, the increase in copper load between these two stations is consistent with the load from the Mogul Mine and there was no drainage from the mine at sampling site SO-7. However, at high-flow, the downstream loading increase is greater than what can be accounted for at the two draining mines. A portion of the increased loading is probably from snowmelt and mine drainage leaching of the waste rock, but the small south-flowing tributary which enters Cement Creek just downstream of sampling site CC-5 may also be a partial source. This tributary should be investigated further.

Ross Basin Upper Site - There are several small waste piles at this site, which contain acid forming materials. Some of these piles are located near small prospect shafts. These shafts should be investigated to determine whether the waste rock can be simply placed back in the mine opening, covered and revegetated.

Ross Basin Lower Site - Sampling site CC-3 was located as a background water quality site for upper Cement Creek from Ross Basin (Figure 3). However, low-flow and high-flow sampling shows that a significant zinc load comes from the area above. There are numerous prospects, a few small mines, and one large mine above this site. The large mine, labelled here as the Ross Basin Lower Site, is approximately 200 yards above the sampling site (shown at waste rock sampling site #31 on Figure 6). A portion of the zinc load is thought to come from this large mine site, particularly during spring snow melt. It is recommended that a water quality monitoring station be added to bracket this area. The monitoring site should be set at the bottom of the cascade from

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Ross Basin. This is immediately above where white precipitate has been observed to form in the channel.

There are several small waste rock piles located near small prospect shafts. These shafts should be investigated to determine whether the waste rock can be simply placed back in the mine opening, covered and revegetated.

Grand Mogul-East Adit - Before any definite reclamation measures are developed at this mine site, the source of the acid rock drainage flowing from the waste rock pile must be determined. This can be done by drilling into the mine workings or driving a well point through the collapsed adit to evaluate whether there is water in the adit. If the mine workings are the source of water, the adit should be reopened, so the drainage can be diverted from the waste rock pile and characterized. If the source of the drainage is a spring, either the waste rock must be moved to a relatively drier site, or the spring flow must be intercepted and diverted away from the waste rock.

Mine North of Mogul - The spring/mine drainage flowing from near the edge of the waste rock pile should be monitored at least one time to determine whether any further investigations are warranted.

Mogul Mine - There is an inclined shaft which may connect to the Mogul adit 850 ft. northeast of the portal. The shaft collar is 201 ft. above the Mogul level on the same vein (Figure 3). It was constructed adjacent to Cement Creek, and includes a diversion dam and pipe intake through its side, which may have been used to deliver water for drilling to the main Mogul adit level, though this connection has not been verified. The shaft is still open, but the pipe intake has been disconnected. If this shaft connects to the Mogul, it could be allowing groundwater from Cement Creek 25 ft. away to enter the mine workings. There is also an open stope present in the area. This shaft and the open stope could be allowing water to directly enter the Mogul Mine workings, and may be significantly contributing to the total portal discharge. These should be investigated to determine their influence on the portal discharge and to assess the feasibility of source control approaches to control the flow. Source control approaches include methods of preventing water from flowing into the mine, such as stream diversion, lining the stream, or shallow fracture grouting.

Mine South of Mogul - This collapsed mine adit drains about 13 gpm from late spring through early summer. The adit should be reopened to determine if there is perennial drainage from the mine.

Red and Bonita Mine - The adit at this mine is collapsed, but still drains approximately 5 gpm of zinc-laden water during high-flow (Figure 3). It should be determined if there is any perennial flow from the mine workings. A well point could be driven through the collapsed portion of the mine, or the adit can be reopened. If the mine drainage is seasonal, reclamation of the barren ferricrete area can serve as the treatment system for this site. If there is perennial drainage, characterization of the drainage will be necessary before a treatment plan can be developed.

Some of the drainage may be entering the groundwater system through the loose, unconsolidated colluvium and scree at the portal or through fractures in the mine tunnel rather than exiting the

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portal as surface flow. The mine workings should be reopened and investigated to determine the presence of additional flow and to assess whether it is necessary to capture and treat that flow.

Samples should be taken from the main channel flowing from the barren ferricrete area below and west of the mine to determine the metals loading from that site.

Prospect Gulch - A south-flowing tributary enters Prospect Gulch from the northwest of the Lark Mine and north pile of the Henrietta Mine. This tributary was sampled upstream at WQCD site *CC-22* and downstream at site PG-10 by DMG (Figure 4). Between these sites, there are no mine-related features other than the two roads which the drainage crosses. Low-flow and high-flow concentrations measured at DMG site PG-10 are higher than measured at WQCD site *CC-22*. In fact, the concentrations measured at PG-10 were higher at high-flow than at low-flow. The WQCD data shows the opposite trend. The most likely explanation is that the roads are the principal cause of the apparent increase. Particularly during snowmelt, tributary water flowing down the roads is churned up by 4-wheel drive vehicles, which may explain the increase in zinc concentrations. However, this area between the two sampling sites should be investigated further.

Galena Queen/ Hercules - The possibility of processing the wastes in the Galena Queen/ Hercules piles to remove the heavy metals should be investigated as a reclamation option (Figures 7 and 31). Although the metal values are probably too low to completely pay for the processing, they may offset the overall cost of reclaiming this area.

Henrietta Mine - The Henrietta 800 level adit should be investigated to determine if there is mine drainage flowing underground from the collapsed portal (Figure 32).

Lark Mine - Some of the mine drainage may be entering the groundwater system through the loose, unconsolidated colluvium and scree at the portal or through fractures in the mine tunnel rather than exiting the portal as surface flow. The mine workings should be reopened and investigated to determine the presence of additional flow and to assess whether it is necessary to capture and treat that flow.

Georgia Gulch - Much of the flow in Georgia Gulch has, subsequent to the completion of monitoring, been observed to flow underground through the alluvial fan. It is recommended that Georgia Gulch be monitored in at least two new areas. The first would be a background sample above the upper-most mine of the Kansas City Group (Figure 5). This site will be difficult to monitor during the spring because of high flow. The most important monitoring site may be in the canyon above the alluvial fan.

Evelyne Mine - This mine adit drains approximately 2-60 gpm of iron-rich water, sampled at site SO-24 on Figure 5. One reclamation option to mitigate this drainage is bulkheading the adit. The surrounding rock appears to have many fractures, but the rock inside the adit may be tighter. The mine workings should be investigated to determine if this is an option.

Gold Hub Mine - A series of springs lies below the waste pile. Water quality samples should be

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taken at the springs below the waste pile to determine the metals loading from this source.

ANALYSIS OF RESULTS

Water quality in the Cement Creek basin is affected by both natural and mining-related metals loading. One important aspect of this investigation was to quantify the relative contribution of surface mine waste and surface mine portal discharge sources from potential mining-related groundwater sources and natural background metals inflows to Cement Creek. A simple model can be used to provide some indication of the potential for water quality improvement if surface wastes and portal discharges were addressed.

To do this, manganese was selected as the parameter to be used to determine the relative percentage of metals that can be attributed to mining-related surface discharge sources. Manganese was chosen because it is found in all the mine drainages in the Cement Creek basin and because it is a 'conservative' metal, meaning that it is not readily precipitated. Therefore, the total manganese load measured in mine drainage at the adits will be approximately equal to the manganese load measured in the creek downstream of these sources if there are no natural manganese sources or inflows of mining-impacted groundwater. For example, at water quality sampling site CC-6 (location on Figure 3), low-flow manganese load was measured at 8.7 lb/day. The manganese load from all the draining mines upstream of this site was totaled at 2.4 lb/day. The total manganese load from mine drainages is about 0.28 times the load measured in the main creek. This is very close to equal and confirms that the manganese is staying in solution.

In contrast, an example of a 'nonconservative' metal is iron, which is also found at all the mine drainages in the basin. In this example, the iron load measured at all the draining mines upstream of site CC-6 totaled 6.4 lb/ day. The iron load measured at site CC-6 was 0.33 lb/day. The amount measured from the upstream sources is about 19 times more than what was measured in the stream at CC-6. This metal is apparently precipitating between the sources and site CC-6, and would not be a good indicator of the mining-related metal loads in this basin.

The relative contributions from mining-related surface discharge sources in the creek were investigated in upper Cement Creek at water quality sampling site CC-9 (location on Figure 3). This area was chosen because it lies upstream of the confluence with the North Fork of Cement Creek. Active mining is still occurring in the North Fork watershed and this creek contributes significant metals loads to the mainstem of Cement Creek. At site CC-9, the low-flow manganese load was measured at 7.5 lb/day, and the load from all the surface mine-discharges upstream of this site was totaled at 2.4 lb/day. The percentage of the manganese load, contributed by mine-discharge sources at the surface, can be estimated by dividing the total manganese input from mine-discharge sources at the surface upstream by the manganese load at site CC-9. In this case, 32% of the manganese load at low-flow can be attributed to mine-discharge sources at the surface. In the same way, the high-flow manganese load at site CC-9 was measured at 81 lb/day and the load from all the upstream mine-discharge sources at the surface totaled 14.5 lb/day. The percentage of the manganese load that can be attributed to mine-discharge sources at the surface

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at high-flow is estimated at 18%.

Waste rock piles, in general, only affect water quality during snowmelt and runoff events (i.e. high-flow conditions). The data collected to-date indicate that the waste rock piles produce two orders of magnitude more sulfates than the natural outcrops and soils. If the waste rock piles comprise 0.2% (an educated guess) of the total watershed area, this would mean that 20% of the sulfates in runoff comes from the waste rock piles. Extrapolating that further to assume that 20% of the metals come from the waste rock piles, the percentage of metals in the water at site CC-9 at high-flow that are mining-related can be estimated by adding the 20% contribution from waste piles to the 18% from mine drainages. Therefore, about 38% of the metals and sulfates in upper Cement Creek upstream of North Fork is estimated to be contributed by mining-related sources at the surface.

The same method described above can be used to estimate the percentage of metals and sulfates attributable to mining-related sources at the surface for the entire Cement Creek basin. Water quality site CC-31 is the most downstream water quality station monitored by DMG for both low and high-flow above the confluence of Cement Creek and the Animas River. Based on the WQCD data and the lack of mining downstream of this site, data from this site should be representative of the situation at the confluence of Cement Creek with the Animas River. At high-flow, about 24% of the manganese can be attributed to the draining mines upstream of site CC-31. At low-flow, about 29% of the manganese can be attributed to the draining mines upstream. Using the sulfate analogy above for metals contribution from waste piles (20%) and the percentages for metals contribution from draining mines, the percentage contribution from mining-related surface sources is estimated to be about 44% of the metals in Cement Creek during high-flow.

There are two problems with the above estimate of metals contribution from mining-related sources at the surface. The first is that the estimate does not include the impact of the mine drainage from the operating Gold King Mine in the North Fork of Cement Creek. The second is that the water in Cement Creek upstream of Gladstone is being treated by SGC, and a reduction in metals is documented as a result of this system. The first problem will tend to increase the metals load in the creek. The second problem will tend to decrease the metals load in the creek, especially at low-flow.

Another way to estimate the percentage of metals and sulfates attributable to mining-related sources at the surface for the entire Cement Creek basin is to add the manganese load attributable to waste rock piles that can be directly measured by water quality sampling (5% at high-flow, almost negligible at low-flow) to the loads in the surface drainage from the mines (24% at high-flow, 29% at low-flow). These calculations show that about 29% of the load at water quality site CC-31 at low-flow and high-flow can be attributed to mining-related surface sources. To further refine this, if the measured load at site CC-12 from the North Fork is subtracted from the manganese load at site CC-31, the relative contributions from the measured mining-related surface sources is about 33% during low-flow and 30% during high-flow. Detailed modeling of the geochemical and hydrologic conditions in the creek would be necessary to refine these estimates of results of reclaiming the major mining sources of metals to Cement Creek.

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CONCLUSIONS

Based on the analysis of data collected during this investigation, the following conclusions can be made.

1. Upper Cement Creek and Prospect Gulch are the major source areas for zinc and copper.

2. The South Fork of Cement Creek and Cement Creek below Gladstone are principally iron loaders, but also produce considerable zinc.

3. The iron bogs between Gladstone and Georgia Gulch are a major source of iron and contribute a large portion of the natural metal loading to Cement Creek.

4. Table 3 is a brief synopsis of the reclamation recommended at this time at each of the sites discussed in this report. Detailed discussion of these recommended actions is provided in the text.

5. The mine-drainage sources discharging at the surface and waste rock piles in Cement Creek contribute an estimated 29 to 44% of the heavy metals in Cement Creek. The remaining metals load is a combination of natural background inflows and mining-related contaminated groundwater inflows. Groundwater data must be collected before the remaining unknown loading sources can be partitioned into natural versus mining-related groundwater problems.

6. It is estimated that at high-flow, about 44% of the metals in Cement Creek can be attributed to mining-related surface sources, including waste piles and draining mines. If the reclamation activities described in this report for each site were completed, the reduction in loading from the individual sites would vary, but would probably average about 80%. Therefore, if all the reclamation activities described in this report were completed, the overall loading reduction in the Cement Creek basin would be in the range of 35%. Additional reduction of metals, due to geochemical processes in the stream, would further reduce the loading at the mouth of Cement Creek.

7. Reclamation of the mining-related sources at the surface in the Cement Creek watershed is likely to improve water quality visibly upstream of Gladstone. However, downstream of that area, the natural iron springs will continue to make Cement Creek run red.

8. Even if all the mining-related impacts are mitigated, the water quality of Cement Creek will be too poor to support aquatic life.

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9. Reclamation of the mining-related sources in Cement Creek is an important step in accomplishing the goal of improving the water quality in the Animas River. However, because of the high percentage of metals loading from natural sources in this drainage, reclamation of other watersheds in the upper Animas River must also be conducted.

Table 3. Brief Synopsis of Reclamation Actions Recommended at This Time

SITE	RECOMMENDED ACTION		
	Mine Drainage Reclamation	Waste Rock Reclamation	No Action at this time
ROSS BASIN SITES			
Ross Basin Upper Site		X	
Ross Basin Lower Site		X	
Grand Mogul - East Adit	X	X	
Grand Mogul Stope		X	
Mine North of Mogul			X
Queen Anne Mine	X	X	
Columbia Mine and Upper Queen Anne Complex		X	
Mogul Mine	X	X	
Mine South of Mogul	X		
CEMENT CREEK - BONITA PEAK AREA			
Adams Mine			X
Red & Bonita Mine	X	X	
Lead Carbonate Mine and Mill		X	
Black Hawk Mine			X
Unknown Mine South of the Black Hawk Mine		X	
SOUTH FORK AREA			
Big Colorado Mine			X
Silver Ledge Mine	X	X	
PROSPECT GULCH - GEORGIA GULCH AREA			
Upper Prospect Gulch Adit		X	
Galena Queen/ Hercules		X	
Henrietta Mine	X	X	
Lark Mine	X		
Joe & Johns Mine	X	X	
Kansas City Mines		X	
LOWER CEMENT CREEK AREA			
Galty Boy Mine			X
Evelyne Mine	X		
Mammoth Tunnel	X		
BLM Adit Near Fairview Gulch (Elk Tunnel)	X		
Anglo Saxon Mine	X	X	
Gold Hub Mine	X	X	
OTHER SITE OF INTEREST			
Corkscrew Pass Mine		X	

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APPENDIX 1

Cement Creek
Low-Flow
10/1/96
Analytical Results

Site #	Description	PH	Temp	Spec. Cond.	Flow	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.
		(S.U.)	(deg C)	(umhos/cm)	(cfs)	Al	Al	As	As	Ba	Ba	Be	Be	Cd	Cd	Co	Co
						ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
A-68	Silverton Co.	8.35	2.70	273.00	55.00	0.00	69.00	0.00	0.00	22.40	24.90	0.00	0.00	1.10	1.50	0.00	0.00
A-72	Silverton Co. G.S. Gage	7.97	2.40	377.00	127.00	0.00	1530.00	0.00	0.00	20.20	22.30	0.00	0.00	1.20	1.50	0.00	0.00
CC-1	Above Queen Anne	7.05	8.30	189.00	0.08	0.00	40.00	0.00	0.00	26.80	28.20	0.00	0.00	0.80	1.20	0.00	0.00
CC-2	CC Below Queen Anne	5.46	5.00	394.00	0.11	3331.00	3224.00	0.00	0.00	31.00	31.50	0.00	0.00	12.30	11.50	0.00	0.00
CC-3	Background Below Ross Basin	4.47	ND	187.00	0.63	0.00	284.00	0.00	0.00	26.20	26.90	0.00	0.00	2.90	3.30	0.00	0.00
CC-4	CC Below SO-3	4.47	5.90	182.00	0.52	451.00	840.00	0.00	0.00	26.60	28.40	0.00	0.00	10.30	9.40	0.00	0.00
CC-5	CC Above Mogul	4.73	ND	210.00	1.42	699.00	818.00	0.00	0.00	28.00	29.40	0.00	0.00	11.50	7.90	0.00	0.00
CC-6	CC Below Mogul	3.83	ND	225.00	1.84	1149.00	1241.00	0.00	0.00	27.40	29.00	0.00	0.00	11.70	11.10	0.00	0.00
CC-6 DUP		3.83	ND	225.00	1.84	1119.00		0.00	0.00	26.90		0.00	0.00	11.50		0.00	0.00
CC-7	CC Above Ferricrete	4.24	ND	250.00	1.42	1128.00	1114.00	0.00	0.00	23.20	27.50	0.00	0.00	11.10	12.20	0.00	0.00
CC-8	Below North Ferricrete	5.01	5.70	359.00	1.45	1139.00	1108.00	0.00	0.00	23.40	26.00	0.00	0.00	10.20	10.00	0.00	0.00
CC-9	Below Lower Ferricrete	4.32	9.20	361.00	1.79	1418.00	1524.00	0.00	0.00	23.30	26.30	0.00	0.00	11.00	11.10	0.00	0.00
CC-12	North Fork Above CC	2.68	7.60	2090.00	0.20	58773.00	62206.00	4.40	5.20	1.60	2.50	5.30	5.80	100.00	112.00	106.00	116.00
CC-13	Below North Fork	4.54	8.50	376.00	1.15	1788.00	1849.00	0.00	0.00	22.60	25.80	0.00	0.00	11.00	13.50	0.00	0.00
CC-15	Minnehaha	4.24	6.20	190.00	0.05	2772.00	3185.00	0.00	0.00	21.60	25.20	0.00		9.60	11.60	9.30	0.00
CC-16	Minnehaha Above SF	6.46	7.00	143.00	0.16	0.00	46.00	0.00	0.00	10.70	12.90	0.00	0.00	0.00	0.50	0.00	6.80
CC-16 DUP		6.46	7.00	143.00	0.16	0.00		0.00	0.00	10.90		0.00		0.00		0.00	
CC-19	MF Below Blackhawk	6.68	5.10	646.00	0.62	108.00	212.00	0.00	0.00	12.30	13.00	0.00	0.00	1.40	1.50	5.70	0.00
CC-20	MF Above SF	6.87	4.60	580.00	0.44	0.00	291.00	0.00	0.00	12.00	13.00	0.00	0.00	0.90	1.00	0.00	0.00
CC-21	SF Above Silver Ledge	6.32	5.80	180.00	0.38	95.00	492.00	0.00	0.00	9.60	10.20	0.00	0.00	0.00	0.00	0.00	0.00
CC-22	SF Below Silver Ledge	5.71	5.60	658.00	1.36	861.00	2153.00	0.00	0.00	7.80	9.90	0.00	0.00	1.70	2.20	0.00	16.00
CC-23	SF Above CC	5.60	9.50	738.00	2.27	895.00	1957.00	0.00	0.00	9.60	11.10	0.00	0.00	2.20	2.60	16.80	13.30
CC-24	CC Below SF	6.11	8.40	1227.00	4.36	384.00	1445.00	0.00	0.00	10.90	11.90	0.00	0.00	2.00	2.80	7.10	5.80
CC-25	Above Prospect Gulch	5.44	9.50	1071.00	6.50	1256.00	2148.00	0.00	0.00	10.90	10.80	0.00	0.00	1.90	2.60	9.70	7.70
CC-25 DUP		5.44	9.50	1071.00	6.50	1300.00		0.00		10.30		0.00		1.80		13.60	
CC-26	Below Prospect Gulch	4.79	6.50	1119.00	7.09	3195.00	3746.00	0.00	1.60	10.00	10.00	0.00	0.00	2.00	2.60	0.00	14.30
CC-28	CC Below Georgia Gulch	3.86	8.20	772.00	9.49	6042.00	6319.00	3.20	7.50	9.50	9.80	1.30	0.00	1.70	2.30	26.00	17.30
CC-28 DUP		3.86	8.20	772.00	9.49	6286.00		2.50		9.50		0.00		1.80		14.30	
CC-29	CC Above Porcupine Gulch	3.71	8.60	805.00	13.72	5812.00	5882.00	1.10	4.50	9.60	10.60	0.00	0.00	1.90	2.50	13.00	17.20
CC-30	Porcupine Gulch Above CC	4.45	11.30	197.00	0.14	1673.00	2114.00	0.00	0.00	24.60	27.00	0.00	0.00	1.90	2.50	8.00	9.90
CC-31	CC Below Porcupine	3.76	11.00	820.00	11.89	5648.00	5538.00	0.00	4.60	17.90	9.90	1.90	0.00	1.90	2.10	7.90	11.80
CC-33	Cement Creek Above SF	7.90	9.00	1567.00	2.88	369.00	861.00	0.00	0.00	11.70	12.80	0.00	0.00	1.40	2.80	0.00	0.00
CC-48	Cement Creek Gage	4.10	6.60	790.00	17.64	5001.00	5183.00	0.00	2.10	10.60	12.40	0.00	0.00	1.80	2.10	16.30	13.10
M-34	Mineral Creek Gage	7.70	4.00	313.00	51.00	0.00	2222.00	0.00	0.00	22.80	24.20	0.00	0.00	0.80	1.10	7.60	7.60
PG-1	Background-Upper Prospect	4.48	7.00	112.00	0.00	0.00	40.00	0.00	0.00	55.40	62.30	0.00	0.00	0.00	0.00	0.00	6.50
PG-2	Background-Upper Prospect	4.46	6.00	194.00	0.01	244.00	638.00	0.00	0.00	37.50	42.90	0.00	0.00	0.00	0.00	0.00	5.90

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Cement Creek
Low-Flow
10/1/96
Analytical Results

Site #	Description	PH	Temp	Spec. Cond.	Flow	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.
		(S.U.)	(deg C)	(umhos/cm)	(cfs)	Al	Al	As	As	Ba	Ba	Be	Be	Cd	Cd	Co	Co
						ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
PG-3	Below Galena Queen	2.73	6.00	1073.00	0.00	6827.00	6955.00	1.60	2.30	32.70	35.60	0.00	0.00	114.00	111.00	14.60	23.30
PG-4	Background-Upper Prospect	5.46	7.00	585.00	0.00	62.00	482.00	0.00	0.00	40.90	44.40	0.00	0.00	1.40	1.50	0.00	7.60
PG-5	Below Mine Drainages	6.00	6.00	490.00	0.01	98.00	93.00	0.00	0.00	40.40	43.70	0.00	0.00	0.00	0.50	0.00	0.00
PG-6	Tributary Below Hercules	3.62	7.00	256.00	0.00	1903.00	1861.00	0.00	0.00	53.70	56.80	0.00	0.00	4.20	4.30	0.00	11.90
PG-7	Tributary Below Draining Mine	3.67	6.00	575.00	0.00	3268.00	3379.00	0.00	0.00	26.80	36.20	0.00	0.00	1.20	1.50	9.40	17.70
PG-8	Below Upper Mines	3.95	5.00	772.00	0.02	1265.00	1279.00	0.00	0.00	38.20	42.30	0.00	0.00	6.90	7.80	0.00	9.60
PG-9	Below Mineralized Canyon	3.61	4.00	414.00	0.05	1617.00	1920.00	0.00	0.00	38.80	45.90	0.00	0.00	7.20	7.90	0.00	10.50
PG-10	Undisturbed Tributary	3.66	9.20	363.00	0.01	7944.00	8028.00	0.00	0.00	50.00	52.90	0.00	0.00	0.00	0.00	18.80	27.40
PG-11	Above Henrietta 7	3.33	3.00	351.00	0.05	2392.00	2371.00	0.00	0.00	37.20	40.80	0.00	0.00	6.50	6.30	7.30	8.60
PG-16	Below Henrietta 7	3.08	7.30	741.00	0.05	6450.00	6289.00	0.00	1.90	27.50	29.80	0.00	0.00	13.90	12.50	17.00	25.90
PG-18	Above Henrietta 11	2.82	2.00	694.00	0.04	6343.00	6034.00	0.00	0.00	27.60	27.90	0.00	0.00	14.60	12.80	18.70	25.20
SO-1	Queen Anne	6.37	ND	301.00	0.05	105.00	614.00	0.00	0.00	13.80	15.30	0.00	0.00	9.10	10.90	0.00	8.50
SO-3	Grand Mogul	3.43	8.70	510.00	0.02	10029.00	10085.00	0.00	0.00	21.40	22.70	0.00	0.00	88.10	86.70	5.10	13.80
SO-5	Mogul	2.89	ND	1098.00	0.02	5002.00	5243.00	8.80	17.30	5.90	8.80	4.40	4.70	156.00	148.00	17.00	27.30
SO-6	Joe & Johns	2.71	10.00	1350.00	0.00	13450.00	13352.00	23.20	26.10	4.70	5.30	0.00	0.00	52.60	48.20	32.50	35.70
SO-12	Black Hawk Mine	7.29	7.40	1200.00	0.20	0.00	106.00	0.00	0.00	8.60	9.40	0.00	0.00	1.80	2.50	5.40	5.00
SO-13	Silver Ledge	6.28	5.90	1050.00	0.89	768.00	1014.00	1.00	2.10	8.40	10.20	1.30	1.60	2.10	2.40	9.60	17.00
SO-14	Yukon Tunnel	7.08	14.00	953.00	1.21	0.00	427.00	1.00	1.10	15.10	17.90	0.00	0.00	0.00	0.00	0.00	11.60
SO-16	Anglo Saxon	6.61	10.00	1692.00	0.09	338.00	356.00	5.00	8.40	12.40	12.10	2.30	2.20	3.00	3.60	48.00	42.20
SO-17	Big Colorado	4.56	6.10	825.00	0.04	6774.00	7346.00	6.80	8.70	2.40	2.40	1.60	1.80	4.80	6.70	58.50	63.00
SO-18	Mammoth Tunnel	4.90	9.00	1464.00	0.07	1725.00	1758.00	9.20	12.10	4.60	4.80	1.20	1.70	1.30	1.80	22.50	32.10
SO-19	Elk Tunnel	7.05	14.00	1501.00	0.38	0.00	0.00	2.80	3.10	10.60	9.70	0.00	0.00	0.00	0.00	0.00	0.00
SO-20	KC #1 Adit	3.02	2.00	1431.00	0.00	10038.00	9976.00	45.70	54.20	1.70	2.40	1.80	2.50	25.40	35.40	41.60	51.70
SO-23	Porcupine Adit	6.58	12.00	1526.00	0.09	126.00	442.00	2.80	5.20	12.40	12.60	1.00	1.40	2.30	2.40	26.60	36.20
SO-24	Evelyne	3.36	3.00	469.00	0.00	11311.00	10960.00	0.00	0.00	1.30	1.90	1.00	1.00	10.00	9.50	21.80	26.80

000148

Cement Creek
Low-Flow
10/1/96
Analytical Results

Site #	Description	Diss. Cr ug/l	Tot. Cr ug/l	Diss. Cu ug/l	Tot. Cu ug/l	Diss. Fe ug/l	Tot. Fe ug/l	Diss. Mn ug/l	Tot. Mn ug/l	Diss. Ni ug/l	Tot. Ni ug/l	Diss. Pb ug/l	Tot. Pb ug/l	Diss. Sb ug/l	Tot. Sb ug/l	Diss. Se ug/l	Tot. Se ug/l
A-68	Silverton Co.	0.00	0.00	0.00	0.00	28.60	98.50	678.00	672.30	0.00	0.00	0.00	1.40	0.00	0.00	0.00	0.00
A-72	Silverton Co. G.S. Gage	0.00	0.00	4.20	18.20	1156.10	2235.80	599.70	618.60	0.00	0.00	0.00	4.30	0.00	0.00	0.00	0.00
CC-1	Above Queen Anne	0.00	0.00	0.00	6.20	0.00	16.70	1.00	1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CC-2	CC Below Queen Anne	0.00	0.00	114.20	116.00	0.00	104.00	4492.60	4402.90	14.90	11.90	1.40	2.80	0.00	0.00	0.00	0.00
CC-3	Background Below Ross Basin	0.00	0.00	39.80	74.60	0.00	27.00	121.50	120.40	0.00	0.00	0.00	3.60	0.00	0.00	0.00	0.00
CC-4	CC Below SO-3	0.00	0.00	220.20	223.50	5.60	118.70	517.50	521.40	0.00	0.00	2.30	3.30	0.00	0.00	0.00	0.00
CC-5	CC Above Mogul	0.00	0.00	168.60	166.40	0.00	77.10	704.80	690.40	0.00	0.00	3.80	4.60	0.00	0.00	0.00	0.00
CC-6	CC Below Mogul	0.00	0.00	237.70	244.00	33.90	100.70	874.50	884.40	0.00	0.00	3.60	4.80	0.00	0.00	0.00	0.00
CC-6 DUP		0.00	0.00	231.50		31.90		861.40		0.00	0.00	3.80		0.00	0.00	0.00	0.00
CC-7	CC Above Ferricrete	0.00	0.00	202.90	215.10	50.90	113.30	806.90	832.30	0.00	0.00	5.00	5.60	0.00	0.00	0.00	0.00
CC-8	Below North Ferricrete	0.00	0.00	183.40	192.60	29.80	50.90	760.80	792.30	0.00	0.00	5.40	6.30	0.00	0.00	0.00	0.00
CC-9	Below Lower Ferricrete	0.00	0.00	182.30	196.80	46.70	146.80	774.10	812.60	0.00	0.00	6.20	6.40	0.00	0.00	0.00	0.00
CC-12	North Fork Above CC	14.20	18.00	5959.60	6292.60	80355.00	88912.00	10569.50	11208.30	82.20	80.70	1.70	3.50	0.00	0.00	0.00	0.00
CC-13	Below North Fork	9.40	0.00	210.10	217.60	142.40	218.20	832.60	861.90	11.80	0.00	6.10	7.30	0.00	0.00	0.00	0.00
CC-15	Minnehaha	0.00	0.00	242.60	268.40	857.60	3877.00	681.30	728.30	0.00	0.00	108.30	170.70	0.00	0.00	0.00	0.00
CC-16	Minnehaha Above SF	0.00	0.00	0.00	6.30	8.50	67.00	1.30	3.30	0.00	0.00	0.00	1.80	0.00	0.00	0.00	0.00
CC-16 DUP		0.00	0.00	4.00		10.90		1.90		0.00	0.00	0.00		0.00	0.00	0.00	0.00
CC-19	MF Below Blackhawk	0.00	0.00	11.90	13.70	13.40	789.80	717.20	808.10	0.00	0.00	1.80	2.40	0.00	0.00	0.00	0.00
CC-20	MF Above SF	0.00	0.00	0.00	12.90	50.80	720.60	329.90	399.50	0.00	0.00	0.00	1.70	0.00	0.00	0.00	0.00
CC-21	SF Above Silver Ledge	0.00	0.00	7.40	6.50	25.30	120.90	58.80	59.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CC-22	SF Below Silver Ledge	0.00	0.00	11.50	27.10	5207.00	6637.30	1310.50	1276.10	0.00	0.00	0.00	2.50	0.00	0.00	0.00	0.00
CC-23	SF Above CC	8.10	0.00	28.50	29.90	2008.00	3216.90	1645.40	1659.70	0.00	0.00	0.00	2.30	0.00	0.00	0.00	0.00
CC-24	CC Below SF	0.00	0.00	9.10	25.20	868.10	2021.40	1641.30	1671.60	0.00	0.00	0.00	8.40	0.00	0.00	0.00	0.00
CC-25	Above Prospect Gulch	0.00	0.00	14.30	19.70	2831.70	4023.50	1597.30	1646.90	0.00	0.00	1.30	14.50	0.00	0.00	0.00	0.00
CC-25 DUP		0.00		18.40		2931.70		1640.20		0.00	0.00	1.10		0.00	0.00	0.00	0.00
CC-26	Below Prospect Gulch	0.00	4.30	10.00	28.90	7100.70	8599.90	1460.60	1458.90	0.00	0.00	6.70	13.30	0.00	0.00	0.00	0.00
CC-28	CC Below Georgia Gulch	0.00	0.00	34.10	14.40	16868.00	18827.00	1723.00	1732.60	19.90	13.40	10.50	14.70	46.90	0.00	0.00	0.00
CC-28 DUP		0.00	0.00	22.80		17316.00		1782.30		16.20		10.50		0.00	0.00	0.00	0.00
CC-29	CC Above Porcupine Gulch	0.00	0.00	28.80	24.40	11624.00	13694.00	1771.10	1756.20	12.50	0.00	13.50	17.10	0.00	0.00	0.00	0.00
CC-30	Porcupine Gulch Above CC	0.00	0.00	43.70	46.80	92.10	457.80	856.60	869.90	0.00	0.00	1.70	4.60	0.00	0.00	0.00	0.00
CC-31	CC Below Porcupine	0.00	0.00	16.90	26.00	10742.00	12569.00	1592.30	1537.50	16.40	0.00	13.10	15.70	0.00	0.00	0.00	0.00
CC-33	Cement Creek Above SF	0.00	0.00	0.00	23.90	39.40	531.60	1390.90	2050.80	0.00	0.00	0.00	11.90	0.00	0.00	0.00	0.00
CC-48	Cement Creek Gage	0.00	0.00	30.60	26.30	5304.70	7992.60	1543.50	1558.90	16.50	0.00	10.30	12.40	0.00	0.00	0.00	0.00
M-34	Mineral Creek Gage	0.00	0.00	7.90	33.60	1979.70	3244.20	306.60	298.70	0.00	0.00	0.00	5.80	0.00	0.00	0.00	0.00
PG-1	Background-Upper Prospect	0.00	0.00	18.70	25.50	19.70	18.70	24.30	28.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PG-2	Background-Upper Prospect	0.00	0.00	0.00	0.00	209.00	1034.10	164.00	172.30	0.00	0.00	0.90	2.50	0.00	0.00	0.00	0.00

0001146

Cement Creek
Low-Flow
10/1/96
Analytical Results

Site #	Description	Diss. Cr ug/l	Tot. Cr ug/l	Diss. Cu ug/l	Tot. Cu ug/l	Diss. Fe ug/l	Tot. Fe ug/l	Diss. Mn ug/l	Tot. Mn ug/l	Diss. Ni ug/l	Tot. Ni ug/l	Diss. Pb ug/l	Tot. Pb ug/l	Diss. Sb ug/l	Tot. Sb ug/l	Diss. Se ug/l	Tot. Se ug/l
PG-3	Below Galena Queen	0.00	0.00	3087.80	3116.60	17864.00	18050.00	483.10	494.70	18.30	12.40	1011.50	1027.40	0.00	0.00	0.00	0.00
PG-4	Background-Upper Prospect	0.00	0.00	0.00	55.20	0.00	324.10	137.60	149.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PG-5	Below Mine Drainages	0.00	0.00	0.00	0.00	298.30	369.40	64.60	67.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PG-6	Tributary Below Hercules	0.00	0.00	139.50	140.10	955.60	1056.10	246.90	244.90	0.00	0.00	167.10	155.91	0.00	0.00	0.00	0.00
PG-7	Tributary Below Draining Mine	0.00	0.00	125.00	130.60	633.90	802.10	901.20	939.10	10.10	0.00	16.10	17.00	0.00	0.00	0.00	0.00
PG-8	Below Upper Mines	0.00	0.00	180.00	186.00	455.90	552.60	309.50	322.50	0.00	0.00	88.60	72.77	0.00	0.00	0.00	0.00
PG-9	Below Mineralized Canyon	0.00	0.00	178.60	171.20	250.50	919.80	353.10	345.70	11.50	0.00	57.90	62.60	0.00	0.00	0.00	0.00
PG-10	Undisturbed Tributary	0.00	0.00	21.20	22.80	193.30	235.00	1015.40	1035.60	17.50	20.40	41.50	41.20	0.00	0.00	0.00	0.00
PG-11	Above Henrietta 7	0.00	0.00	163.10	162.70	247.10	270.00	414.00	421.80	12.20	0.00	61.40	63.00	0.00	0.00	0.00	0.00
PG-16	Below Henrietta 7	0.00	0.00	689.90	676.90	2630.80	15458.00	783.70	772.50	12.80	16.30	106.90	98.39	0.00	0.00	0.00	0.00
PG-18	Above Henrietta 11	0.00	0.00	639.30	616.80	10672.00	9842.00	770.20	751.30	17.10	13.90	104.60	103.25	0.00	0.00	0.00	0.00
SO-1	Queen Anne	0.00	0.00	83.60	231.60	121.30	1816.60	1223.30	1190.80	0.00	0.00	1.60	81.60	0.00	0.00	0.00	0.00
SO-3	Grand Mogul	0.00	0.00	2562.50	2613.40	726.80	824.30	7071.40	7284.70	11.80	13.10	38.40	39.40	0.00	0.00	0.00	0.00
SO-5	Mogul	0.00	0.00	6453.40	6422.80	48397.00	51192.00	9730.60	9742.70	20.70	15.10	182.30	206.22	0.00	0.00	0.00	0.00
SO-6	Joe & Johns	0.00	0.00	513.40	507.90	62289.00	61740.00	287.90	287.00	32.90	30.20	550.43	531.14	0.00	0.00	0.00	0.00
SO-12	Black Hawk Mine	0.00	0.00	0.00	11.20	49.70	2206.10	2540.60	2742.30	10.10	0.00	0.00	5.90	0.00	0.00	0.00	0.00
SO-13	Silver Ledge	0.00	4.70	0.00	15.70	12750.00	15638.00	2343.20	2405.20	0.00	0.00	0.00	5.20	0.00	0.00	0.00	0.00
SO-14	Yukon Tunnel	0.00	5.20	0.00	20.30	1105.20	3466.10	1048.30	1121.10	0.00	0.00	0.00	2.20	0.00	0.00	0.00	0.00
SO-16	Anglo Saxon	0.00	0.00	14.10	14.30	30827.00	39290.00	9242.50	9173.90	22.40	12.10	0.00	8.90	0.00	0.00	0.00	0.00
SO-17	Big Colorado	0.00	0.00	15.00	25.90	74949.00	78415.00	2210.00	2323.30	36.90	40.10	0.00	1.70	0.00	0.00	0.00	0.00
SO-18	Mammoth Tunnel	0.00	0.00	12.20	44.20	53470.00	53721.00	4416.80	4511.20	19.50	22.50	0.00	0.80	0.00	0.00	0.00	0.00
SO-19	Elk Tunnel	0.00	0.00	0.00	0.00	3487.10	3701.90	1725.80	1687.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO-20	KC #1 Adit	0.00	0.00	2102.70	2137.30	57278.00	61240.00	31600.20	32659.10	30.40	34.80	101.20	124.61	0.00	0.00	0.00	0.00
SO-23	Porcupine Adit	0.00	0.00	0.00	29.30	19888.00	23829.00	11164.00	11094.00	12.30	0.00	0.00	4.40	0.00	0.00	0.00	0.00
SO-24	Evelyne	0.00	0.00	55.70	57.40	14643.00	18266.00	847.60	848.70	16.20	13.80	1.40	1.80	0.00	0.00	0.00	0.00

000154

Cement Creek
Low-Flow
10/1/96
Analytical Results

Site #	Description	Diss. Th ug/l	Tot. Th ug/l	Diss. V ug/l	Tot. V ug/l	Diss. Zn ug/l	Tot. Zn ug/l	Diss. Ca mg/l	Diss. Mg mg/l	Diss. K mg/l	Diss. Na mg/l	HARDNESS	Si mg/l	Cl mg/l	SO4 mg/l
A-68	Silverton Co.	0.00	0.00	0.00	0.00	422.70	431.80	45.97	2.52	0.00	1.93	125.00	3.80	1.53	86.20
A-72	Silverton Co. G.S. Gage	0.00	0.00	0.00	0.00	376.00	416.10	67.65	4.05	0.00	2.53	186.00	4.20	2.01	173.00
CC-1	Above Queen Anne	0.00	0.00	0.00	0.00	225.00	215.20	28.61	2.87	0.00	0.69	83.30	2.00	1.39	68.20
CC-2	CC Below Queen Anne	0.00	0.00	0.00	0.00	2419.00	2260.00	53.87	6.79	0.00	1.13	162.00	4.10	1.28	176.00
CC-3	Background Below Ross Basin	0.00	0.00	0.00	0.00	537.30	517.30	29.33	2.45	0.00	0.85	83.30	1.90	1.26	59.80
CC-4	CC Below SO-3	0.00	0.00	0.00	0.00	2248.40	2136.20	25.37	2.76	0.00	0.91	74.70	1.80	1.22	65.20
CC-5	CC Above Mogul	0.00	0.00	0.00	0.00	2160.40	2007.30	29.21	3.32	0.00	0.83	86.60	2.00	1.20	80.50
CC-6	CC Below Mogul	0.00	0.00	0.00	0.00	2727.70	2614.50	28.80	3.23	0.00	0.90	85.20	2.40	1.21	85.20
CC-6 DUP		0.00	0.00	0.00	0.00	2701.30		28.39	3.22	0.00	0.87	84.10			
CC-7	CC Above Ferricrete	0.00	0.00	0.00	0.00	2447.60	2397.00	35.51	3.12	0.00	1.13	102.00	2.50	1.33	102.00
CC-8	Below North Ferricrete	0.00	0.00	0.00	0.00	2391.60	2372.00	39.99	3.06	0.00	1.18	112.00	3.00	1.20	115.00
CC-9	Below Lower Ferricrete	0.00	0.00	0.00	0.00	2673.20	2618.80	40.51	3.07	1.30	1.68	114.00	3.00	1.21	119.00
CC-12	North Fork Above CC	0.00	0.00	0.00	0.00	19950.00	21932.00	50.79	32.85	0.00	2.95	262.00	21.40	1.20	858.00
CC-13	Below North Fork	0.00	0.00	5.40	0.00	2545.30	2700.30	41.43	3.26	0.00	1.29	117.00	3.50	1.22	125.00
CC-15	Minnehaha	0.00	0.00	0.00	0.00	2328.30	2557.50	19.09	2.45	0.00	1.37	57.80	6.40	1.53	73.30
CC-16	Minnehaha Above SF	0.00	0.00	0.00	0.00	75.50	93.00	22.01	1.64	0.00	0.98	61.70	2.50	1.38	39.00
CC-16 DUP		0.00	0.00	0.00	0.00	78.10		22.15	1.67	0.00	1.22	62.20			
CC-19	MF Below Blackhawk	0.00	0.00	4.80	0.00	298.20	368.70	121.80	6.17	1.50	1.82	330.00	3.80	1.62	303.00
CC-20	MF Above SF	0.00	0.00	0.00	0.00	196.30	236.00	112.10	5.94	0.00	1.82	304.00	3.80	1.31	266.00
CC-21	SF Above Silver Ledge	0.00	0.00	0.00	0.00	47.40	41.00	29.94	1.75	0.00	1.24	82.00	3.40	1.29	66.60
CC-22	SF Below Silver Ledge	0.00	0.00	0.00	3.00	441.00	451.80	124.90	6.12	0.00	2.92	337.00	9.70	1.34	338.00
CC-23	SF Above CC	0.00	0.00	3.60	0.00	690.30	707.10	108.10	5.89	1.40	2.50	294.00	9.90	1.33	289.00
CC-24	CC Below SF	0.00	0.00	0.00	0.00	611.10	659.10	188.10	7.40	1.90	3.13	500.00	6.10	1.37	449.00
CC-25	Above Prospect Gulch	0.00	0.00	0.00	0.00	645.80	706.30	165.90	7.33	0.00	3.13	444.00	8.80	1.39	420.00
CC-25 DUP		0.00	0.00	0.00	0.00	680.80		170.80	7.49	1.30	3.17	457.00			
CC-26	Below Prospect Gulch	0.00	0.00	0.00	0.00	701.90	678.70	150.30	7.52	0.00	3.09	406.00	10.30	1.38	403.00
CC-28	CC Below Georgia Gulch	0.00	0.00	0.00	0.00	833.90	863.50	165.60	8.75	3.30	3.18	450.00	14.90	1.40	465.00
CC-28 DUP		0.00	0.00	0.00	0.00	844.30		169.00	9.00	1.80	3.27	459.00			
CC-29	CC Above Porcupine Gulch	0.00	0.00	0.00	5.10	834.30	881.60	167.00	8.58	2.90	3.38	452.00	15.40	1.46	472.00
CC-30	Porcupine Gulch Above CC	0.00	0.00	3.10	0.00	565.70	590.10	27.67	5.10	0.00	1.69	90.10	8.90	1.35	94.30
CC-31	CC Below Porcupine	0.00	0.00	0.00	0.00	775.50	764.80	163.10	8.35	0.00	3.39	442.00	16.10	1.41	469.00
CC-33	Cement Creek Above SF	0.00	0.00	0.00	0.00	317.80	724.90	264.00	8.49	0.00	3.59	694.00	0.70	1.40	623.00
CC-48	Cement Creek Gage	0.00	0.00	0.00	0.00	653.50	677.40	162.60	8.04	2.90	3.71	439.00	16.70	1.44	469.00
M-34	Mineral Creek Gage	0.00	0.00	0.00	0.00	268.80	286.60	59.56	4.61	1.30	2.63	168.00	4.50	1.55	152.00
PG-1	Background-Upper Prospect	0.00	0.00	0.00	0.00	28.30	21.80	11.79	1.91	0.00	0.93	37.30	1.40	1.16	32.80
PG-2	Background-Upper Prospect	0.00	0.00	0.00	0.00	35.60	44.90	23.63	3.19	0.00	1.04	72.10	2.20	1.27	65.50

000151

Cement Creek
Low-Flow
10/1/96
Analytical Results

Site #	Description	Diss. Th ug/l	Tot. Th ug/l	Diss. V ug/l	Tot. V ug/l	Diss. Zn ug/l	Tot. Zn ug/l	Diss. Ca mg/l	Diss. Mg mg/l	Diss. K mg/l	Diss. Na mg/l	HARDNESS	Si mg/l	Cl mg/l	SO4 mg/l
PG-3	Below Galena Queen	0.00	0.00	0.00	0.00	29211.00	28243.00	13.06	3.98	0.00	1.15	49.00	7.60	1.28	259.00
PG-4	Background-Upper Prospect	0.00	0.00	0.00	3.30	542.40	985.10	88.86	8.26	0.00	1.48	256.00	3.70	1.28	244.00
PG-5	Below Mine Drainages	0.00	0.00	0.00	0.00	195.80	191.20	69.36	6.23	0.00	1.26	199.00	2.90	1.27	185.00
PG-6	Tributary Below Hercules	0.00	0.00	0.00	0.00	841.60	797.20	13.97	2.41	0.00	0.76	44.80	4.10	1.35	58.70
PG-7	Tributary Below Draining Mine	0.00	0.00	0.00	0.00	239.30	231.30	62.50	10.85	0.00	0.58	201.00	4.10	1.81	220.00
PG-8	Below Upper Mines	0.00	0.00	0.00	0.00	1741.20	1720.80	46.37	5.40	0.00	1.02	138.00	3.10	1.34	145.00
PG-9	Below Mineralized Canyon	0.00	0.00	0.00	0.00	1909.70	1750.90	45.25	5.33	0.00	1.03	135.00	3.00	1.35	143.00
PG-10	Undisturbed Tributary	0.00	0.00	0.00	0.00	187.80	171.40	24.93	6.82	0.00	0.39	90.30	4.60	1.25	153.00
PG-11	Above Henrietta 7	0.00	0.00	0.00	0.00	1684.90	1615.40	41.19	5.30	0.00	0.94	125.00	2.90	1.30	141.00
PG-16	Below Henrietta 7	0.00	0.00	0.00	0.00	3125.30	2913.30	40.58	7.03	0.00	0.95	130.00	4.60		
PG-18	Above Henrietta 11	0.00	0.00	0.00	0.00	3253.60	3020.60	37.57	6.84	0.00	0.93	122.00	6.30	1.36	219.00
SO-1	Queen Anne	0.00	0.00	0.00	0.00	2165.40	2027.80	40.60	2.80	0.00	0.98	113.00	2.30	1.21	97.30
SO-3	Grand Mogul	0.00	0.00	0.00	0.00	16895.00	16485.00	21.09	7.87	0.00	0.96	85.10	7.90	1.91	192.00
SO-5	Mogul	0.00	0.00	0.00	0.00	29435.00	28091.00	83.53	4.20	1.00	3.32	226.00	9.50	1.35	449.00
SO-6	Joe & Johns	0.00	0.00	4.30	0.00	10690.00	10135.00	1.88	1.89	0.00	0.28	12.50	23.10	1.23	331.00
SO-12	Black Hawk Mine	0.00	0.00	0.00	0.00	582.90	717.90	259.20	11.35	1.10	3.32	694.00	4.90	1.33	614.00
SO-13	Silver Ledge	0.00	0.00	0.00	3.20	713.50	704.80	216.80	8.98	0.00	3.71	578.00	6.80	1.26	541.00
SO-14	Yukon Tunnel	0.00	0.00	0.00	0.00	98.60	110.10	223.40	6.51	0.00	5.70	585.00	7.50	3.62	504.00
SO-16	Anglo Saxon	0.00	0.00	0.00	0.00	2924.90	2780.50	319.30	20.19	3.50	9.19	880.00	10.70	1.28	813.00
SO-17	Big Colorado	0.00	0.00	7.00	6.70	1086.90	1066.50	113.40	13.01	2.80	3.93	337.00	19.50	1.30	446.00
SO-18	Mammoth Tunnel	0.00	0.00	0.00	0.00	1008.50	978.60	207.00	17.70	2.40	5.06	590.00	16.00	1.29	577.00
SO-19	Elk Tunnel	0.00	0.00	0.00	0.00	186.40	171.70	331.80	6.43	0.00	7.90	855.00	10.50	1.27	741.00
SO-20	KC #1 Adit	0.00	0.00	0.00	0.00	8347.90	8254.00	119.70	12.85	0.00	0.99	352.00	7.10	1.52	600.00
SO-23	Porcupine Adit	0.00	0.00	0.00	0.00	2117.80	2085.10	291.10	16.52	1.30	8.82	795.00	10.90	1.38	724.00
SO-24	Evelyne	0.00	0.00	0.00	0.00	853.60	802.20	4.90	10.50	0.00	2.32	55.50	21.60	1.76	168.00

000152

Cement Creek
Low-Flow
Metals Loading

Site #	Description	Diss. Load Al g/day	Tot. Load Al g/day	Diss. Load As g/day	Tot. Load As g/day	Diss. Load Ba g/day	Tot. Load Ba g/day	Diss. Load Be g/day	Tot. Load Be g/day	Diss. Load Cd g/day	Tot. Load Cd g/day	Diss. Load Co g/day	Tot. Load Co g/day
A-68	Silverton Co.	0.00	9297.75	0.00	0.00	3018.40	3355.28	0.00	0.00	148.23	202.13	0.00	0.00
A-72	Silverton Co. G.S. Gage	0.00	476059.50	0.00	0.00	6285.23	6938.65	0.00	0.00	373.38	466.73	0.00	0.00
CC-1	Above Queen Anne	0.00	7.84	0.00	0.00	5.25	5.53	0.00	0.00	0.16	0.24	0.00	0.00
CC-2	CC Below Queen Anne	914.03	884.67	0.00	0.00	8.51	8.64	0.00	0.00	3.38	3.16	0.00	0.00
CC-3	Background Below Ross Basin	0.00	439.75	0.00	0.00	40.57	41.65	0.00	0.00	4.49	5.11	0.00	0.00
CC-4	CC Below SO-3	578.99	1078.39	0.00	0.00	34.15	36.46	0.00	0.00	13.22	12.07	0.00	0.00
CC-5	CC Above Mogul	2424.97	2837.81	0.00	0.00	97.14	101.99	0.00	0.00	39.90	27.41	0.00	0.00
CC-6	CC Below Mogul	5176.88	5591.39	0.00	0.00	123.45	130.66	0.00	0.00	52.71	50.01	0.00	0.00
CC-6 DUP		5041.71	0.00	0.00	0.00	121.20	0.00	0.00	0.00	51.81	0.00	0.00	0.00
CC-7	CC Above Ferricrete	3927.08	3878.34	0.00	0.00	80.77	95.74	0.00	0.00	38.64	42.47	0.00	0.00
CC-8	Below North Ferricrete	4037.93	3928.03	0.00	0.00	82.96	92.17	0.00	0.00	36.16	35.45	0.00	0.00
CC-9	Below Lower Ferricrete	6225.59	6690.97	0.00	0.00	102.30	115.47	0.00	0.00	48.29	48.73	0.00	0.00
CC-12	North Fork Above CC	28798.77	30480.94	2.16	2.55	0.78	1.23	2.60	2.84	49.00	54.88	51.94	56.84
CC-13	Below North Fork	5046.45	5218.62	0.00	0.00	63.79	72.82	0.00	0.00	31.05	38.10	0.00	0.00
CC-15	Minnehaha	339.57	390.16	0.00	0.00	2.65	3.09	0.00	0.00	1.18	1.42	1.14	0.00
CC-16	Minnehaha Above SF	0.00	18.03	0.00	0.00	4.19	5.06	0.00	0.00	0.00	0.20	0.00	2.67
CC-16 DUP		0.00	0.00	0.00	0.00	4.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CC-19	MF Below Blackhawk	164.32	322.55	0.00	0.00	18.71	19.78	0.00	0.00	2.13	2.28	8.67	0.00
CC-20	MF Above SF	0.00	313.70	0.00	0.00	12.94	14.01	0.00	0.00	0.97	1.08	0.00	0.00
CC-21	SF Above Silver Ledge	88.45	458.05	0.00	0.00	8.94	9.50	0.00	0.00	0.00	0.00	0.00	0.00
CC-22	SF Below Silver Ledge	2868.85	7173.80	0.00	0.00	25.99	32.99	0.00	0.00	5.66	7.33	0.00	53.31
CC-23	SF Above CC	4977.54	10883.86	0.00	0.00	53.39	61.73	0.00	0.00	12.24	14.46	93.43	73.97
CC-24	CC Below SF	4101.89	15435.49	0.00	0.00	116.43	127.12	0.00	0.00	21.36	29.91	75.84	61.96
CC-25	Above Prospect Gulch	20001.80	34206.90	0.00	0.00	173.58	171.99	0.00	0.00	30.26	41.41	154.47	122.62
CC-25 DUP		20702.50	0.00	0.00	0.00	164.03	0.00	0.00	0.00	28.67	0.00	216.58	0.00
CC-26	Below Prospect Gulch	55530.06	65106.60	0.00	27.81	173.80	173.80	0.00	0.00	34.76	45.19	0.00	248.54
CC-28	CC Below Georgia Gulch	140420.31	146857.98	74.37	174.31	220.79	227.76	30.21	0.00	39.51	53.45	604.26	402.06
CC-28 DUP		146091.04	0.00	58 10	0.00	220.79	0.00	0.00	0.00	41.83	0.00	332.34	0.00
CC-29	CC Above Porcupine Gulch	195407.29	197760.78	36 98	151.30	322.76	356.39	0.00	0.00	63.88	84.05	437.08	578.29
CC-30	Porcupine Gulch Above CC	577.94	730.28	0 00	0.00	8.50	9.33	0.00	0.00	0.66	0.86	2.76	3.42
CC-31	CC Below Porcupine	164584.41	161378.98	0 00	134.05	521.61	288.49	55.37	0.00	55.37	61.19	230.21	343.86
CC-33	Cement Creek Above SF	2603.66	6075.22	0 00	0.00	82.56	90.32	0.00	0.00	9.88	19.76	0.00	0.00
CC-48	Cement Creek Gage	216133.22	223998.89	0 00	90.76	458.11	535.90	0.00	0.00	77.79	90.76	704.45	566.16
M-34	Mineral Creek Gage	0.00	277638.90	0 00	0.00	2848.86	3023.79	0.00	0.00	99.96	137.45	949.62	949.62
PG-1	Background-Upper Prospect	0.00	0.08	0.00	0 00	0.11	0.12	0.00	0.00	0.00	0.00	0.00	0.01
PG-2	Background-Upper Prospect	2.99	7.82	0 00	0 00	0.46	0.53	0.00	0.00	0.00	0.00	0.00	0.07
PG-3	Below Galena Queen	20.07	20.45	0.00	0 01	0.10	0.10	0.00	0.00	0.34	0.33	0.04	0.07
PG-4	Background-Upper Prospect	0.12	0.94	0.00	0 00	0 08	0.09	0.00	0.00	0.00	0.00	0.00	0.01
		1.20	1.14	0.00	0 00	0 49	0.54	0.00	0.00	0.00	0.01	0.00	0.00

Low-Flow
Metals Loading

Site #	Description	Diss. Load Al g/day	Tot. Load Al g/day	Diss. Load As g/day	Tot. Load As g/day	Diss. Load Ba g/day	Tot. Load Ba g/day	Diss. Load Be g/day	Tot. Load Be g/day	Diss. Load Cd g/day	Tot. Load Cd g/day	Diss. Load Co g/day	Tot. Load Co g/day
PG-6	Tributary Below Hercules	3.73	3.65	0.00	0.00	0.11	0.11	0.00	0.00	0.01	0.01	0.00	0.02
PG-7	Tributary Below Draining Mine	25.62	26.49	0.00	0.00	0.21	0.28	0.00	0.00	0.01	0.01	0.07	0.14
PG-8	Below Upper Mines	75.00	75.83	0.00	0.00	2.26	2.51	0.00	0.00	0.41	0.46	0.00	0.57
PG-9	Below Mineralized Canyon	202.04	239.90	0.00	0.00	4.85	5.74	0.00	0.00	0.90	0.99	0.00	1.31
PG-10	Undisturbed Tributary	97.31	98.34	0.00	0.00	0.61	0.65	0.00	0.00	0.00	0.00	0.23	0.34
PG-11	Above Henrietta 7	263.72	261.40	0.00	0.00	4.10	4.50	0.00	0.00	0.72	0.69	0.80	0.95
PG-16	Below Henrietta 7	790.13	770.40	0.00	0.23	3.37	3.65	0.00	0.00	1.70	1.53	2.08	3.17
PG-18	Above Henrietta 11	637.15	606.12	0.00	0.00	2.77	2.80	0.00	0.00	1.47	1.29	1.88	2.53
SO-1	Queen Anne	13.63	79.73	0.00	0.00	1.79	1.99	0.00	0.00	1.18	1.42	0.00	1.10
SO-3	Grand Mogul	515.99	518.87	0.00	0.00	1.10	1.17	0.00	0.00	4.53	4.46	0.26	0.71
SO-5	Mogul	294.12	308.29	0.52	1.02	0.35	0.52	0.26	0.28	9.17	8.70	1.00	1.61
SO-6	Joe & Johns	3.30	3.27	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
SO-12	Black Hawk Mine	0.00	51.94	0.00	0.00	4.21	4.61	0.00	0.00	0.88	1.23	2.65	2.45
SO-13	Silver Ledge	1674.62	2211.03	2.18	4.58	18.32	22.24	2.83	3.49	4.58	5.23	20.93	37.07
SO-14	Yukon Tunnel	0.00	1268.98	2.97	3.27	44.87	53.20	0.00	0.00	0.00	0.00	0.00	34.47
SO-16	Anglo Saxon	76.19	80.24	1.13	1.89	2.79	2.73	0.52	0.50	0.68	0.81	10.82	9.51
SO-17	Big Colorado	597.47	647.92	0.60	0.77	0.21	0.21	0.14	0.16	0.42	0.59	5.16	5.56
SO-18	Mammoth Tunnel	304.29	310.11	1.62	2.13	0.81	0.85	0.21	0.30	0.23	0.32	3.97	5.66
SO-19	Elk Tunnel	0.00	0.00	2.63	2.92	9.97	9.13	0.00	0.00	0.00	0.00	0.00	0.00
SO-20	KC #1 Adit	14.76	14.66	0.07	0.08	0.00	0.00	0.00	0.00	0.04	0.05	0.06	0.08
SO-23	Porcupine Adit	28.40	99.63	0.63	1.17	2.79	2.84	0.23	0.32	0.52	0.54	6.00	8.16
SO-24	Evelyne	69.28	67.13	0.00	0.00	0.01	0.01	0.01	0.01	0.06	0.06	0.13	0.16

000154

Cement Creek
Low-Flow
Metals Loading

Site #	Description	Diss. Load Cr g/day	Tot. Load Cr g/day	Diss. Load Cu g/day	Tot. Load Cu g/day	Diss. Load Fe g/day	Tot. Load Fe g/day	Diss. Load Mn g/day	Tot. Load Mn g/day	Diss. Load Ni g/day	Tot. Load Ni g/day	Diss. Load Pb g/day	Tot. Load Pb g/day
A-68	Silverton Co.	0.00	0.00	0.00	0.00	3853.85	13272.88	91360.50	90592.43	0.00	0.00	0.00	188.65
A-72	Silverton Co. G.S. Gage	0.00	0.00	1306.83	5662.93	359720.52	695669.17	186596.66	192477.39	0.00	0.00	0.00	1337.95
CC-1	Above Queen Anne	0.00	0.00	0.00	1.22	0.00	3.27	0.20	0.35	0.00	0.00	0.00	0.00
CC-2	CC Below Queen Anne	0.00	0.00	31.34	31.83	0.00	28.54	1232.77	1208.16	4.09	3.27	0.38	0.77
CC-3	Background Below Ross Basin	0.00	0.00	61.63	115.51	0.00	41.81	188.13	186.43	0.00	0.00	0.00	5.57
CC-4	CC Below SO-3	0.00	0.00	282.69	286.93	7.19	152.39	664.37	669.37	0.00	0.00	2.95	4.24
CC-5	CC Above Mogul	0.00	0.00	584.91	577.27	0.00	267.48	2445.09	2395.14	0.00	0.00	13.18	15.96
CC-6	CC Below Mogul	0.00	0.00	1070.97	1099.35	152.74	453.71	3940.10	3984.71	0.00	0.00	16.22	21.63
CC-6 DUP		0.00	0.00	1043.03	0.00	143.73	0.00	3881.08	0.00	0.00	0.00	17.12	0.00
CC-7	CC Above Ferricrete	0.00	0.00	706.39	748.86	177.21	394.45	2809.18	2897.61	0.00	0.00	17.41	19.50
CC-8	Below North Ferricrete	0.00	0.00	650.18	682.80	105.65	180.45	2697.15	2808.82	0.00	0.00	19.14	22.33
CC-9	Below Lower Ferricrete	0.00	0.00	800.37	864.03	205.03	644.51	3398.61	3567.64	0.00	0.00	27.22	28.10
CC-12	North Fork Above CC	6.96	8.82	2920.20	3083.37	39373.95	43566.88	5179.06	5492.07	40.28	39.54	0.83	1.72
CC-13	Below North Fork	26.53	0.00	592.99	614.15	401.91	615.85	2349.93	2432.63	33.30	0.00	17.22	20.60
CC-15	Minnehaha	0.00	0.00	29.72	32.88	105.06	474.93	83.46	89.22	0.00	0.00	13.27	20.91
CC-16	Minnehaha Above SF	0.00	0.00	0.00	2.47	3.33	26.26	0.51	1.29	0.00	0.00	0.00	0.71
CC-16 DUP		0.00	0.00	1.57	0.00	4.27	0.00	0.74	0.00	0.00	0.00	0.00	0.00
CC-19	MF Below Blackhawk	0.00	0.00	18.11	20.84	20.39	1201.64	1091.18	1229.48	0.00	0.00	2.74	3.65
CC-20	MF Above SF	0.00	0.00	0.00	13.91	54.76	776.81	355.63	430.66	0.00	0.00	0.00	1.83
CC-21	SF Above Silver Ledge	0.00	0.00	6.89	6.05	23.55	112.56	54.74	54.93	0.00	0.00	0.00	0.00
CC-22	SF Below Silver Ledge	0.00	0.00	38.32	90.30	17349.72	22115.48	4366.59	4251.97	0.00	0.00	0.00	8.33
CC-23	SF Above CC	45.05	0.00	158.50	166.29	11167.49	17890.79	9150.89	9230.42	0.00	0.00	0.00	12.79
CC-24	CC Below SF	0.00	0.00	97.21	269.19	9273.04	21592.59	17532.37	17856.03	0.00	0.00	0.00	89.73
CC-25	Above Prospect Gulch	0.00	0.00	227.73	313.72	45094.82	64074.24	25437.00	26226.88	0.00	0.00	20.70	230.91
CC-25 DUP		0.00	0.00	293.02	0.00	46687.32	0.00	26120.19	0.00	0.00	0.00	17.52	0.00
CC-26	Below Prospect Gulch	0.00	74.74	173.80	502.29	123412.30	149468.84	25385.67	25356.12	0.00	0.00	116.45	231.16
CC-28	CC Below Georgia Gulch	0.00	0.00	792.51	334.67	392024.13	437552.66	40043.73	40266.84	462.49	311.43	244.03	341.64
CC-28 DUP		0.00	0.00	529.89	0.00	402435.96	0.00	41421.90	0.00	376.50	0.00	244.03	0.00
CC-29	CC Above Porcupine Gulch	0.00	0.00	968.29	820.36	390814.57	460410.77	59546.77	59045.81	420.27	0.00	453.89	574.93
CC-30	Porcupine Gulch Above CC	0.00	0.00	15.10	16.17	31.82	158.15	295.91	300.51	0.00	0.00	0.59	1.59
CC-31	CC Below Porcupine	0.00	0.00	492.47	757.65	313025.10	366264.43	46400.10	44803.21	477.90	0.00	381.74	457.50
CC-33	Cement Creek Above SF	0.00	0.00	0.00	168.64	278.01	3750.97	9814.19	14470.44	0.00	0.00	0.00	83.97
CC-48	Cement Creek Gage	0.00	0.00	1322.47	1136.63	229258.52	345424.19	66706.98	67372.54	713.10	0.00	445.15	535.90
M-34	Mineral Creek Gage	0.00	0.00	987.11	4198.32	247363.52	405362.79	38309.67	37322.57	0.00	0.00	0.00	724.71
PG-1	Background-Upper Prospect	0.00	0.00	0.04	0.05	0.04	0.04	0.05	0.06	0.00	0.00	0.00	0.00
PG-2	Background-Upper Prospect	0.00	0.00	0.00	0.00	2.56	12.67	2.01	2.11	0.00	0.00	0.01	0.03
PG-3	Below Galena Queen	0.00	0.00	9.08	9.16	52.52	53.07	1.42	1.45	0.05	0.04	2.97	3.02
PG-4	Background-Upper Prospect	0.00	0.00	0.00	0.11	0.00	0.64	0.27	0.29	0.00	0.00	0.00	0.00
PG-5	Below Mine Drainages	0.00	0.00	0.00	0.00	3.65	4.53	0.79	0.83	0.00	0.00	0.00	0.00

000155

Low-Flow
Metals Loading

Site #	Description	Diss. Load Cr g/day	Tot. Load Cr g/day	Diss. Load Cu g/day	Tot. Load Cu g/day	Diss. Load Fe g/day	Tot. Load Fe g/day	Diss. Load Mn g/day	Tot. Load Mn g/day	Diss. Load Ni g/day	Tot. Load Ni g/day	Diss. Load Pb g/day	Tot. Load Pb g/day
PG-6	Tributary Below Hercules	0.00	0.00	0.27	0.27	1.87	2.07	0.48	0.48	0.00	0.00	0.33	0.31
PG-7	Tributary Below Draining Mine	0.00	0.00	0.98	1.02	4.97	6.29	7.07	7.36	0.08	0.00	0.13	0.13
PG-8	Below Upper Mines	0.00	0.00	10.67	11.03	27.03	32.76	18.35	19.12	0.00	0.00	5.25	4.31
PG-9	Below Mineralized Canyon	0.00	0.00	22.32	21.39	31.30	114.93	44.12	43.20	1.44	0.00	7.23	7.82
PG-10	Undisturbed Tributary	0.00	0.00	0.26	0.28	2.37	2.88	12.44	12.69	0.21	0.25	0.51	0.50
PG-11	Above Henrietta 7	0.00	0.00	17.98	17.94	27.24	29.77	45.64	46.50	1.35	0.00	6.77	6.95
PG-16	Below Henrietta 7	0.00	0.00	84.51	82.92	322.27	1893.61	96.00	94.63	1.57	2.00	13.10	12.05
PG-18	Above Henrietta 11	0.00	0.00	64.22	61.96	1072.00	988.63	77.37	75.47	1.72	1.40	10.51	10.37
SO-1	Queen Anne	0.00	0.00	10.86	30.07	15.75	235.89	158.85	154.63	0.00	0.00	0.21	10.60
SO-3	Grand Mogul	0.00	0.00	131.84	134.46	37.39	42.41	363.82	374.80	0.61	0.67	1.98	2.03
SO-5	Mogul	0.00	0.00	379.46	377.66	2845.74	3010.09	572.16	572.87	1.22	0.89	10.72	12.13
SO-6	Joe & Johns	0.00	0.00	0.13	0.12	15.26	15.13	0.07	0.07	0.01	0.01	0.13	0.13
SO-12	Black Hawk Mine	0.00	0.00	0.00	5.49	24.35	1080.99	1244.89	1343.73	4.95	0.00	0.00	2.89
SO-13	Silver Ledge	0.00	10.25	0.00	34.23	27801.38	34098.66	5109.35	5244.54	0.00	0.00	0.00	11.34
SO-14	Yukon Tunnel	0.00	15.45	0.00	60.33	3284.49	10300.73	3115.39	3331.74	0.00	0.00	0.00	6.54
SO-16	Anglo Saxon	0.00	0.00	3.18	3.22	6948.41	8855.97	2083.26	2067.80	5.05	2.73	0.00	2.01
SO-17	Big Colorado	0.00	0.00	1.32	2.28	6610.50	6916.20	194.92	204.92	3.25	3.54	0.00	0.15
SO-18	Mammoth Tunnel	0.00	0.00	2.15	7.80	9432.11	9476.38	779.12	795.78	3.44	3.97	0.00	0.14
SO-19	Elk Tunnel	0.00	0.00	0.00	0.00	3280.66	3482.75	1623.63	1587.79	0.00	0.00	0.00	0.00
SO-20	KC #1 Adit	0.00	0.00	3.09	3.14	84.20	90.02	46.45	48.01	0.04	0.05	0.15	0.18
SO-23	Porcupine Adit	0.00	0.00	0.00	6.60	4482.76	5371.06	2516.37	2500.59	2.77	0.00	0.00	0.99
SO-24	Evelyne	0.00	0.00	0.34	0.35	89.69	111.88	5.19	5.20	0.10	0.08	0.01	0.01

Cement Creek
Low-Flow
Metals Loading

Site #	Description	Diss. Load Sb g/day	Tot. Load Sb g/day	Diss. Load Se g/day	Tot. Load Se g/day	Diss. Load Th g/day	Tot. Load Th g/day	Diss. Load V g/day	Tot. Load V g/day	Diss. Load Zn g/day	Tot. Load Zn g/day
A-68	Silverton Co.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56958.83	58185.05
A-72	Silverton Co. G.S. Gage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	116992.40	129469.52
CC-1	Above Queen Anne	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.10	42.18
CC-2	CC Below Queen Anne	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	663.77	620.14
CC-3	Background Below Ross Basin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	831.96	800.99
CC-4	CC Below SO-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2886.50	2742.45
CC-5	CC Above Mogul	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7494.86	6963.73
CC-6	CC Below Mogul	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12289.79	11779.76
CC-6 DUP		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12170.84	0.00
CC-7	CC Above Ferricrete	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8521.20	8345.04
CC-8	Below North Ferricrete	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8478.58	8409.10
CC-9	Below Lower Ferricrete	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11736.42	11497.58
CC-12	North Fork Above CC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9775.50	10746.68
CC-13	Below North Fork	0.00	0.00	0.00	0.00	0.00	0.00	15.24	0.00	7183.85	7621.33
CC-15	Minnehaha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	285.22	313.29
CC-16	Minnehaha Above SF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.60	36.46
CC-16 DUP		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.62	0.00
CC-19	MF Below Blackhawk	0.00	0.00	0.00	0.00	0.00	0.00	7.30	0.00	453.70	560.96
CC-20	MF Above SF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	211.61	254.41
CC-21	SF Above Silver Ledge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.13	38.17
CC-22	SF Below Silver Ledge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	1469.41	1505.40
CC-23	SF Above CC	0.00	0.00	0.00	0.00	0.00	0.00	20.02	0.00	3839.10	3932.54
CC-24	CC Below SF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6527.77	7040.51
CC-25	Above Prospect Gulch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10284.37	11247.83
CC-25 DUP		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10841.74	0.00
CC-26	Below Prospect Gulch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12199.23	11796.01
CC-28	CC Below Georgia Gulch	1089.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19380.42	20068.34
CC-28 DUP		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19622.12	0.00
CC-29	CC Above Porcupine Gulch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	171.47	28050.29	29640.58
CC-30	Porcupine Gulch Above CC	0.00	0.00	0.00	0.00	0.00	0.00	1.07	0.00	195.42	203.85
CC-31	CC Below Porcupine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22598.30	22286.50
CC-33	Cement Creek Above SF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2242.40	5114.89
CC-48	Cement Creek Gage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28242.96	29275.87
M-34	Mineral Creek Gage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33586.56	35810.67
PG-1	Background-Upper Prospect	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.04
PG-2	Background-Upper Prospect	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.55
PG-3	Below Galena Queen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	85.88	83.03
PG-4	Background-Upper Prospect	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	1.06	1.93
PG-5	Below Mine Drainages	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.34

000157

Low-Flow
Metals Loading

Site #	Description	Diss. Load Sb g/day	Tot. Load Sb g/day	Diss. Load Se g/day	Tot. Load Se g/day	Diss. Load Th g/day	Tot. Load Th g/day	Diss. Load V g/day	Tot. Load V g/day	Diss. Load Zn g/day	Tot. Load Zn g/day
PG-6	Tributary Below Hercules	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.65	1.56
PG-7	Tributary Below Draining Mine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.88	1.81
PG-8	Below Upper Mines	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	103.24	102.03
PG-9	Below Mineralized Canyon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	238.62	218.77
PG-10	Undisturbed Tributary	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.30	2.10
PG-11	Above Henrietta 7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	185.76	178.10
PG-16	Below Henrietta 7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	382.85	356.88
PG-18	Above Henrietta 11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	326.82	303.42
SO-1	Queen Anne	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	281.18	263.31
SO-3	Grand Mogul	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	869.25	848.15
SO-5	Mogul	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1730.78	1651.75
SO-6	Joe & Johns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.62	2.48
SO-12	Black Hawk Mine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	285.62	351.77
SO-13	Silver Ledge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.98	1555.79	1536.82
SO-14	Yukon Tunnel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	293.02	327.20
SO-16	Anglo Saxon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	659.27	626.72
SO-17	Big Colorado	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.59	95.86	94.07
SO-18	Mammoth Tunnel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	177.90	172.63
SO-19	Elk Tunnel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	175.37	161.54
SO-20	KC #1 Adit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.27	12.13
SO-23	Porcupine Adit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	477.35	469.98
SO-24	Evelyne	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.23	4.91

000158

APPENDIX 2

Cement Creek
February 25, 1997 Sampling

Site #	Flow	pH	Cond.	Temp.	Tot. As	Diss. As	Tot. Cd	Diss. Cd	Tot. Pb	Diss. Pb	Tot. Se	Diss. Se	Tot. Th	Diss. Th
	cfs	s.u.	umhos/cm	Deg C	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
PG-19	0.2	3.84	779	2	43	44.9	4.3	3.8	4.2	4.4	0	0	1.1	1.1
CC-23	1.151	5.01	890	2	0	0	4.1	3.3	4.6	1.2	0	0	0	0
CC-24	2.58	6.5	1143	3	0	0	4.2	3.1	17.9	0.8	0	0	0	0
CC-25	3.476	4.77	1337	2	0	0	3.1	2.6	25.5	14.9	0	0	0	0
CC-26	4.532	4.41	1270	3	3.8	0	3	2.5	32.8	17.1	0	0	0	0
CC-29	7.405	3.56	1360	6	8.6	1.7	2.5	2	22.6	20.2	0	0	0	0
CC-30	0.03	6.26	1840	5	6	0	2.7	2	8.4	0	0	0	0	0
CC-31	7.589	3.46	1370	2	7.9	2.1	2.5	2.1	19.4	20	0	0	0	0
CC-33	1.49	6.55	1723	3	0	0	3.7	3	17.7	0	0	0	0	0
RB-1					0	0	0	0	0	0	0	0	0	0
CC-24						0		3.5		0.8		0		0
CC-31						1.6		2.2		20.1		0		0

Site #	Tot. Al	Diss. Al	Tot. Sb	Diss. Sb	Tot. Ba	Diss. Ba	Tot. Be	Diss. Be	Tot. Cr	Diss. Cr	Tot. Co	Diss. Co	Tot. Cu	Diss. Cu
	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
PG-19	21210	20770	0	0	7	6	3	1	0	0	38	37	44	35
CC-23	3106	1859	0	0	11	11	3	1	0	0	20	21	49	31
CC-24	1923	969	0	0	10	10	2	0	0	0	10	11	44	15
CC-25	4195	3637	0	0	9	9	3	1	0	0	15	13	37	26
CC-26	5764	5059	0	0	9	8	3	1	0	0	18	12	49	31
CC-29	7501	7500	62	0	10	8	6	1	8	0	29	18	39	22
CC-30	671	0	0	0	13	11	5	0	0	0	34	34	70	0
CC-31	7375	7365	0	0	8	8	4	1	5	0	23	21	37	23
CC-33	940	329	0	0	8	8	3	0	0	0	0	7	45	4
RB-1	0	0	0	0	0	0	3	0	0	0	0	0	11	0
CC-24		921		0		9		0		0		7		11
CC-31		7507		0		8		1		0		17		24

000160

Cement Creek
February 25, 1997 Sampling

Site #	Tot. As	Diss. As	Tot. Cd	Diss. Cd	Tot. Pb	Diss. Pb	Tot. Se	Diss. Se	Tot. Th	Diss. Th	Tot. Al	Diss. Al	Tot. Sb	Diss. Sb
	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day
PG-19	21.0	22.0	2.1	1.9	2.1	2.2	0.0	0.0	0.5	0.5	10382.7	10167.3	0.0	0.0
CC-23	0.0	0.0	11.6	9.3	13.0	3.4	0.0	0.0	0.0	0.0	8750.2	5237.1	0.0	0.0
CC-24	0.0	0.0	26.5	19.6	113.0	5.1	0.0	0.0	0.0	0.0	12143.3	6119.0	0.0	0.0
CC-25	0.0	0.0	26.4	22.1	216.9	126.8	0.0	0.0	0.0	0.0	35690.3	30943.0	0.0	0.0
CC-26	42.2	0.0	33.3	27.7	363.8	189.7	0.0	0.0	0.0	0.0	63937.1	56116.9	0.0	0.0
CC-29	155.9	30.8	45.3	36.2	409.6	366.1	0.0	0.0	0.0	0.0	135951.3	135933.1	1123.7	0.0
CC-30	0.4	0.0	0.2	0.1	0.6	0.0	0.0	0.0	0.0	0.0	49.3	0.0	0.0	0.0
CC-31	146.7	39.0	46.4	39.0	360.4	371.5	0.0	0.0	0.0	0.0	136989.0	136803.2	0.0	0.0
CC-33	0.0	0.0	13.5	10.9	64.6	0.0	0.0	0.0	0.0	0.0	3428.1	1199.8	0.0	0.0
RB-1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CC-24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CC-31	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Site #	Tot. Ba	Diss. Ba	Tot. Be	Diss. Be	Tot. Cr	Diss. Cr	Tot. Co	Diss. Co	Tot. Cu	Diss. Cu	Tot. Fe	Diss. Fe	Tot. Mn	Diss. Mn
	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day
PG-19	3.4	2.9	1.5	0.5	0.0	0.0	18.6	18.1	21.5	17.1	27765.5	26713.0	400.4	384.3
CC-23	31.0	31.0	8.5	2.8	0.0	0.0	56.3	59.2	138.0	87.3	16136.8	8119.1	8682.5	8136.0
CC-24	63.1	63.1	12.6	0.0	0.0	0.0	63.1	69.5	277.9	94.7	17043.6	8556.5	15155.5	14511.4
CC-25	76.6	76.6	25.5	8.5	0.0	0.0	127.6	110.6	314.8	221.2	84584.8	67586.2	17798.4	16207.4
CC-26	99.8	88.7	33.3	11.1	0.0	0.0	199.7	133.1	543.5	343.9	161839.4	125677.9	23272.0	20698.6
CC-29	181.2	145.0	108.7	18.1	145.0	0.0	525.6	326.2	706.9	398.7	399462.2	297421.7	38061.3	32533.3
CC-30	1.0	0.8	0.4	0.0	0.0	0.0	2.5	2.5	5.1	0.0	2124.3	564.8	826.8	737.9
CC-31	148.6	148.6	74.3	18.6	92.9	0.0	427.2	390.1	687.3	427.2	344190.6	291252.5	38431.2	36183.7
CC-33	29.2	29.2	10.9	0.0	0.0	0.0	0.0	25.5	164.1	14.6	1714.0	43.8	6936.4	5784.0
RB-1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CC-24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CC-31	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

000161

Cement Creek
February 25, 1997 Sampling

Site #	Tot. Ni g/day	Diss. Ni g/day	Tot. Va g/day	Diss. Va g/day	Tot.Zn g/day	Diss. Zn g/day	Diss. Ca g/day	Diss. Mg g/day	Diss. K g/day	Diss. Na g/day
PG-19	16.2	15.7	12.2	10.8	530.6	528.2	15.6	4.4	1.9	0.7
CC-23	0.0	0.0	0.0	0.0	3298.9	3186.2	490.2	24.8	0.0	9.9
CC-24	0.0	0.0	0.0	0.0	6769.5	6453.7	2046.0	64.4	0.0	29.6
CC-25	110.6	102.1	0.0	0.0	8507.8	7912.3	1863.2	81.6	0.0	33.8
CC-26	133.1	166.4	44.4	0.0	11425.3	18091.8	2251.8	100.6	0.0	41.0
CC-29	0.0	308.1	163.1	0.0	19012.5	16819.5	3751.8	178.7	36.6	74.1
CC-30	0.0	1.2	0.0	0.0	170.1	124.0	21.4	1.2	0.2	0.6
CC-31	0.0	297.2	111.4	0.0	18073.3	17757.5	3900.7	189.5	42.0	74.9
CC-33	0.0	0.0	0.0	0.0	3395.3	2746.1	1633.8	40.1	0.0	19.8
RB-1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CC-24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CC-31	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

000162

APPENDIX 3

Cement Creek
High-Flow
June 25-26, 1997
Analytical Results

Site Id	Description	pH s.u.	Cond. umhos/cm	Flow cfs	Diss. As ug/l	Tot. As ug/l	Diss. Cd ug/l	Tot. Cd ug/l	Diss. Pb ug/l	Tot. Pb ug/l	Diss. Se ug/l	Tot. Se ug/l	Diss. Th ug/l	Tot. Th ug/l	Diss. Al ug/l
CC-1	Above Queen Anne	5.57	87	1.300	BDL	BDL	BDL	BDL	2.5	3.5	BDL	BDL	BDL	BDL	BDL
CC-2	CC Below Queen Anne	5.43	82	4.610	BDL	BDL	BDL	0.5	1.8	3.8	BDL	BDL	BDL	BDL	BDL
CC-3	Background Below Ross Basin	6.70	90	5.969	BDL	BDL	1.9	2.5	6.5	12.4	BDL	BDL	BDL	BDL	52
CC-4	CC Below SO-3	6.38	120	6.999	BDL	BDL	4.6	5.8	6.5	13.7	BDL	BDL	BDL	BDL	440
CC-5	CC Above Mogul	4.91	124	18.918	BDL	BDL	3.2	4.1	2.7	8.4	BDL	BDL	BDL	BDL	161
CC-6	CC Below Mogul	5.16	192	24.850	BDL	BDL	3.9	4.6	4.9	9.8	BDL	BDL	BDL	BDL	377
CC-7	CC Above Ferricrete	5.27	87	29.983	BDL	BDL	3.5	4.4	4.5	8	BDL	BDL	BDL	BDL	330
CC-8	Below North Ferricrete	4.18	105	40.647	BDL	BDL	2.8	3.4	4.2	6.8	BDL	BDL	BDL	BDL	475
CC-9	Below Lower Ferricrete	4.52	84	34.555	BDL	BDL	2.7	3.3	4	5.7	BDL	BDL	BDL	BDL	466
CC-12	North Fork Above CC	2.71	612	1.225	25.2	9.7	38	4.4	3.7	4.4	BDL	BDL	BDL	BDL	15210
CC-13	Below North Fork	3.30	176	37.072	2	3.2	6	6.4	4.9	6.4	BDL	BDL	BDL	BDL	2215
CC-14	Minnehaha Background	5.59	107	2.607	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
CC-15	Minnehaha Below Lead Carbonate	5.65	109	2.508	BDL	BDL	0.7	0.8	4.4	12.9	BDL	BDL	BDL	BDL	96
CC-16	Minnehaha Above SF	5.64	124	4.438	BDL	BDL	0.5	0.5	1.5	3.9	BDL	BDL	BDL	BDL	65
CC-17	Middle Fork Above Mine Blockage	5.04	70	0.800	BDL	BDL	BDL	BDL	0.8	1.3	BDL	BDL	BDL	BDL	BDL
CC-19	MF Below Blackhawk	5.15	194	2.010	BDL	BDL	2.1	1.3	1.2	1.6	BDL	BDL	BDL	BDL	141
CC-20	MF Above SF	5.49	349	5.610	BDL	BDL	0.8	1.1	BDL	1.4	BDL	BDL	BDL	BDL	48
CC-21	SF Above Silver Ledge	5.59	106	17.896	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	66
CC-22	SF Below Silver Ledge	4.93	220	20.104	BDL	BDL	1.1	1.6	BDL	5.7	BDL	BDL	BDL	BDL	377
CC-23	SF Above CC	4.90	190	31.701	BDL	BDL	1.2	1.2	BDL	3.7	BDL	BDL	BDL	BDL	92
CC-24	CC Below SF	3.62	230	64.460	BDL	BDL	4	3.6	6.9	9.2	BDL	BDL	BDL	BDL	1247
CC-25	CC Above Prospect Gulch	3.76	217	59.440	BDL	BDL	3.6	3.4	12.3	14.1	BDL	BDL	BDL	BDL	1394
CC-26	CC Below Prospect	3.36	230	89.435	BDL	BDL	3.6	3.1	17.3	18.4	BDL	BDL	BDL	BDL	1466
CC-27	Georgia Gulch Above Confluence	5.09	136	7.018	BDL	BDL	1.4	1.2	BDL	1	BDL	BDL	BDL	BDL	BDL
CC-28	CC Below Georgia Gulch	3.54	255	109.379	BDL	1.3	3.2	2.4	17	18.6	BDL	BDL	BDL	BDL	1751
CC-29	CC Above Porcupine Gulch	3.60	200	111.200	BDL	1.4	3.4	3.6	15.2	17.6	BDL	BDL	BDL	BDL	1546
CC-30	Porcupine Gulch Above CC	4.85	440	3.951	BDL	BDL	0.9	0.8	6.6	22.5	BDL	BDL	BDL	BDL	75
CC-31	CC Below Porcupine	3.93	203	116.797	BDL	1.3	3.2	4	15.6	16.5	BDL	BDL	BDL	BDL	1507
CC-32	Below Hurricane Mine Complex	4.05	183	1.043	BDL	BDL	8.1	4.3	5	4.3	BDL	BDL	BDL	BDL	1977
CC-33	CC Below Sunnyside Ponds	2.96	271	33.442	1.8	2.2	7.9	9.5	11.1	12.8	BDL	BDL	BDL	BDL	2217
PG-1	Background-Upper Prospect	6.14	32	0.187	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
PG-2	Background-Upper Prospect	5.52	60	0.403	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	71
PG-3	Below Galena Queen	3.77	90	0.334	1.3	3.3	11	10	62.3	59.3	BDL	BDL	BDL	BDL	300
PG-4	Background-Upper Prospect	5.97	200	0.537	BDL	BDL	1.3	1.3	BDL	BDL	BDL	BDL	BDL	BDL	240
PG-5	Below Mine Drainages	5.66	329	0.485	BDL	BDL	1	0.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL
PG-6	Tributary Below Hercules	4.35	40	0.562	BDL	1.1	1.2	1	15.1	15.1	BDL	BDL	BDL	BDL	316
PG-7	Tributary Below Draining Mine	4.67	308	0.124	BDL	BDL	0.9	0.7	16.1	16.3	BDL	BDL	BDL	BDL	666

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Site Id	Description	pH s.u.	Cond. umhos/cm	Flow cfs	Diss. As ug/l	Tot. As ug/l	Diss. Cd ug/l	Tot. Cd ug/l	Diss. Pb ug/l	Tot. Pb ug/l	Diss. Se ug/l	Tot. Se ug/l	Diss. Th ug/l	Tot. Th ug/l	Diss. Al ug/l
PG-8	Below Upper Mines	4.93	90	2.850	BDL	BDL	2.3	2.6	5.5	14.1	BDL	BDL	BDL	BDL	64
PG-9	Below Mineralized Canyon	5.81	166	3.079	BDL	BDL	2.1	2.2	5.8	14.7	BDL	BDL	BDL	BDL	72
PG-10	Undisturbed Tributary	3.60	98	1.021	BDL	BDL	2	BDL	5.7	17.3	BDL	BDL	BDL	BDL	52
PG-11	Above Henrietta 7	4.52	90	4.220	BDL	3.1	1.6	1.6	16.3	137	BDL	BDL	BDL	BDL	626
PG-12	Spring	3.93	33	0.106	BDL	133	1	1.6	4	1511	BDL	4.1	BDL	1.6	168
PG-13	Spring	4.35	70	0.002	BDL	BDL	1.9	2.1	7.3	6.7	BDL	BDL	BDL	BDL	1488
PG-14	Tributary Below Lark & Mine Waste	2.74	330	0.095	BDL	16.4	9	10	20.8	165	BDL	BDL	BDL	BDL	1456
PG-15	Below Henrietta 7	3.97	130	5.262	BDL	2.6	2.6	2.7	19.4	20.3	BDL	BDL	BDL	BDL	812
PG-16	Below Tributary PG14	3.04	150	5.360	1	2.9	3.4	3.4	29.5	88.2	BDL	BDL	BDL	BDL	918
PG-17	Below Joe & Johns Tributary	2.54	530	0.014	2.3	3.1	21	21	164	157	BDL	BDL	BDL	BDL	2923
PG-18	Above Henrietta 11	3.47	150	6.600	1.3	*	2.7	*	24.7	*	BDL	*	BDL	*	951
PG-18	Above Henrietta 11	3.47	150	6.600	1.1	*	3.1	*	25.2	*	BDL	*	BDL	*	946
PG-19	Prospect Gulch Above Confluence	3.01	193	9.956	2	2.7	3.4	4.2	47.7	51.9	BDL	BDL	BDL	BDL	1820
PG-20	Tributary Above Hercules	3.81	41	0.381	BDL	BDL	BDL	BDL	2.9	5.7	BDL	BDL	BDL	BDL	161
SO-1	Queen Anne Mine	6.26	144	0.083	BDL	BDL	4	5.2	9.1	44.5	BDL	BDL	BDL	BDL	46
SO-2	Lark Mine	2.71	60	0.012	142	136	242	226	1117	1034	BDL	BDL	BDL	BDL	3532
SO-3	Grand Mogul	3.34	294	1.356	BDL	1.4	20	18	29.3	30.6	BDL	BDL	BDL	BDL	2020
SO-4	Henrietta 7 Mine	2.80	49	0.101	38	36.4	16	14	6.3	6.3	1.2	2	BDL	BDL	2238
SO-5	Mogul	2.61	722	0.060	9.1	7.8	119	98	259	200	BDL	BDL	BDL	BDL	3695
SO-6	Joe & Johns	2.92	80	0.034	111	98.4	63	59	1538	1434	BDL	BDL	BDL	1.3	8439
SO-7	Mine South of Mogul	3.00	706	0.030	12.2	13	28	28	54.3	51.3	BDL	BDL	BDL	BDL	5912
SO-8	Red & Bonita Mine	3.01	879	0.013	BDL	BDL	97	101	110	143	BDL	BDL	BDL	BDL	11270
SO-12	Black Hawk Mine	nd	nd	0.845	BDL	BDL	0.9	1.3	BDL	2.4	BDL	BDL	BDL	BDL	BDL
SO-13	Silver Ledge	6.14	560	2.456	1	2.6	7	6	9.2	36.1	BDL	BDL	BDL	BDL	2877
SO-14	Yukon Tunnel	6.72	997	1.210	BDL	BDL	BDL	BDL	BDL	2.4	BDL	BDL	BDL	BDL	BDL
SO-16	Anglo Saxon	6.63	1510	0.131	5.7	6.7	4.9	4.8	3.8	9.1	BDL	BDL	BDL	BDL	348
SO-17	Big Colorado	5.24	685	0.015	X	7.5	X	3.3	X	1.3	X	BDL	X	BDL	X
SO-18	Mammoth Tunnel	5.76	982	0.065	6.8	10	2.9	1.9	1.5	BDL	BDL	BDL	BDL	BDL	7159
SO-19	Adit Below Georgia Gulch	7.05	1257	0.385	3.6	3.5	BDL	BDL	BDL	0.9	BDL	BDL	BDL	BDL	BDL
SO-20	Kansas City Adit #1	6.44	166	0.022	BDL	7.6	1.4	2.3	10.5	140	BDL	BDL	BDL	BDL	BDL
SO-21	Kansas City Adit #2	6.11	270	0.021	BDL	BDL	9	10	2.2	14.6	BDL	BDL	BDL	BDL	62
SO-23	Porcupine Gulch Adit	6.43	1359	0.120	2.3	4.1	4.2	4.1	BDL	11.4	BDL	BDL	BDL	BDL	475
SO-24	Dry Gulch Adit (Evelyne)	3.31	450	0.130	BDL	1.3	10	12	3.2	2.8	BDL	BDL	BDL	BDL	11290
DG-1	Deer Gulch	7.10	80	nd	BDL	BDL	BDL	BDL	BDL	0.9	BDL	BDL	BDL	BDL	BDL
EP-1	Elk Park	7.30	120	nd	BDL	BDL	0.8	0.8	BDL	8.1	BDL	BDL	BDL	BDL	BDL
KC-1	Kendall Creek	8.10	60	nd	BDL	BDL	BDL	BDL	BDL	0.8	BDL	BDL	BDL	BDL	BDL
UK-1	1st East Trib south of Deer Creek	7.70	20	nd	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	81
SO-18	Duplicate			0.065	6.9		1.5		BDL		BDL		BDL		1780
	* Bottle leaked during transport														

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Site Id	Description	Tot. Al ug/l	Diss. Sb ug/l	Tot. Sb ug/l	Diss. Ba ug/l	Tot. Ba ug/l	Diss. Be ug/l	Tot. Be ug/l	Diss. Ca mg/l	Diss. Cr ug/l	Tot. Cr ug/l	Diss. Co ug/l	Tot. Co ug/l	Diss. Cu ug/l	Tot. Cu ug/l
CC-1	Above Queen Anne	43	BDL	BDL	12	13	BDL	BDL	11.7	BDL	5	BDL	BDL	BDL	BDL
CC-2	CC Below Queen Anne	59	BDL	BDL	12	13	BDL	BDL	11.9	BDL	BDL	BDL	BDL	BDL	BDL
CC-3	Background Below Ross Basin	306	BDL	BDL	17	18	BDL	BDL	15	BDL	BDL	BDL	BDL	40	59
CC-4	CC Below SO-3	676	BDL	BDL	16	17	BDL	BDL	13.4	BDL	BDL	BDL	BDL	174	180
CC-5	CC Above Mogul	553	BDL	BDL	16	18	BDL	BDL	14.1	BDL	BDL	BDL	BDL	78	90
CC-6	CC Below Mogul	706	BDL	BDL	16	18	BDL	BDL	13.9	BDL	BDL	BDL	BDL	110	118
CC-7	CC Above Ferricrete	658	BDL	BDL	15	17	BDL	BDL	13.4	BDL	5	BDL	BDL	95	104
CC-8	Below North Ferricrete	670	BDL	BDL	18	20	BDL	BDL	12	BDL	7	BDL	BDL	84	87
CC-9	Below Lower Ferricrete	709	BDL	BDL	18	19	BDL	BDL	11.9	BDL	BDL	BDL	BDL	82	87
CC-12	North Fork Above CC	15660	BDL	BDL	10	12	BDL	1	14.9	BDL	BDL	34	36	2349	2398
CC-13	Below North Fork	2478	BDL	BDL	17	19	BDL	BDL	11.8	BDL	BDL	7	BDL	333	353
CC-14	Minnehaha Background	53	BDL	BDL	16	17	BDL	BDL	15.8	BDL	BDL	BDL	BDL	BDL	BDL
CC-15	Minnehaha Below Lead Carbonate	337	BDL	BDL	16	18	BDL	BDL	15	BDL	BDL	BDL	BDL	15	34
CC-16	Minnehaha Above SF	130	BDL	BDL	14	16	BDL	BDL	17.1	BDL	BDL	BDL	BDL	BDL	9
CC-17	Middle Fork Above Mine Blockage	116	BDL	BDL	8	9	BDL	BDL	9.34	BDL	BDL	BDL	BDL	BDL	5
CC-19	MF Below Blackhawk	522	BDL	BDL	10	10	BDL	BDL	31.4	BDL	BDL	BDL	BDL	37	43
CC-20	MF Above SF	336	BDL	BDL	7	10	BDL	BDL	26.2	BDL	BDL	BDL	BDL	10	23
CC-21	SF Above Silver Ledge	403	BDL	BDL	10	11	BDL	BDL	16.6	BDL	BDL	6	BDL	BDL	4
CC-22	SF Below Silver Ledge	1143	BDL	BDL	10	10	BDL	BDL	34.9	BDL	BDL	6	8	16	28
CC-23	SF Above CC	717	BDL	BDL	10	10	BDL	BDL	29.3	BDL	BDL	8	6	9	22
CC-24	CC Below SF	1566	BDL	BDL	13	16	BDL	1	29.6	BDL	BDL	7	7	175	174
CC-25	CC Above Prospect Gulch	1613	BDL	BDL	14	16	BDL	BDL	28.3	BDL	BDL	BDL	8	155	158
CC-26	CC Below Prospect	1691	BDL	BDL	16	17	BDL	BDL	26	BDL	BDL	BDL	7	169	168
CC-27	Georgia Gulch Above Confluence	298	BDL	BDL	18	20	BDL	BDL	18.7	BDL	BDL	BDL	BDL	25	33
CC-28	CC Below Georgia Gulch	2084	BDL	BDL	15	18	BDL	BDL	30	BDL	4	6	BDL	155	158
CC-29	CC Above Porcupine Gulch	1769	BDL	BDL	16	18	BDL	BDL	29.3	BDL	BDL	9	9	130	132
CC-30	Porcupine Gulch Above CC	754	BDL	BDL	34	38	BDL	BDL	29.7	BDL	BDL	8	7	6	15
CC-31	CC Below Porcupine	1753	BDL	BDL	16	17	BDL	BDL	29.1	BDL	BDL	6	6	128	131
CC-32	Below Hurricane Mine Complex	1949	BDL	BDL	30	30	BDL	BDL	24	BDL	BDL	BDL	BDL	262	253
CC-33	CC Below Sunnyside Ponds	2456	BDL	BDL	16	18	BDL	BDL	19.5	BDL	BDL	BDL	6	326	329
PG-1	Background-Upper Prospect	117	BDL	BDL	18	21	BDL	BDL	3.16	BDL	BDL	BDL	BDL	BDL	5
PG-2	Background-Upper Prospect	257	BDL	BDL	19	20	BDL	BDL	9.65	BDL	BDL	BDL	BDL	BDL	BDL
PG-3	Below Galena Queen	408	BDL	BDL	16	18	BDL	BDL	3.13	BDL	BDL	BDL	BDL	269	264
PG-4	Background-Upper Prospect	BDL	BDL	BDL	32	34	BDL	BDL	36.3	BDL	BDL	BDL	BDL	BDL	4
PG-5	Below Mine Drainages	42	BDL	BDL	29	29	BDL	BDL	31.9	BDL	BDL	BDL	BDL	BDL	BDL
PG-6	Tributary Below Hercules	256	BDL	BDL	32	31	BDL	BDL	3.28	BDL	BDL	BDL	BDL	22	22
PG-7	Tributary Below Draining Mine	652	BDL	BDL	20	21	BDL	2	24.5	BDL	BDL	BDL	6	53	57

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Site Id	Description	Tot. Al ug/l	Diss. Sb ug/l	Tot. Sb ug/l	Diss. Ba ug/l	Tot. Ba ug/l	Diss. Be ug/l	Tot. Be ug/l	Diss. Ca mg/l	Diss. Cr ug/l	Tot. Cr ug/l	Diss. Co ug/l	Tot. Co ug/l	Diss. Cu ug/l	Tot. Cu ug/l
PG-8	Below Upper Mines	519	BDL	BDL	24	28	BDL	BDL	14.3	BDL	BDL	BDL	BDL	37	48
PG-9	Below Mineralized Canyon	548	BDL	BDL	22	24	BDL	BDL	13.5	BDL	BDL	BDL	6	35	44
PG-10	Undisturbed Tributary	1842	BDL	BDL	22	BDL	BDL	BDL	13.4	BDL	BDL	BDL	BDL	32	6
PG-11	Above Henrietta 7	971	BDL	BDL	29	34	BDL	BDL	11.1	BDL	BDL	BDL	BDL	28	38
PG-12	Spring	21080	BDL	BDL	74	422	1	BDL	2.45	BDL	13	BDL	BDL	BDL	143
PG-13	Spring	1527	BDL	BDL	84	85	BDL	BDL	2.66	BDL	BDL	BDL	BDL	104	BDL
PG-14	Tributary Below Lark & Mine Waste	7539	BDL	BDL	63	118	BDL	BDL	2.54	BDL	BDL	11	6	372	371
PG-15	Below Henrietta 7	1101	BDL	BDL	28	29	1	BDL	13.7	4	BDL	BDL	BDL	104	100
PG-16	Below Tributary PG14	1424	BDL	BDL	28	32	1	BDL	13.6	BDL	BDL	BDL	BDL	142	142
PG-17	Below Joe & Johns Tributary	2946	BDL	BDL	22	22	1	BDL	2.36	BDL	BDL	9	14	601	588
PG-18	Above Henrietta 11	*	BDL	*	29	*	1	*	12.5	4	*	BDL	*	166	*
PG-18	Above Henrietta 11	*	BDL	*	29	*	1	*	12.5	BDL	*	BDL	*	169	*
PG-19	Prospect Gulch Above Confluence	2011	BDL	BDL	27	28	1	BDL	10.8	BDL	BDL	BDL	7	260	259
PG-20	Tributary Above Hercules	377	BDL	BDL	31	31	1	BDL	3.67	BDL	BDL	BDL	BDL	18	14
SO-1	Queen Anne Mine	149	BDL	BDL	8	9	2	BDL	27	5	BDL	BDL	BDL	61	82
SO-2	Lark Mine	3612	BDL	BDL	17	16	2	BDL	2.86	BDL	4	45	44	12020	11820
SO-3	Grand Mogul	2114	BDL	BDL	15	15	2	BDL	11.3	4	BDL	BDL	BDL	727	725
SO-4	Henrietta 7 Mine	2342	BDL	BDL	14	14	2	BDL	4.79	BDL	BDL	18	21	170	167
SO-5	Mogul	3259	BDL	BDL	4	3	4	2	45.8	BDL	BDL	15	14	5395	4567
SO-6	Joe & Johns	8538	BDL	BDL	17	18	2	BDL	2.04	4	4	25	26	1121	1100
SO-7	Mine South of Mogul	6268	BDL	BDL	3	4	6	4	59.3	BDL	BDL	23	27	1991	2059
SO-8	Red & Bonita Mine	12630	BDL	BDL	5	6	5	4	47.1	BDL	BDL	92	102	1359	1429
SO-12	Black Hawk Mine	139	BDL	BDL	12	14	1	BDL	72.6	BDL	BDL	BDL	BDL	4	6
SO-13	Silver Ledge	3516	BDL	BDL	5	6	4	3	126	BDL	BDL	30	34	114	126
SO-14	Yukon Tunnel	209	BDL	BDL	15	17	1	BDL	215	BDL	4	BDL	BDL	BDL	15
SO-16	Anglo Saxon	598	BDL	BDL	9	11	3	2	280	BDL	BDL	34	45	30	35
SO-17	Big Colorado	8170	BDL	BDL	X	4	X	2	X	X	BDL	X	63	X	77
SO-18	Mammoth Tunnel	2007	BDL	BDL	3	7	3	1	127	4	BDL	54	34	73	38
SO-19	Adit Below Georgia Gulch	50	BDL	BDL	9	10	1	BDL	255	BDL	BDL	BDL	7	BDL	BDL
SO-20	Kansas City Adit #1	427	BDL	BDL	9	12	1	BDL	25.6	4	5	BDL	BDL	29	84
SO-21	Kansas City Adit #2	342	BDL	BDL	6	7	2	BDL	37.8	4	4	6	8	51	66
SO-23	Porcupine Gulch Adit	846	BDL	BDL	11	13	2	2	237	BDL	BDL	30	50	18	65
SO-24	Dry Gulch Adit (Evelyne)	12720	BDL	BDL	1	1	2	1	4.6	BDL	4	25	31	315	324
DG-1	Deer Gulch	51	BDL	BDL	10	11	1	BDL	16.2	BDL	BDL	BDL	BDL	BDL	BDL
EP-1	Elk Park	510	BDL	BDL	19	24	1	BDL	17.8	4	BDL	BDL	BDL	7	14
KC-1	Kendall Creek	153	BDL	BDL	22	25	1	BDL	12	4	6	BDL	BDL	BDL	7
UK-1	1st East Trib south of Deer Creek	199	BDL	BDL	8	10	1	BDL	4.17	BDL	4	BDL	BDL	5	BDL
SO-18	Duplicate		BDL		5		2		200	5		32		27	
	* Bottle leaked during transport														

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Cement Creek
High-Flow
June 25-26, 1997
Analytical Results

Site Id	Description	Diss. Fe ug/l	Tot. Fe ug/l	Diss. Mg mg/l	Diss. Mn ug/l	Tot. Mn ug/l	Diss. Ni ug/l	Tot. Ni ug/l	Diss. K mg/l	Diss. Na mg/l	Diss. V ug/l	Tot. V ug/l	Diss. Zn ug/l	Tot. Zn ug/l
CC-1	Above Queen Anne	10	22	1.17	28	32	13	BDL	BDL	0.42	BDL	BDL	64	63
CC-2	CC Below Queen Anne	BDL	31	1.19	28	33	11	BDL	BDL	0.44	BDL	BDL	62	63
CC-3	Background Below Ross Basin	5	110	1.44	147	153	11	BDL	BDL	0.49	BDL	BDL	403	399
CC-4	CC Below SO-3	123	862	1.55	366	365	12	BDL	BDL	0.49	BDL	BDL	1074	1010
CC-5	CC Above Mogul	26	364	1.65	561	594	12	BDL	BDL	0.5	BDL	BDL	709	711
CC-6	CC Below Mogul	115	490	1.64	562	572	13	BDL	BDL	0.53	BDL	BDL	919	864
CC-7	CC Above Ferricrete	61	447	1.55	511	540	17	39	BDL	0.52	BDL	BDL	813	818
CC-8	Below North Ferricrete	80	377	1.38	438	440	BDL	BDL	BDL	0.51	BDL	4	728	696
CC-9	Below Lower Ferricrete	81	365	1.36	434	439	13	BDL	BDL	0.51	BDL	BDL	724	746
CC-12	North Fork Above CC	66330	37810	7.87	2147	2274	37	25	BDL	0.87	6	5	8010	8157
CC-13	Below North Fork	6770	7912	2.08	611	668	32	BDL	BDL	0.57	BDL	BDL	1559	1620
CC-14	Minnehaha Background	16	38	0.99	5	5	BDL	BDL	BDL	0.99	BDL	4	13	11
CC-15	Minnehaha Below Lead Carbonate	314	761	1.11	53	60	12	BDL	BDL	0.93	BDL	BDL	205	214
CC-16	Minnehaha Above SF	61	233	1.42	26	31	12	BDL	BDL	0.84	BDL	BDL	114	125
CC-17	Middle Fork Above Mine Blockage	8	43	1.18	55	58	BDL	BDL	BDL	0.34	BDL	BDL	47	42
CC-19	MF Below Blackhawk	21	200	2.6	240	272	12	BDL	BDL	0.95	BDL	BDL	282	285
CC-20	MF Above SF	56	252	2.27	136	174	12	BDL	BDL	0.68	BDL	BDL	177	184
CC-21	SF Above Silver Ledge	34	222	1.24	44	47	BDL	BDL	BDL	0.78	BDL	BDL	31	32
CC-22	SF Below Silver Ledge	3068	4480	2.63	435	455	14	BDL	BDL	1.17	BDL	BDL	291	289
CC-23	SF Above CC	1279	2020	2.36	359	374	12	BDL	BDL	1.05	BDL	BDL	265	261
CC-24	CC Below SF	2390	4074	2.46	557	562	12	BDL	BDL	0.89	BDL	4	969	907
CC-25	CC Above Prospect Gulch	1929	3662	2.46	539	544	13	BDL	BDL	0.92	BDL	BDL	870	835
CC-26	CC Below Prospect	2298	3816	2.37	491	494	14	BDL	BDL	0.86	BDL	BDL	890	816
CC-27	Georgia Gulch Above Confluence	5	211	2.5	317	333	44	BDL	BDL	0.7	BDL	BDL	458	453
CC-28	CC Below Georgia Gulch	3308	4931	2.61	520	530	11	BDL	BDL	0.91	BDL	4	837	809
CC-29	CC Above Porcupine Gulch	2352	4312	2.56	469	477	15	BDL	BDL	0.96	BDL	BDL	711	703
CC-30	Porcupine Gulch Above CC	1337	2444	2.7	1424	1428	14	BDL	BDL	1.33	BDL	BDL	356	364
CC-31	CC Below Porcupine	2323	3791	2.54	462	476	12	BDL	BDL	0.93	BDL	BDL	713	699
CC-32	Below Hurricane Mine Complex	174	211	3.29	2062	1967	15	BDL	BDL	0.61	BDL	BDL	1483	1376
CC-33	CC Below Sunnyside Ponds	5661	6594	2.32	739	762	15	BDL	BDL	0.65	BDL	BDL	1624	1592
PG-1	Background-Upper Prospect	68	454	0.55	8	26	BDL	BDL	BDL	0.42	BDL	BDL	BDL	BDL
PG-2	Background-Upper Prospect	25	104	1.36	55	54	14	BDL	BDL	0.49	BDL	BDL	10	9
PG-3	Below Galena Queen	2984	3542	0.6	24	28	11	BDL	BDL	0.47	BDL	BDL	2830	2687
PG-4	Background-Upper Prospect	9	5	3.4	245	247	11	BDL	BDL	0.87	BDL	5	284	256
PG-5	Below Mine Drainages	BDL	22	2.89	168	162	BDL	BDL	BDL	0.78	BDL	BDL	176	190
PG-6	Tributary Below Hercules	360	202	0.63	30	29	13	BDL	BDL	0.25	BDL	BDL	164	153
PG-7	Tributary Below Draining Mine	360	274	4.79	226	218	20	BDL	BDL	0.36	BDL	BDL	86	82

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Cement Creek
High-Flow
June 25-26, 1997
Analytical Results

Site Id	Description	Diss. Fe ug/l	Tot. Fe ug/l	Diss. Mg mg/l	Diss. Mn ug/l	Tot. Mn ug/l	Diss. Ni ug/l	Tot. Ni ug/l	Diss. K mg/l	Diss. Na mg/l	Diss. V ug/l	Tot. V ug/l	Diss. Zn ug/l	Tot. Zn ug/l
PG-8	Below Upper Mines	83	597	1.77	92	94	12	BDL	BDL	0.45	BDL	BDL	501	470
PG-9	Below Mineralized Canyon	111	654	1.81	93	95	13	BDL	BDL	0.4	BDL	BDL	419	400
PG-10	Undisturbed Tributary	114	495	1.78	91	220	BDL	BDL	BDL	0.4	BDL	BDL	427	37
PG-11	Above Henrietta 7	189	653	1.84	138	135	14	BDL	BDL	0.34	BDL	BDL	298	315
PG-12	Spring	24	58990	0.4	27	1511	BDL	BDL	BDL	0.26	BDL	47	250	367
PG-13	Spring	258	102	0.7	72	355	BDL	BDL	BDL	0.37	BDL	BDL	431	402
PG-14	Tributary Below Lark & Mine Waste	7507	20120	0.9	76	165	22	BDL	BDL	0.32	BDL	11	2268	2058
PG-15	Below Henrietta 7	2364	2724	2.02	152	148	BDL	BDL	BDL	0.37	BDL	BDL	532	463
PG-16	Below Tributary PG14	3813	3909	1.97	156	156	BDL	BDL	BDL	0.36	BDL	BDL	655	585
PG-17	Below Joe & Johns Tributary	12720	10490	2.43	388	374	BDL	BDL	BDL	0.33	BDL	BDL	4949	4431
PG-18	Above Henrietta 11	3561	*	1.89	150	*	BDL	*	BDL	0.36	BDL	*	789	*
PG-18	Above Henrietta 11	3578	*	1.88	150	*	BDL	*	BDL	0.36	BDL	*	784	*
PG-19	Prospect Gulch Above Confluence	4767	4710	1.92	177	174	BDL	BDL	BDL	0.42	BDL	5	810	732
PG-20	Tributary Above Hercules	228	454	0.61	28	27	BDL	BDL	BDL	0.22	BDL	BDL	18	12
SO-1	Queen Anne Mine	75	446	1.79	397	400	BDL	BDL	BDL	0.63	BDL	BDL	885	815
SO-2	Lark Mine	71800	64060	1.22	164	157	27	33	BDL	0.21	BDL	4	55110	49940
SO-3	Grand Mogul	4451	4114	2.15	1357	1315	BDL	BDL	BDL	0.45	BDL	BDL	3737	3405
SO-4	Henrietta 7 Mine	48880	43600	1.23	106	102	BDL	BDL	BDL	0.26	BDL	5	3136	2833
SO-5	Mogul	44750	39240	2.96	7195	200	BDL	BDL	BDL	1.55	BDL	BDL	25200	21250
SO-6	Joe & Johns	57540	51110	1.11	130	124	BDL	13	BDL	0.3	10	11	12080	10890
SO-7	Mine South of Mogul	48770	48300	5.42	1892	1941	BDL	18	BDL	1.91	BDL	BDL	5316	5113
SO-8	Red & Bonita Mine	38770	41450	16.7	26120	27730	18	36	BDL	3.06	BDL	BDL	18200	18490
SO-12	Black Hawk Mine	80	470	4.06	426	437	BDL	BDL	BDL	1.2	BDL	BDL	286	276
SO-13	Silver Ledge	22970	30050	9.08	2424	1557	BDL	19	BDL	2.73	BDL	BDL	1641	1646
SO-14	Yukon Tunnel	273	1488	6.28	711	788	BDL	BDL	BDL	5.67	BDL	BDL	119	116
SO-16	Anglo Saxon	32190	34240	18.8	8825	9198	BDL	19	2.3	9.02	BDL	BDL	3203	3227
SO-17	Big Colorado	X	86650	X	X	2271	X	36	X	X	X	7	X	1009
SO-18	Mammoth Tunnel	85010	56490	13.7	2192	4546	24	19	3.45	4.02	7	BDL	1026	1049
SO-19	Adit Below Georgia Gulch	3634	4161	5.57	1674	1838	BDL	BDL	BDL	6.9	BDL	BDL	285	266
SO-20	Kansas City Adit #1	79	1655	1.8	216	365	BDL	BDL	BDL	0.76	BDL	5	358	548
SO-21	Kansas City Adit #2	1742	2802	2.51	1452	1578	BDL	BDL	BDL	0.78	BDL	BDL	1020	1037
SO-23	Porcupine Gulch Adit	20870	27740	15.5	14870	15390	BDL	32	BDL	7.98	BDL	BDL	3088	3062
SO-24	Dry Gulch Adit (Evelyne)	26240	29780	10.2	820	876	BDL	16	BDL	2.37	BDL	5	1053	1059
DG-1	Deer Gulch	BDL	26	1.24	1	2	BDL	BDL	BDL	0.89	BDL	BDL	6	4
EP-1	Elk Park	58	659	2.05	114	186	BDL	BDL	BDL	1.03	BDL	BDL	194	223
KC-1	Kendall Creek	8	72	1.02	3	6	BDL	BDL	BDL	0.69	BDL	BDL	12	11
UK-1	1st East Trib south of Deer Creek	38	78	0.71	BDL	2	BDL	BDL	BDL	0.41	BDL	4	10	9
SO-18	Duplicate	54680		17.9	4431		BDL		3.41	5.29	4		1076	
	* Bottle leaked during transport													

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Cement Creek
High-Flow
June 25-26, 1997
Analytical Results

Site Id	Description	Hardness mg CaCO3/l	Silica mg/l	Chloride mg/l	Sulfate mg/l							
CC-1	Above Queen Anne	34	2.71	BDL	25.4							
CC-2	CC Below Queen Anne	34.6	2.73	BDL	25.5							
CC-3	Background Below Ross Basin	43.4	3.27	BDL	33.9							
CC-4	CC Below SO-3	39.8	4.17	BDL	43.3							
CC-5	CC Above Mogul	42	4.11	BDL	44.7							
CC-6	CC Below Mogul	41.5	4.89	BDL	51.4							
CC-7	CC Above Ferricrete	39.8	4.89	BDL	51.3							
CC-8	Below North Ferricrete	35.6	5.78	BDL	43.6							
CC-9	Below Lower Ferricrete	35.3	6.13	BDL	50							
CC-12	North Fork Above CC	69.6	X	X	X							
CC-13	Below North Fork	38	7.36	BDL	111							
CC-14	Minnehaha Background	43.5	6.39	BDL	21.5							
CC-15	Minnehaha Below Lead Carbonate	42	6.83	BDL	25.9							
CC-16	Minnehaha Above SF	48.5	5.78	BDL	27.8							
CC-17	Middle Fork Above Mine Blockage	28.2	3.13	BDL	24.1							
CC-19	MF Below Blackhawk	89.1	5.59	BDL	90.7							
CC-20	MF Above SF	74.8	5.55	BDL	67.2							
CC-21	SF Above Silver Ledge	46.6	6.6	BDL	37.2							
CC-22	SF Below Silver Ledge	98	12	BDL	112							
CC-23	SF Above CC	82.9	9.42	BDL	85.3							
CC-24	CC Below SF	84	8.72	BDL	125							
CC-25	CC Above Prospect Gulch	80.8	9.75	BDL	128							
CC-26	CC Below Prospect	74.7	9.81	BDL	124							
CC-27	Georgia Gulch Above Confluence	57	6.76	BDL	73.5							
CC-28	CC Below Georgia Gulch	85.7	11.2	BDL	142							
CC-29	CC Above Porcupine Gulch	83.7	10.7	BDL	128							
CC-30	Porcupine Gulch Above CC	85.3	8.41	BDL	94							
CC-31	CC Below Porcupine	83.1	10.8	BDL	130							
CC-32	Below Hurrican Mine Complex	73.5	6.31	BDL	117							
CC-33	CC Below Sunnyside Ponds	58.2	7.73	BDL	128							
PG-1	Background-Upper Prospect	10.2	1.87	BDL	4							
PG-2	Background-Upper Prospect	29.7	3	BDL	22.8							
PG-3	Below Galena Queen	10.3	2.22	BDL	45.2							
PG-4	Background-Upper Prospect	105	5.06	BDL	94.8							
PG-5	Below Mine Drainages	91.6	4.44	BDL	79.5							
PG-6	Tributary Below Hercules	10.8	4.91	BDL	14.2							
PG-7	Tributary Below Draining Mine	80.9	3.76	BDL	99.9							

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Cement Creek
High-Flow
June 25-26, 1997
Analytical Results

Site Id	Description	Hardness mg CaCO3/l	Silica mg/l	Chloride mg/l	Sulfate mg/l							
PG-8	Below Upper Mines	43	3.84	BDL	46.8							
PG-9	Below Mineralized Canyon	41.2	3.68	BDL	45.6							
PG-10	Undisturbed Tributary	40.8	5.7	BDL	61.1							
PG-11	Above Henrietta 7	35.3	4.14	BDL	61.9							
PG-12	Spring	7.8	10.2	BDL	8.4							
PG-13	Spring	9.5	11.3	BDL	44.5							
PG-14	Tributary Below Lark & Mine Waste	10	12.2	BDL	123							
PG-15	Below Henrietta 7	42.5	4.14	BDL	74.2							
PG-16	Below Tributary PG14	42.1	4.73	BDL	91.7							
PG-17	Below Joe & Johns Tributary	15.9	16.9	BDL	169							
PG-18	Above Henrietta 11	39	5.24	BDL	92.6							
PG-18	Above Henrietta 11	39										
PG-19	Prospect Gulch Above Confluence	34.9	8.62	BDL	101							
PG-20	Tributary Above Hercules	11.7	4.95	BDL	35.4							
SO-1	Queen Anne Mine	74.8	3.65	BDL	66.7							
SO-2	Lark Mine	12.2	35.1	0.56	478							
SO-3	Grand Mogul	37.1	6.89	BDL	117							
SO-4	Henrietta 7 Mine	17	4.42	BDL	212							
SO-5	Mogul	127	16.4	0.52	453							
SO-6	Joe & Johns	9.7	45.5	BDL	368							
SO-7	Mine South of Mogul	170	31.6	BDL	438							
SO-8	Red & Bonita Mine	186	39.3	BDL	555							
SO-12	Black Hawk Mine	198	6.62	BDL	194							
SO-13	Silver Ledge	352	30.3	BDL	553							
SO-14	Yukon Tunnel	563	19	BDL	577							
SO-16	Anglo Saxon	777	28.9	BDL	914							
SO-17	Big Colorado	X	49.9	BDL	793							
SO-18	Mammoth Tunnel	374	48	BDL	957							
SO-19	Adit Below Georgia Gulch	660	28.3	BDL	733							
SO-20	Kansas City Adit #1	71.3	4.4	BDL	60.5							
SO-21	Kansas City Adit #2	105	7.17	BDL	103							
SO-23	Porcupine Gulch Adit	656	27.9	BDL	771							
SO-24	Dry Gulch Adit (Evelyne)	53.5	50.5	BDL	236							
DG-1	Deer Gulch	45.6	4.03	BDL	19.8							
EP-1	Elk Park	52.9	6.27	BDL	35.5							
KC-1	Kendall Creek	34.2	3.27	BDL	5.4							
UK-1	1st East Trib south of Deer Creek	13.3	3.02	BDL	3.1							
SO-18	Duplicate	573										
	* Bottle leaked during transport											

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Cement Creek
High-Flow
June 25-26, 1997
Analytical Results

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Cement Creek
High-Flow
June 25-26, 1997
Analytical Results

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Cement Creek
High-Flow
Metals Loading

Site Id	Description	Diss. Load As g/day	Tot. Load As g/day	Diss. Load Cd g/day	Tot. Load Cd g/day	Diss. Load Pb g/day	Tot. Load Pb g/day	Diss. Load Al g/day	Tot. Load Al g/day	Diss. Load Ba g/day	Tot. Load Ba g/day	Diss. Load Be g/day
CC-1	Above Queen Anne	0.00	0.00	0.00	0.00	7.96	11.15	0.00	136.96	38.22	41.41	0.00
CC-2	CC Below Queen Anne	0.00	0.00	0.00	5.65	20.33	42.92	0.00	666.38	135.53	146.83	0.00
CC-3	Background Below Ross Basin	0.00	0.00	27.79	36.56	95.06	181.34	760.45	4474.96	248.61	263.23	0.00
CC-4	CC Below SO-3	0.00	0.00	78.88	99.46	111.46	234.92	7544.92	11591.74	274.36	291.51	0.00
CC-5	CC Above Mogul	0.00	0.00	148.32	190.03	125.14	389.33	7462.21	25631.05	741.59	834.28	0.00
CC-6	CC Below Mogul	0.00	0.00	237.44	280.06	298.32	596.65	22952.70	42983.05	974.12	1095.89	0.00
CC-7	CC Above Ferricrete	0.00	0.00	257.10	323.22	330.56	587.67	24241.26	48335.59	1101.88	1248.79	0.00
CC-8	Below North Ferricrete	0.00	0.00	278.84	338.59	418.26	677.18	47302.95	66722.05	1792.53	1991.70	0.00
CC-9	Below Lower Ferricrete	0.00	0.00	228.58	279.38	338.64	482.56	39451.44	60023.76	1523.88	1608.54	0.00
CC-12	North Fork Above CC	75.63	29.11	114.05	13.21	11.10	13.21	45649.01	46999.58	30.01	36.02	0.00
CC-13	Below North Fork	181.65	290.64	544.96	581.29	445.05	581.29	201180.48	225067.82	1544.05	1725.70	0.00
CC-14	Minnehaha Background	0.00	0.00	0.00	0.00	0.00	0.00	0.00	338.52	102.19	108.58	0.00
CC-15	Minnehaha Below Lead Carbonate	0.00	0.00	4.30	4.92	27.04	79.27	589.88	2070.73	98.31	110.60	0.00
CC-16	Minnehaha Above SF	0.00	0.00	5.44	5.44	16.31	42.41	706.75	1413.50	152.22	173.97	0.00
CC-17	Middle Fork Above Mine Blockage	0.00	0.00	0.00	0.00	1.57	2.55	0.00	227.36	15.68	17.64	0.00
CC-19	MF Below Blackhawk	0.00	0.00	10.34	6.40	5.91	7.88	694.35	2570.59	49.25	49.25	0.00
CC-20	MF Above SF	0.00	0.00	11.00	15.12	0.00	19.24	659.74	4618.15	96.21	137.45	0.00
CC-21	SF Above Silver Ledge	0.00	0.00	0.00	0.00	0.00	0.00	2893.78	17669.62	438.45	482.30	0.00
CC-22	SF Below Silver Ledge	0.00	0.00	54.18	78.81	0.00	280.75	18569.06	56298.24	492.55	492.55	0.00
CC-23	SF Above CC	0.00	0.00	93.20	93.20	0.00	287.37	7145.41	55687.56	776.67	776.67	0.00
CC-24	CC Below SF	0.00	0.00	631.71	568.54	1089.70	1452.93	196934.97	247313.68	2053.05	2526.83	0.00
CC-25	CC Above Prospect Gulch	0.00	0.00	524.26	495.14	1791.22	2053.35	203005.43	234897.96	2038.79	2330.05	0.00
CC-26	CC Below Prospect	0.00	0.00	788.82	679.26	3790.70	4031.73	321223.69	370524.73	3505.85	3724.97	0.00
CC-27	Georgia Gulch Above Confluence	0.00	0.00	24.07	20.63	0.00	17.19	0.00	5123.84	309.49	343.88	0.00
CC-28	CC Below Georgia Gulch	0.00	348.37	857.53	643.15	4555.64	4984.40	469230.44	558467.30	4019.68	4823.61	0.00
CC-29	CC Above Porcupine Gulch	0.00	381.42	926.30	980.78	4141.09	4794.94	421192.24	481946.36	4359.04	4903.92	0.00
CC-30	Porcupine Gulch Above CC	0.00	0.00	8.71	7.74	63.89	217.80	726.00	7298.68	329.12	367.84	0.00
CC-31	CC Below Porcupine	0.00	372.00	915.69	1144.61	4463.98	4721.52	431232.04	501625.60	4578.44	4864.60	0.00
CC-32	Below Hurricane Mine Complex	0.00	0.00	20.70	10.99	12.78	10.99	5051.93	4980.38	76.66	76.66	0.00
CC-33	CC Below Sunnyside Ponds	147.48	180.25	647.27	778.36	909.46	1048.74	181645.24	201227.20	1310.93	1474.79	0.00
PG-1	Background-Upper Prospect	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.60	8.25	9.62	0.00
PG-2	Background-Upper Prospect	0.00	0.00	0.00	0.00	0.00	0.00	70.10	253.75	18.76	19.75	0.00
PG-3	Below Galena Queen	1.06	2.70	9.00	8.18	50.98	48.53	245.49	333.87	13.09	14.73	0.00
PG-4	Background-Upper Prospect	0.00	0.00	1.71	1.71	0.00	0.00	276.29	0.00	42.10	44.73	0.00
PG-5	Below Mine Drainages	0.00	0.00	1.19	1.07	0.00	0.00	0.00	49.91	34.46	34.46	0.00
PG-6	Tributary Below Hercules	0.00	1.51	1.65	1.38	20.79	20.79	435.10	352.49	44.06	42.68	0.00
PG-7	Tributary Below Draining Mine	0.00	0.00	0.27	0.21	4.89	4.95	202.33	198.08	6.08	6.38	0.00
PG-8	Below Upper Mines	0.00	0.00	16.06	18.15	38.40	98.45	446.88	3623.92	167.58	195.51	0.00

000174

High-Flow
Metals Loading

Site Id	Description	Diss. Load As g/day	Tot. Load As g/day	Diss. Load Cd g/day	Tot. Load Cd g/day	Diss. Load Pb g/day	Tot. Load Pb g/day	Diss. Load Al g/day	Tot. Load Al g/day	Diss. Load Ba g/day	Tot. Load Ba g/day	Diss. Load Be g/day
PG-10	Undisturbed Tributary	0.00	0.00	5.00	0.00	14.26	43.28	130.08	4607.67	55.03	0.00	0.00
PG-11	Above Henrietta 7	0.00	32.05	16.54	16.54	168.53	1416.44	6472.21	10039.17	299.83	351.53	0.00
PG-12	Spring	0.00	34.54	0.26	0.42	1.04	392.41	48.82	5474.48	19.22	109.59	0.26
PG-13	Spring	0.00	0.00	0.01	0.01	0.04	0.03	7.29	7.48	0.41	0.42	0.00
PG-14	Tributary Below Lark & Mine Waste	0.00	3.82	2.09	2.33	4.84	38.40	338.88	1754.70	14.66	27.46	0.00
PG-15	Below Henrietta 7	0.00	33.52	33.52	34.81	250.10	261.71	10468.22	14193.98	360.97	373.87	12.89
PG-16	Below Tributary PG14	13.13	38.08	44.65	44.65	387.39	1158.24	12055.18	18699.97	367.70	420.22	13.13
PG-17	Below Joe & Johns Tributary	0.08	0.11	0.72	0.72	5.63	5.39	100.26	101.05	0.75	0.75	0.03
PG-18	Above Henrietta 11	21.02	0.00	43.66	0.00	399.40	0.00	15377.67	0.00	468.93	0.00	16.17
PG-18	Above Henrietta 11	17.79	0.00	50.13	0.00	407.48	0.00	15296.82	0.00	468.93	0.00	16.17
PG-19	Prospect Gulch Above Confluence	48.78	65.86	82.93	102.45	1163.51	1265.96	44393.80	49052.71	658.59	682.98	24.39
PG-20	Tributary Above Hercules	0.00	0.00	0.00	0.00	2.71	5.32	150.29	351.91	28.94	28.94	0.93
SO-1	Queen Anne	0.00	0.00	0.81	1.06	1.85	9.05	9.35	30.30	1.63	1.83	0.41
SO-2	Lark Mine	4.17	4.00	7.11	6.64	32.84	30.40	103.84	106.19	0.50	0.47	0.06
SO-3	Grand Mogul	0.00	4.65	66.44	59.80	97.34	101.66	6710.84	7023.13	49.83	49.83	6.64
SO-4	Henrietta 7 Mine	9.40	9.01	3.96	3.46	1.56	1.56	553.79	579.53	3.46	3.46	0.49
SO-5	Mogul	1.34	1.15	17.49	14.41	38.07	29.40	543.17	479.07	0.59	0.44	0.59
SO-6	Joe & Johns	9.25	8.20	5.25	4.91	128.12	119.45	702.97	711.22	1.42	1.50	0.17
SO-7	Mine South of Mogul	0.90	0.96	2.06	2.06	3.99	3.77	434.53	460.70	0.22	0.29	0.44
SO-8	Red & Bonita Mine	0.00	0.00	3.09	3.22	3.50	4.55	358.95	402.27	0.16	0.19	0.16
SO-12	Black Hawk Mine	0.00	0.00	1.86	2.69	0.00	4.97	0.00	287.76	24.84	28.98	2.07
SO-13	Silver Ledge	6.02	15.64	42.12	36.10	55.36	217.22	17311.48	21156.48	30.09	36.10	24.07
SO-14	Yukon Tunnel	0.00	0.00	0.00	0.00	0.00	7.11	0.00	619.58	44.47	50.40	2.96
SO-16	Anglo Saxon	1.83	2.15	1.57	1.54	1.22	2.92	111.69	191.93	2.89	3.53	0.96
SO-17	Big Colorado	*	0.28	*	0.12	*	0.05	*	300.25	*	0.15	*
SO-18	Mammoth Tunnel	1.08	1.59	0.46	0.30	0.24	0.00	1140.07	319.61	0.48	1.11	0.48
SO-19	Adit Below Georgia Gulch	3.40	3.30	0.00	0.00	0.00	0.85	0.00	47.16	8.49	9.43	0.94
SO-20	Kansas City Adit #1	0.00	0.41	0.08	0.12	0.57	7.55	0.00	23.02	0.49	0.65	0.05
SO-21	Kansas City Adit #2	0.00	0.00	0.46	0.51	0.11	0.75	3.19	17.60	0.31	0.36	0.10
SO-23	Porcupine Gulch Adit	0.68	1.21	1.23	1.21	0.00	3.35	139.65	248.72	3.23	3.82	0.59
SO-24	Dry Gulch Adit (Evelyne)	0.00	0.41	3.19	3.82	1.02	0.89	3595.87	4051.32	0.32	0.32	0.64
	* Bottle Leaked in Transport											

000175

Cement Creek
High-Flow
Metals Loading

Site Id	Description	Tot. Load Be	Diss. Load Cr	Tot. Load Cr	Diss. Load Co	Tot. Load Co	Diss. Load Cu	Tot. Load Cu	Diss. Load Fe	Tot. Load Fe	Diss. Load Mn
		g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day
CC-1	Above Queen Anne	0.00	0.00	15.93	0.00	0.00	0.00	0.00	31.85	70.07	89.18
CC-2	CC Below Queen Anne	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	350.13	316.25
CC-3	Background Below Ross Basin	0.00	0.00	0.00	0.00	0.00	584.96	862.82	73.12	1608.65	2149.74
CC-4	CC Below SO-3	0.00	0.00	0.00	0.00	0.00	2983.67	3086.56	2109.15	14781.19	6276.00
CC-5	CC Above Mogul	0.00	0.00	0.00	0.00	0.00	3615.23	4171.42	1205.08	16871.07	26001.85
CC-6	CC Below Mogul	0.00	0.00	0.00	0.00	0.00	6697.08	7184.14	7001.49	29832.43	34215.97
CC-7	CC Above Ferricrete	0.00	0.00	367.29	0.00	0.00	6978.54	7639.67	4480.96	32835.88	37537.22
CC-8	Below North Ferricrete	0.00	0.00	697.10	0.00	0.00	8365.15	8663.91	7966.81	37543.60	43618.30
CC-9	Below Lower Ferricrete	0.00	0.00	0.00	0.00	0.00	6942.10	7365.40	6857.44	30900.81	36742.33
CC-12	North Fork Above CC	3.00	0.00	0.00	102.04	108.05	7049.94	7197.00	199072.91	113477.26	6443.68
CC-13	Below North Fork	0.00	0.00	0.00	635.78	0.00	30245.19	32061.72	614894.73	718618.48	55494.93
CC-14	Minnehaha Background	0.00	0.00	0.00	0.00	0.00	0.00	0.00	102.19	242.71	31.94
CC-15	Minnehaha Below Lead Carbonate	0.00	0.00	0.00	0.00	0.00	92.17	208.92	1929.40	4676.04	325.66
CC-16	Minnehaha Above SF	0.00	0.00	0.00	0.00	0.00	0.00	97.86	663.26	2533.43	282.70
CC-17	Middle Fork Above Mine Blockage	0.00	0.00	0.00	0.00	0.00	0.00	9.80	15.68	84.28	107.80
CC-19	MF Below Blackhawk	0.00	0.00	0.00	0.00	0.00	182.21	211.75	103.41	984.90	1181.88
CC-20	MF Above SF	0.00	0.00	0.00	0.00	0.00	137.45	316.12	769.69	3463.61	1869.25
CC-21	SF Above Silver Ledge	0.00	0.00	0.00	263.07	0.00	0.00	175.38	1490.74	9733.63	1929.19
CC-22	SF Below Silver Ledge	0.00	0.00	0.00	295.53	394.04	788.08	1379.13	151113.73	220661.50	21425.84
CC-23	SF Above CC	0.00	0.00	0.00	621.34	466.00	699.01	1708.68	99336.67	156888.25	27882.61
CC-24	CC Below SF	157.93	0.00	0.00	1105.49	1105.49	27637.23	27479.30	377445.53	643394.60	87965.34
CC-25	CC Above Prospect Gulch	0.00	0.00	0.00	0.00	1165.02	22572.34	23009.22	280916.41	533289.74	78493.49
CC-26	CC Below Prospect	0.00	0.00	0.00	0.00	1533.81	37030.56	36811.45	503527.99	836145.70	107585.83
CC-27	Georgia Gulch Above Confluence	0.00	0.00	0.00	0.00	0.00	429.85	567.41	85.97	3627.96	5450.53
CC-28	CC Below Georgia Gulch	0.00	0.00	1071.91	1607.87	0.00	41536.68	42340.61	886473.04	1321402.23	139348.85
CC-29	CC Above Porcupine Gulch	0.00	0.00	0.00	2451.96	2451.96	35417.20	35962.08	640778.88	1174761.28	127774.36
CC-30	Porcupine Gulch Above CC	0.00	0.00	0.00	77.44	67.76	58.08	145.20	12942.09	23657.80	13784.25
CC-31	CC Below Porcupine	0.00	0.00	0.00	1716.92	1716.92	36627.54	37486.00	664732.61	1084804.70	132202.52
CC-32	Below Hurricane Mine Complex	0.00	0.00	0.00	0.00	0.00	669.50	646.50	444.63	539.18	5269.13
CC-33	CC Below Sunnyside Ponds	0.00	0.00	0.00	0.00	491.60	26710.13	26955.92	463822.15	540265.54	60548.41
PG-1	Background-Upper Prospect	0.00	0.00	0.00	0.00	0.00	0.00	2.29	31.15	208.00	3.67
PG-2	Background-Upper Prospect	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.68	102.68	54.30
PG-3	Below Galena Queen	0.00	0.00	0.00	0.00	0.00	220.12	216.03	2441.81	2898.42	19.64
PG-4	Background-Upper Prospect	0.00	0.00	0.00	0.00	0.00	0.00	5.26	11.84	6.58	322.33
PG-5	Below Mine Drainages	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.14	199.63
PG-6	Tributary Below Hercules	0.00	0.00	0.00	0.00	0.00	30.29	30.29	495.68	278.13	41.31
PG-7	Tributary Below Draining Mine	0.61	0.00	0.00	0.00	1.82	16.10	17.32	109.37	83.24	68.66
PG-8	Below Upper Mines	0.00	0.00	0.00	0.00	0.00	258.35	335.16	579.55	4168.55	642.39

000176

High-Flow
Metals Loading

Site Id	Description	Tot. Load Be	Diss. Load Cr	Tot. Load Cr	Diss. Load Co	Tot. Load Co	Diss. Load Cu	Tot. Load Cu	Diss. Load Fe	Tot. Load Fe	Diss. Load Mn
		g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day
PG-10	Undisturbed Tributary	0.00	0.00	0.00	0.00	0.00	80.05	15.01	285.17	1238.22	227.63
PG-11	Above Henrietta 7	0.00	0.00	0.00	0.00	0.00	289.49	392.88	1954.07	6751.37	1426.78
PG-12	Spring	0.00	0.00	3.38	0.00	0.00	0.00	37.14	6.23	15319.70	7.01
PG-13	Spring	0.00	0.00	0.00	0.00	0.00	0.51	0.00	1.26	0.50	0.35
PG-14	Tributary Below Lark & Mine Waste	0.00	0.00	0.00	2.56	1.40	86.58	86.35	1747.25	4682.93	17.69
PG-15	Below Henrietta 7	0.00	51.57	0.00	0.00	0.00	1340.76	1289.19	30476.45	35117.54	1959.57
PG-16	Below Tributary PG14	0.00	0.00	0.00	0.00	0.00	1864.74	1864.74	50072.32	51332.99	2048.59
PG-17	Below Joe & Johns Tributary	0.00	0.00	0.00	0.31	0.48	20.61	20.17	436.30	359.81	13.31
PG-18	Above Henrietta 11	0.00	64.68	0.00	0.00	0.00	2684.22	0.00	57581.37	0.00	2425.50
PG-18	Above Henrietta 11	0.00	0.00	0.00	0.00	0.00	2732.73	0.00	57856.26	0.00	2425.50
PG-19	Prospect Gulch Above Confluence	0.00	0.00	0.00	0.00	170.75	6341.97	6317.58	116277.62	114887.26	4317.42
PG-20	Tributary Above Hercules	0.00	0.00	0.00	0.00	0.00	16.80	13.07	212.83	423.79	26.14
SO-1	Queen Anne	0.00	1.02	0.00	0.00	0.00	12.40	16.67	15.25	90.69	80.73
SO-2	Lark Mine	0.00	0.00	0.12	1.32	1.29	353.39	347.51	2110.92	1883.36	4.82
SO-3	Grand Mogul	0.00	13.29	0.00	0.00	0.00	2415.24	2408.60	14787.11	13667.53	4508.23
SO-4	Henrietta 7 Mine	0.00	0.00	0.00	4.45	5.20	42.07	41.32	12095.36	10788.82	26.23
SO-5	Mogul	0.29	0.00	0.00	2.21	2.08	793.07	671.35	6578.25	5768.28	1057.67
SO-6	Joe & Johns	0.00	0.33	0.33	2.08	2.17	93.38	91.63	4793.08	4257.46	10.83
SO-7	Mine South of Mogul	0.29	0.00	0.00	1.69	1.98	146.34	151.34	3584.60	3550.05	139.06
SO-8	Red & Bonita Mine	0.13	0.00	0.00	2.93	3.25	43.28	45.51	1234.82	1320.18	831.92
SO-12	Black Hawk Mine	0.00	0.00	0.00	0.00	0.00	8.28	12.42	165.62	973.02	881.93
SO-13	Silver Ledge	18.05	0.00	0.00	180.52	204.58	685.96	758.17	138215.08	180816.86	14585.69
SO-14	Yukon Tunnel	0.00	0.00	11.86	0.00	0.00	0.00	44.47	809.31	4411.18	2107.76
SO-16	Anglo Saxon	0.64	0.00	0.00	10.91	14.44	9.63	11.23	10331.38	10989.33	2832.38
SO-17	Big Colorado	0.07	*	0.00	*	2.32	*	2.83	*	3184.39	*
SO-18	Mammoth Tunnel	0.16	0.64	0.00	8.60	5.41	11.63	6.05	13537.84	8996.03	349.08
SO-19	Adit Below Georgia Gulch	0.00	0.00	0.00	0.00	6.60	0.00	0.00	3427.77	3924.86	1579.00
SO-20	Kansas City Adit #1	0.00	0.22	0.27	0.00	0.00	1.56	4.53	4.26	89.20	11.64
SO-21	Kansas City Adit #2	0.00	0.21	0.21	0.31	0.41	2.62	3.40	89.63	144.16	74.71
SO-23	Porcupine Gulch Adit	0.59	0.00	0.00	8.82	14.70	5.29	19.11	6135.78	8155.56	4371.78
SO-24	Dry Gulch Adit (Evelyne)	0.32	0.00	1.27	7.96	9.87	100.33	103.19	8357.44	9484.93	261.17
	* Bottle Leaked in Transport										

000177

Cement Creek
High-Flow
Metals Loading

Site Id	Description	Tot. Load Mn g/day	Diss. Load Ni g/day	Tot. Load Ni g/day	Diss. Load V g/day	Tot. Load V g/day	Diss. Load Zn g/day	Tot. Load Zn g/day
CC-1	Above Queen Anne	101.92	41.41	0.00	0.00	0.00	203.84	200.66
CC-2	CC Below Queen Anne	372.72	124.24	0.00	0.00	0.00	700.26	711.55
CC-3	Background Below Ross Basin	2237.48	160.86	0.00	0.00	0.00	5893.49	5835.00
CC-4	CC Below SO-3	6258.86	205.77	0.00	0.00	0.00	18416.47	17319.03
CC-5	CC Above Mogul	27531.37	556.19	0.00	0.00	0.00	32861.51	32954.21
CC-6	CC Below Mogul	34824.79	791.47	0.00	0.00	0.00	55951.02	52602.48
CC-7	CC Above Ferricrete	39667.51	1248.79	2864.88	0.00	0.00	59721.64	60088.93
CC-8	Below North Ferricrete	43817.47	0.00	0.00	0.00	398.34	72497.99	69311.26
CC-9	Below Lower Ferricrete	37165.63	1100.58	0.00	0.00	0.00	61293.66	63156.17
CC-12	North Fork Above CC	6824.84	111.05	75.03	18.01	15.01	24040.01	24481.20
CC-13	Below North Fork	60672.04	2906.44	0.00	0.00	0.00	141598.36	147138.77
CC-14	Minnehaha Background	31.94	0.00	0.00	0.00	25.55	83.03	70.26
CC-15	Minnehaha Below Lead Carbonate	368.68	73.74	0.00	0.00	0.00	1259.64	1314.94
CC-16	Minnehaha Above SF	337.07	130.48	0.00	0.00	0.00	1239.53	1359.14
CC-17	Middle Fork Above Mine Blockage	113.68	0.00	0.00	0.00	0.00	92.12	82.32
CC-19	MF Below Blackhawk	1339.46	59.09	0.00	0.00	0.00	1388.71	1403.48
CC-20	MF Above SF	2391.54	164.93	0.00	0.00	0.00	2432.78	2528.99
CC-21	SF Above Silver Ledge	2060.72	0.00	0.00	0.00	0.00	1359.20	1403.05
CC-22	SF Below Silver Ledge	22410.93	689.57	0.00	0.00	0.00	14333.15	14234.64
CC-23	SF Above CC	29047.63	932.01	0.00	0.00	0.00	20581.87	20271.20
CC-24	CC Below SF	88754.97	1895.12	0.00	0.00	631.71	153031.26	143239.79
CC-25	CC Above Prospect Gulch	79221.63	1893.16	0.00	0.00	0.00	126696.36	121599.38
CC-26	CC Below Prospect	108243.18	3067.62	0.00	0.00	0.00	195013.02	178798.45
CC-27	Georgia Gulch Above Confluence	5725.64	756.54	0.00	0.00	0.00	7874.90	7788.93
CC-28	CC Below Georgia Gulch	142028.63	2947.76	0.00	0.00	1071.91	224298.05	216794.65
CC-29	CC Above Porcupine Gulch	129953.88	4086.60	0.00	0.00	0.00	193704.84	191525.32
CC-30	Porcupine Gulch Above CC	13822.97	135.52	0.00	0.00	0.00	3446.06	3523.50
CC-31	CC Below Porcupine	136208.66	3433.83	0.00	0.00	0.00	204026.84	200020.70
CC-32	Below Hurricane Mine Complex	5026.37	38.33	0.00	0.00	0.00	3789.58	3516.16
CC-33	CC Below Sunnyside Ponds	62432.87	1228.99	0.00	0.00	0.00	133059.03	130437.18
PG-1	Background-Upper Prospect	11.91	0.00	0.00	0.00	0.00	0.00	0.00
PG-2	Background-Upper Prospect	53.32	13.82	0.00	0.00	0.00	9.87	8.89
PG-3	Below Galena Queen	22.91	9.00	0.00	0.00	0.00	2315.79	2198.77
PG-4	Background-Upper Prospect	324.97	14.47	0.00	0.00	6.58	373.64	336.81
PG-5	Below Mine Drainages	192.50	0.00	0.00	0.00	0.00	209.13	225.77
PG-6	Tributary Below Hercules	39.93	17.90	0.00	0.00	0.00	225.81	210.67
PG-7	Tributary Below Draining Mine	66.23	6.08	0.00	0.00	0.00	26.13	24.91
PG-8	Below Upper Mines	656.36	83.79	0.00	0.00	0.00	3498.23	3281.78
PG-9	Below Mineralized Canyon	716.64	98.07	0.00	0.00	0.00	3160.75	3017.42

000178

High-Flow
Metals Loading

Site Id	Description	Tot. Load Mn g/day	Diss. Load Ni g/day	Tot. Load Ni g/day	Diss. Load V g/day	Tot. Load V g/day	Diss. Load Zn g/day	Tot. Load Zn g/day
PG-10	Undisturbed Tributary	550.32	0.00	0.00	0.00	0.00	1068.12	92.55
PG-11	Above Henrietta 7	1395.77	144.75	0.00	0.00	0.00	3081.02	3256.79
PG-12	Spring	392.41	0.00	0.00	0.00	12.21	64.93	95.31
PG-13	Spring	1.74	0.00	0.00	0.00	0.00	2.11	1.97
PG-14	Tributary Below Lark & Mine Waste	38.40	5.12	0.00	0.00	2.56	527.88	479.00
PG-15	Below Henrietta 7	1908.00	0.00	0.00	0.00	0.00	6858.49	5968.95
PG-16	Below Tributary PG14	2048.59	0.00	0.00	0.00	0.00	8601.46	7682.22
PG-17	Below Joe & Johns Tributary	12.83	0.00	0.00	0.00	0.00	169.75	151.98
PG-18	Above Henrietta 11	0.00	0.00	0.00	0.00	0.00	12758.13	0.00
PG-18	Above Henrietta 11	0.00	0.00	0.00	0.00	0.00	12677.28	0.00
PG-19	Prospect Gulch Above Confluence	4244.24	0.00	0.00	0.00	121.96	19757.68	17855.09
PG-20	Tributary Above Hercules	25.20	0.00	0.00	0.00	0.00	16.80	11.20
SO-1	Queen Anne	81.34	0.00	0.00	0.00	0.00	179.96	165.73
SO-2	Lark Mine	4.62	0.79	0.97	0.00	0.12	1620.23	1468.24
SO-3	Grand Mogul	4368.69	0.00	0.00	0.00	0.00	12415.06	11312.09
SO-4	Henrietta 7 Mine	25.24	0.00	0.00	0.00	1.24	776.00	701.03
SO-5	Mogul	29.40	0.00	0.00	0.00	0.00	3704.40	3123.75
SO-6	Joe & Johns	10.33	0.00	1.08	0.83	0.92	1006.26	907.14
SO-7	Mine South of Mogul	142.66	0.00	1.32	0.00	0.00	390.73	375.81
SO-8	Red & Bonita Mine	883.20	0.57	1.15	0.00	0.00	579.67	588.91
SO-12	Black Hawk Mine	904.70	0.00	0.00	0.00	0.00	592.09	571.39
SO-13	Silver Ledge	9368.78	0.00	114.33	0.00	0.00	9874.23	9904.31
SO-14	Yukon Tunnel	2336.03	0.00	0.00	0.00	0.00	352.78	343.88
SO-16	Anglo Saxon	2952.10	0.00	6.10	0.00	0.00	1028.00	1035.71
SO-17	Big Colorado	83.46	*	1.32	*	0.26	*	37.08
SO-18	Mammoth Tunnel	723.95	3.82	3.03	1.11	0.00	163.39	167.05
SO-19	Adit Below Georgia Gulch	1733.69	0.00	0.00	0.00	0.00	268.83	250.90
SO-20	Kansas City Adit #1	19.67	0.00	0.00	0.00	0.27	19.30	29.54
SO-21	Kansas City Adit #2	81.19	0.00	0.00	0.00	0.00	52.48	53.35
SO-23	Porcupine Gulch Adit	4524.66	0.00	9.41	0.00	0.00	907.87	900.23
SO-24	Dry Gulch Adit (Evelyne)	279.01	0.00	5.10	0.00	1.59	335.38	337.29
	* Bottle Leaked In Transport							

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APPENDIX 4

Cement Creek
Waste Rock Sampling
Analytical Results

Site #	Site Name	pH	Spec. Cond	Total Acidity	Sulfate	Hach SO4	Ag	Al	As	B	Ba	Be	Ca	Cd
		s.u.	umhos	mg/l	mg/l	mg/l	ppb	ppb	ppb	ppb	ppb	ppb	ppm	ppb
1	Lark Mine - Duplicate Extract	nd	nd	nd	920	nd	14.20	4010	404.0	199.0	10.50	bdl	1.74	186.0
1	Lark Mine	2.41	3540	842	935	154	18.60	3990	378.0	191.0	11.20	0.05	1.70	185.0
2	Henrietta 7 Mine North Pile - Dup. Extract	nd	nd	nd	71	nd	bdl	960	2.9	9.6	23.30	0.34	2.83	7.3
2	Henrietta 7 Mine North Pile	3.21	264	70	76	75	0.13	1030	4.5	bdl	24.70	0.35	3.06	7.8
3	Henrietta 7 Mine South Pile - Dup. Extract	nd	nd	nd	836	nd	bdl	11600	bdl	220.0	24.70	0.61	8.87	97.7
3	Henrietta 7 Mine South Pile	2.42	3230	836	923	385	bdl	12500	bdl	219.0	26.20	0.64	9.61	104.0
4	Lower Joe & Johns Mine - Dup. Extract	nd	nd	nd	593	nd	24.90	10900	bdl	118.0	16.20	0.17	2.10	49.4
4	Lower Joe & Johns Mine	2.73	2260	588	614	379	24.30	10800	bdl	111.0	17.00	0.21	2.17	48.8
5	Forested Soil - Prospect Gulch	5.90	90	18	7	11	bdl	150	4.2	bdl	61.30	bdl	2.02	bdl
6	Upper Prospect Gulch Mine	2.15	5840	1426	1908	1270	bdl	18500	2580.0	475.0	24.50	0.33	6.72	33.7
6	Upper Prospect Gulch Mine - Dup. Extract	nd	nd	nd	1947	nd	bdl	18400	2500.0	470.0	20.80	0.33	5.97	34.1
7	Hercules Mine	2.18	8140	1604	5033	1889	bdl	19100	5520.0	958.0	1.23	0.23	3.92	3580.0
7	Hercules Mine - Duplicate Extract	nd	nd	nd	3925	nd	bdl	20500	5690.0	949.0	0.81	0.27	4.13	3850.0
8	Galena Queen - Duplicate Extract	nd	nd	nd	4853	nd	bdl	19400	10600.0	1020.0	1.68	0.29	4.01	4650.0
8	Galena Queen Mine	2.10	8940	1676	5153	3688	bdl	20900	11400.0	1100.0	0.85	0.25	3.56	5000.0
9	Unvegetated Soil - Red Mountain	5.09	110	16	4	30	bdl	3060	6.9	13.3	545.00	0.13	4.80	0.5
10	Henrietta 3 Mine	2.15	6200	1116	2960	1933	bdl	37200	bdl	943.0	25.50	2.43	29.80	127.0
11	Upper Corkscrew Mine	1.69	1380	7610	7160	7045	bdl	43300	17800.0	2370.0	24.00	bdl	4.29	135.0
12	Barren Ferricrete	3.42	260	30	31	20	bdl	430	13.6	0.8	31.60	0.22	3.00	2.2
13	Red & Bonita Mine	2.51	2080	620	581	574	bdl	14000	bdl	96.3	21.30	0.54	6.63	84.5
14	Upper Joe & Johns Mine	2.30	3060	890	1085	483	39.10	10900	11.3	133.0	6.26	0.23	3.97	630.0
15	Adams Mine	3.44	280	60	49	60	bdl	1030	10.0	3.6	1.55	0.68	3.36	5.8
16	Mine South of Black Hawk	2.50	2750	880	1061	1045	bdl	15300	bdl	244.0	8.65	1.26	8.97	34.9
17	Lead Carbonate Mine	2.40	3030	1440	1210	760	bdl	28700	bdl	306.0	19.60	1.83	29.60	188.0
18	Gold King Mine	3.10	1070	290	315	356	bdl	9910	bdl	84.9	65.30	6.82	37.10	35.6
19	Black Hawk Mine	3.20	2450	690	1348	1034	0.58	60200	bdl	77.6	36.60	23.60	183.00	350.0
20	Silver Ledge Mine	2.77	1480	290	276	277	bdl	11100	bdl	80.2	24.60	0.70	4.61	9.5
21	Big Colorado Mine	3.16	430	30	62	20	0.49	1490	bdl	30.2	9.47	0.42	3.88	3.6
22	Queene Anne Mine	2.76	1410	560	274	264	bdl	4900	bdl	64.1	17.30	0.89	11.20	55.0
23	Mine south of Mogul	2.83	1100	200	236	202	bdl	9310	bdl	54.2	5.25	0.41	6.20	10.7
24	Mine north of Mogul	2.64	1520	200	348	216	bdl	5000	bdl	92.3	23.90	0.28	6.18	42.1
25	Grand Mogul - West	2.68	1690	360	536	452	bdl	13600	bdl	77.3	26.00	1.20	12.10	60.1
26	Grand Mogul - East	2.45	2660	890	1052	500	bdl	13000	bdl	258.0	11.90	0.98	9.90	557.0
27	Mogul Mine	1.20	1940	590	581	549	bdl	6500	bdl	155.0	11.20	0.33	3.78	147.0
28	Anglo Saxon - Dup. Extract	nd	nd	nd	2373	nd	bdl	33800	bdl	656.0	22.00	1.51	91.50	112.0
28	Anglo Saxon Mine	2.66	3310	1840	2004	1007	bdl	32000	bdl	622.0	17.30	1.40	81.40	107.0

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Cement Creek
Waste Rock Sampling
Analytical Results

Site #	Site Name	pH	Spec. Cond	Total Acidity	Sulfate	Hach SO4	Ag	Al	As	B	Ba	Be	Ca	Cd
		s.u.	umhos	mg/l	mg/l	mg/l	ppb	ppb	ppb	ppb	ppb	ppb	ppm	ppb
29	Gold Hub - Duplicate Extract	nd	nd	nd	115	nd	1.47	2660	bdl	9.7	36.40	4.00	12.60	9.0
29	Gold Hub Mine	3.40	450	20	97	89	1.30	2390	bdl	13.3	34.60	3.53	11.80	8.2
30	Ross Basin - Upper Mine	2.88	1100	260	386	232	30.10	16000	bdl	24.3	2.51	2.45	10.60	145.0
30	Ross Basin - Upper Mine Dup. Extract	nd	nd	nd	416	nd	30.30	16000	bdl	20.1	2.92	2.43	10.60	144.0
31	Ross Basin - Lower Mine Dup. Extract	nd	nd	nd	1103	nd	bdl	8980	bdl	296.0	13.80	0.42	6.81	274.0
31	Ross Basin - Lower Mine	2.71	2550	1020	1165	576	bdl	8690	bdl	286.0	14.50	0.41	7.10	267.0
32	Mammoth Tunnel - Duplicate Extract	nd	nd	nd	80	nd	0.55	880	bdl	13.1	10.10	0.63	10.40	3.0
32	Mammoth Tunnel	3.66	300	5	86	70	0.82	900	bdl	8.2	10.30	0.63	10.70	3.0
33	Elk Tunnel - Dup. Extract	nd	nd	nd	22	nd	0.75	130	bdl	6.3	8.23	0.12	1.57	0.2
33	Elk Tunnel	3.57	140	3	26	10	0.52	160	bdl	4.8	9.29	0.13	0.93	bdl
34	Columbia Queen Anne Complex - Duplicate	nd	nd	nd	1615	nd	16.10	14000	69.8	391.0	19.50	1.54	6.34	38.4
34	Columbia Queen Anne Complex	2.28	3680	1390	1441	883	13.10	13900	83.2	395.0	22.90	1.50	6.32	37.0
35	Upper Porcupine Gulch Mine	2.59	2420	760	857	545	bdl	39600	bdl	86.7	19.10	1.94	16.30	145.0
36	Lower Porcupine Gulch Mine - Top of Pile	2.59	3050	1380	1219	642	bdl	28400	bdl	321.0	20.90	1.00	14.90	69.7
37	Kansas City Mine #2	2.19	9190	4800	5992	3685	bdl	51100	733.0	1490.0	1.66	3.14	295.00	2300.0
38	Kansas City Mine #1	2.55	3470	1440	1926	1194	bdl	25000	690.0	532.0	9.61	4.44	51.10	370.0
39	Evelyne	3.22	430	90	64	bdl	bdl	940	12.0	bdl	1.67	0.21	3.99	2.0
40	Galty Boy Mine	3.19	520	110	76	13	bdl	2620	12.0	bdl	12.10	0.18	2.27	21.0
41	Kansas City Mine #3	2.86	3860	480	1872	742	5.68	36700	bdl	31.0	211.00	1.72	460.00	7.5
43	Ohio Gulch Natural	2.89	382	60	87	9	bdl	2700	0.9	26.0	77.00	0.88	7.30	2.7
44	Porcupine Adit -outslope only	2.80	1390	640	659	752	bdl	39000	bdl	59.0	11.00	16.00	36.00	62.0
45	Porcupine Gulch Natural	2.47	2770	2735	2517	2700	bdl	110000	bdl	720.0	1.20	1.20	45.00	53.0
49	Elk Tunnel - Dup. Sample	3.16	168	30	25	3	bdl	310	5.3	24.0	6.00	0.24	1.40	1.3
50	Corkscrew Duplicate Sample	1.91	7580	7700	5872	8708	bdl	93000	17000.0	1700.0	64.00	0.18	4.60	120.0

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Cement Creek
Waste Rock Sampling
Analytical Results

Site #	Site Name	Co	Cr	Cu	Fe	K	Li	Mg	Mn	Mo	Ni	Pb	S	Sb	Se	Sl
		ppb	ppb	ppb	ppb	ppm	ppb	ppm	ppm	ppb	ppb	ppb	ppm	ppb	ppb	ppb
1	Lark Mine - Duplicate Extract	66.7	bdl	8900.0	202000	0.88	bdl	0.71	0.07	bdl	89.90	3370.0	307.0	bdl	bdl	615
1	Lark Mine	66.0	bdl	8920.0	199000	0.69	bdl	0.70	0.07	bdl	91.80	3490.0	312.0	bdl	bdl	613
2	Henrietta 7 Mine North Pile - Dup. Extract	8.1	bdl	185.0	3300	0.38	3.57	1.19	0.15	0.07	7.04	582.0	23.6	bdl	bdl	754
2	Henrietta 7 Mine North Pile	8.7	bdl	198.0	3470	0.46	bdl	1.29	0.16	0.45	7.42	617.0	25.4	bdl	bdl	809
3	Henrietta 7 Mine South Pile - Dup. Extract	50.3	bdl	2850.0	194000	0.63	bdl	3.21	0.59	bdl	69.50	2270.0	279.0	bdl	bdl	1070
3	Henrietta 7 Mine South Pile	53.6	bdl	3070.0	209000	0.64	bdl	3.47	0.63	bdl	76.80	2490.0	308.0	bdl	bdl	1170
4	Lower Joe & Johns Mine - Dup. Extract	59.0	bdl	3300.0	121000	0.36	bdl	2.17	0.16	bdl	67.80	3470.0	198.0	bdl	bdl	749
4	Lower Joe & Johns Mine	59.3	bdl	3340.0	122000	0.46	bdl	2.19	0.15	bdl	66.40	3430.0	205.0	bdl	bdl	747
5	Forested Soil - Prospect Gulch	bdl	bdl	3.4	150	1.88	bdl	0.51	0.03	1.45	bdl	bdl	2.4	bdl	10.50	1740
6	Upper Prospect Gulch Mine	125.0	bdl	25800.0	458000	5.44	12.50	3.52	0.33	bdl	166.00	2580.0	637.0	bdl	bdl	1210
6	Upper Prospect Gulch Mine - Dup. Extract	123.0	bdl	24300.0	431000	4.78	11.20	3.12	0.32	bdl	166.00	2480.0	650.0	bdl	bdl	1180
7	Hercules Mine	213.0	bdl	19600.0	785000	2.80	26.40	1.53	1.04	bdl	343.00	2900.0	1680.0	bdl	bdl	489
7	Hercules Mine - Duplicate Extract	229.0	bdl	20900.0	861000	3.62	11.50	1.55	1.12	bdl	358.00	2860.0	1310.0	bdl	bdl	594
8	Galena Queen - Duplicate Extract	275.0	bdl	105000.0	876000	1.32	20.40	1.19	1.96	bdl	427.00	2770.0	1620.0	bdl	bdl	844
8	Galena Queen Mine	295.0	bdl	113000.0	936000	1.02	21.70	1.06	2.11	bdl	461.00	2810.0	1720.0	bdl	bdl	847
9	Unvegetated Soil - Red Mountain	2.1	0.90	11.3	3130	4.14	bdl	1.34	0.31	0.76	4.02	42.3	1.2	bdl	2.88	4570
10	Henrietta 3 Mine	224.0	bdl	18300.0	853000	5.15	44.70	13.60	2.84	bdl	271.00	2230.0	988.0	bdl	bdl	1100
11	Upper Corkscrew Mine	275.0	bdl	36000.0	1920000	5.28	24.00	1.72	bdl	bdl	674.00	855.0	2390.0	bdl	bdl	242
12	Barren Ferricrete	7.0	0.15	39.7	1270	0.80	bdl	0.77	0.69	bdl	2.92	bdl	10.2	bdl	bdl	2410
13	Red & Bonita Mine	23.8	bdl	9930.0	107000	0.67	bdl	3.96	0.91	bdl	30.60	3420.0	194.0	bdl	bdl	1690
14	Upper Joe & Johns Mine	52.5	bdl	12000.0	113000	0.81	16.30	1.85	0.17	bdl	69.20	3160.0	362.0	bdl	bdl	747
15	Adams Mine	4.7	bdl	290.0	1250	0.48	11.20	1.38	0.42	1.95	3.59	bdl	16.4	bdl	bdl	1130
16	Mine South of Black Hawk	54.0	bdl	1080.0	206000	0.21	34.40	6.75	1.93	bdl	73.90	78.2	354.0	bdl	bdl	1150
17	Lead Carbonate Mine	77.5	bdl	6550.0	293000	0.30	56.80	14.80	5.58	bdl	110.00	1620.0	404.0	bdl	bdl	668
18	Gold King Mine	34.7	bdl	1000.0	33600	0.36	46.00	8.59	5.72	bdl	28.80	77.9	105.0	bdl	bdl	1060
19	Black Hawk Mine	226.0	bdl	4780.0	91200	10.30	118.00	38.80	55.60	bdl	179.00	4070.0	450.0	bdl	bdl	2560
20	Silver Ledge Mine	22.9	bdl	372.0	44000	0.49	bdl	2.76	0.38	bdl	22.80	490.0	92.0	bdl	bdl	832
21	Big Colorado Mine	7.8	bdl	225.0	1770	0.56	29.90	1.89	0.17	0.22	7.70	bdl	20.6	bdl	bdl	1140
22	Queene Anne Mine	17.6	bdl	1990.0	37300	bdl	25.30	1.59	2.13	bdl	19.50	135.0	91.4	bdl	bdl	453
23	Mine south of Mogul	12.3	bdl	896.0	27400	0.21	31.80	6.59	1.80	bdl	14.40	bdl	78.8	bdl	bdl	806
24	Mine north of Mogul	11.7	bdl	1530.0	64800	0.42	7.30	1.18	0.31	bdl	20.60	342.0	116.0	bdl	bdl	317
25	Grand Mogul - West	16.0	bdl	5560.0	59900	3.13	31.90	6.63	4.46	bdl	20.70	1760.0	179.0	bdl	bdl	749
26	Grand Mogul - East	26.0	bdl	8120.0	207000	0.33	30.20	3.27	4.57	bdl	63.70	2570.0	351.0	bdl	bdl	408
27	Mogul Mine	11.7	bdl	4060.0	120000	0.33	27.40	2.31	0.97	bdl	30.40	3180.0	194.0	bdl	bdl	405
28	Anglo Saxon - Dup. Extract	167.0	bdl	5680.0	546000	0.19	102.00	23.00	5.78	bdl	209.00	505.0	792.0	bdl	bdl	985
28	Anglo Saxon Mine	158.0	bdl	5350.0	524000	0.25	54.80	21.40	5.44	bdl	196.00	545.0	669.0	bdl	bdl	808

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Cement Creek
Waste Rock Sampling
Analytical Results

Site #	Site Name	Co	Cr	Cu	Fe	K	Li	Mg	Mn	Mo	Ni	Pb	S	Sb	Se	Sl
		ppb	ppb	ppb	ppb	ppm	ppb	ppm	ppm	ppb	ppb	ppb	ppm	ppb	ppb	ppb
29	Gold Hub - Duplicate Extract	29.2	bdl	126.0	540	0.76	35.60	4.90	3.81	0.39	16.50	7.3	38.3	5.84	5.73	3580
29	Gold Hub Mine	27.7	bdl	120.0	510	0.82	44.40	4.59	3.56	bdl	13.20	4.9	32.5	5.02	bdl	2910
30	Ross Basin - Upper Mine	39.1	bdl	3360.0	10200	1.56	29.50	5.21	38.50	bdl	34.90	6700.0	129.0	bdl	bdl	1300
30	Ross Basin - Upper Mine Dup. Extract	39.0	bdl	3360.0	10100	1.50	39.40	5.16	38.00	bdl	34.60	6650.0	139.0	bdl	bdl	1310
31	Ross Basin - Lower Mine Dup. Extract	39.1	bdl	18500.0	238000	0.43	23.00	1.44	0.68	bdl	74.00	2120.0	368.0	bdl	bdl	437
31	Ross Basin - Lower Mine	38.2	bdl	17900.0	235000	0.40	22.20	1.57	0.65	bdl	68.40	2130.0	389.0	bdl	bdl	450
32	Mammoth Tunnel - Duplicate Extract	6.1	bdl	51.1	310	4.98	14.70	3.20	0.51	0.53	6.48	bdl	26.8	0.52	0.81	1070
32	Mammoth Tunnel	5.6	bdl	56.1	300	5.15	26.10	3.17	0.51	bdl	4.68	bdl	28.7	2.05	5.45	1070
33	Elk Tunnel - Dup. Extract	1.1	bdl	8.7	290	0.32	6.31	0.49	0.08	bdl	2.73	bdl	7.4	5.21	bdl	666
33	Elk Tunnel	2.1	bdl	10.7	330	0.28	8.35	0.32	0.09	bdl	1.56	bdl	8.7	0.39	7.75	721
34	Columbia Queen Anne Complex - Duplicate	1.3	bdl	15400.0	323000	1.87	12.40	1.15	0.39	bdl	141.00	2210.0	539.0	bdl	bdl	491
34	Columbia Queen Anne Complex	99.0	bdl	15100.0	318000	1.95	14.00	1.19	0.37	bdl	137.00	2130.0	481.0	bdl	bdl	435
35	Upper Porcupine Gulch Mine	71.7	bdl	2760.0	105000	0.03	102.00	24.90	7.14	bdl	53.20	1210.0	286.0	bdl	bdl	2460
36	Lower Porcupine Gulch Mine - Top of Pile	38.4	bdl	3700.0	308000	0.22	32.00	6.35	1.62	bdl	76.80	2770.0	407.0	bdl	bdl	2920
37	Kansas City Mine #2	327.0	bdl	12400.0	1280000	0.88	61.00	23.00	5.60	bdl	422.00	3160.0	2000.0	bdl	bdl	896
38	Kansas City Mine #1	168.0	bdl	5670.0	495000	bdl	25.50	10.60	52.00	bdl	174.00	1500.0	643.0	bdl	bdl	1070
39	Evelyne	5.0	0.03	25.1	410	1.00	7.38	1.87	0.25	bdl	4.58	bdl	21.4	bdl	3.88	1880
40	Galty Boy Mine	6.9	bdl	416.0	1430	bdl	0.86	1.30	0.15	0.15	6.20	19.0	25.5	bdl	bdl	1400
41	Kansas City Mine #3	57.8	bdl	276.0	52600	3.45	53.60	20.80	6.11	bdl	43.20	bdl	625.0	bdl	bdl	2930
43	Ohio Gulch Natural	20.0	2.40	86.0	2200	1.70	bdl	3.00	0.35	bdl	15.00	20.0	29.0	bdl	9.60	1100
44	Porcupine Adit -outslope only	960.0	bdl	8200.0	58000	0.06	bdl	5.80	93.00	bdl	46.00	2800.0	220.0	bdl	57.00	2400
45	Porcupine Gulch Natural	300.0	bdl	1500.0	780000	bdl	35.00	15.00	2.00	bdl	250.00	20.0	840.0	bdl	630.00	970
49	Elk Tunnel - Dup. Sample	2.0	bdl	20.0	230	0.39	0.42	0.62	0.21	0.42	4.90	bdl	8.3	1.00	4.90	600
50	Corkscrew Duplicate Sample	240.0	bdl	32000.0	1750000	12.00	7.90	3.10	0.08	bdl	610.00	700.0	1960.0	bdl	1300.00	bdl

000184

Cement Creek
Waste Rock Sampling
Analytical Results

Site #	Site Name	Sr	Ti	V	Zn	Na
		ppb	ppb	ppb	ppb	ppm
1	Lark Mine - Duplicate Extract	12.1	4.55	bdl	37900	0.70
1	Lark Mine	12.0	4.63	bdl	37800	0.77
2	Henrietta 7 Mine North Pile - Dup. Extract	20.5	bdl	bdl	1670	0.17
2	Henrietta 7 Mine North Pile	21.6	bdl	bdl	1730	0.49
3	Henrietta 7 Mine South Pile - Dup. Extract	273.0	1.39	bdl	18700	bdl
3	Henrietta 7 Mine South Pile	297.0	1.43	bdl	19700	0.52
4	Lower Joe & Johns Mine - Dup. Extract	18.6	bdl	10.00	9150	0.42
4	Lower Joe & Johns Mine	19.1	bdl	9.81	9240	0.31
5	Forested Soil - Prospect Gulch	4.9	bdl	0.31	70	1.11
6	Upper Prospect Gulch Mine	70.4	4.38	bdl	2080	bdl
6	Upper Prospect Gulch Mine - Dup. Extract	69.4	3.73	bdl	2050	bdl
7	Hercules Mine	13.5	5.96	bdl	551000	29.60
7	Hercules Mine - Duplicate Extract	13.0	5.42	2.31	618000	5.32
8	Galena Queen - Duplicate Extract	16.9	11.90	15.60	782000	24.50
8	Galena Queen Mine	17.0	12.90	16.90	833000	28.70
9	Unvegetated Soil - Red Mountain	20.9	2.02	5.37	60	0.27
10	Henrietta 3 Mine	288.0	16.40	15.10	19400	bdl
11	Upper Corkscrew Mine	30.3	47.60	bdl	2040	bdl
12	Barren Ferricrete	15.1	bdl	bdl	720	0.90
13	Red & Bonita Mine	55.6	121.00	bdl	17100	0.84
14	Upper Joe & Johns Mine	21.7	3.44	0.92	136000	5.68
15	Adams Mine	23.3	bdl	bdl	1460	0.96
16	Mine South of Black Hawk	154.0	26.20	bdl	4620	0.33
17	Lead Carbonate Mine	239.0	38.10	12.80	42800	0.80
18	Gold King Mine	163.0	bdl	bdl	5960	0.85
19	Black Hawk Mine	223.0	bdl	bdl	79800	2.43
20	Silver Ledge Mine	55.9	17.30	bdl	1260	0.78
21	Big Colorado Mine	96.9	bdl	bdl	230	0.71
22	Queene Anne Mine	21.1	bdl	bdl	10400	0.92
23	Mine south of Mogul	43.2	6.08	bdl	1850	0.67
24	Mine north of Mogul	102.0	3.39	bdl	9240	0.68
25	Grand Mogul - West	92.6	2.56	bdl	12700	0.90
26	Grand Mogul - East	164.0	41.70	bdl	107000	5.48
27	Mogul Mine	40.5	32.90	bdl	33300	1.35
28	Anglo Saxon - Dup. Extract	177.0	274.00	16.30	18700	0.04
28	Anglo Saxon Mine	155.0	278.00	16.10	17600	0.12

000185

Cement Creek
Waste Rock Sampling
Analytical Results

Site #	Site Name	Sr	Ti	V	Zn	Na
		ppb	ppb	ppb	ppb	ppm
29	Gold Hub - Duplicate Extract	217.0	bdl	bdl	1260	0.37
29	Gold Hub Mine	200.0	bdl	0.21	1170	0.45
30	Ross Basin - Upper Mine	23.4	0.60	bdl	3340	2.13
30	Ross Basin - Upper Mine Dup. Extract	23.5	0.35	bdl	33000	2.07
31	Ross Basin - Lower Mine Dup. Extract	23.7	10.90	bdl	50000	2.59
31	Ross Basin - Lower Mine	23.0	11.40	bdl	49100	1.70
32	Mammoth Tunnel - Duplicate Extract	102.0	bdl	bdl	410	0.96
32	Mammoth Tunnel	104.0	bdl	bdl	410	0.92
33	Elk Tunnel - Dup. Extract	12.4	bdl	bdl	40	0.44
33	Elk Tunnel	13.3	bdl	0.01	50	0.24
34	Columbia Queen Anne Complex - Duplicate	227.0	5.67	5.44	2170	bdl
34	Columbia Queen Anne Complex	215.0	6.40	4.82	2110	0.01
35	Upper Porcupine Gulch Mine	55.2	2.84	bdl	31100	1.19
36	Lower Porcupine Gulch Mine - Top of Pile	488.0	94.30	bdl	11700	0.24
37	Kansas City Mine #2	148.0	6.47	80.40	377000	8.28
38	Kansas City Mine #1	319.0	bdl	bdl	86200	2.13
39	Evelyne	11.9	bdl	bdl	460	2.42
40	Galty Boy Mine	40.4	bdl	bdl	5190	0.30
41	Kansas City Mine #3	997.0	23.40	bdl	800	1.01
43	Ohio Gulch Natural	180.0	bdl	bdl	410	1.10
44	Porcupine Adit -outslope only	170.0	2.80	bdl	16000	0.30
45	Porcupine Gulch Natural	29.0	3200.00	44.00	1000	0.13
49	Elk Tunnel - Dup. Sample	17.0	bdl	bdl	100	0.69
50	Corkscrew Duplicate Sample	39.0	180.00	bdl	2200	1.30

000186

Reference 6c

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Mine Adits, Mine-Waste Dumps, and Mill Tailings as Sources of Contamination

By J. Thomas Nash and David L. Fey

Chapter E6 of

Integrated Investigations of Environmental Effects of Historical Mining in the Animas River Watershed, San Juan County, Colorado

Edited by Stanley E. Church, Paul von Guerard, and Susan E. Finger

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Chapter E6
Mine Adits, Mine-Waste Dumps, and Mill Tailings as Sources of Contamination

By J. Thomas Nash and David L. Fey

Abstract

The long history of exploration and mining in the upper Animas River basin has produced thousands of prospects and now-inactive mines that range in size from small exploration pits to large mines with tens of miles of workings and mine waste with a corresponding range in size. The recovery of metals required the milling of 18.6 million tons of ore that created large volumes of mill tailings, part of which were placed in streams, or placed in impoundments after 1935. The high precipitation—particularly snowfall—in this area infiltrates mine workings, mine-waste dumps, and mill tailings to create acidic drainage that in places carries high concentrations of metals. To characterize the magnitude of acidic drainage and the concentrations of contaminants, we sampled 97 mine-waste sites, 18 mill-tailings sites, and 60 mine-adit drainages—the most significant ones that we could identify on public lands. Detailed descriptions of the geochemical determinations made on mine water and mine waste enabled us to rank sites for their potential to contaminate the watershed. We utilized three scores—acid generation, metal release in leach tests, and size—to rank waste dumps and mill tailings. For mine-adit water, we utilized metal-loading scores for copper and zinc to rank the potential to contaminate water and degrade aquatic habitat.

Our geochemical characterization results and rankings of sites suggest a wide range in potential to contaminate the watershed. Out of the more than 500 identified sites on public land, only about 40 sites have sufficient size, adit discharge, or waste reactivity to be significant sources of contamination. Sites that have high rankings as sources and those identified by tracer studies of the main streams deserve attention for remediation work.

Introduction

Degraded water quality in streams of the Animas River watershed study area is well documented (Church and others, 1997; J.R. Owen, Unpublished report on water quality and sources of metal loading to the upper Animas River Basin, Colorado Department of Public Health, Water Quality Control Division, 1997; Kimball and others, this volume, Chapter E9; Wright, Simon, and others, this volume, Chapter E10), but the sources of the contaminants are numerous and difficult to quantify. Mining at large and small mines and excavating at countless prospects have disturbed millions of tons of mineralized rock in the Silverton area and resulted in chemical reactions that release acid and metals to receiving waters in the watershed. In this chapter we describe sources of contaminants from inactive mines, mine-waste dumps, and mill tailings that are on public land. The larger sources of contaminants from mining on lands administered by the U.S. Bureau of Land Management (BLM) and United States Department of Agriculture (USDA) Forest Service have been previously described by Nash (1999a, 1999b).

Although biologic criteria drive the standards for desired water quality in the Animas River watershed study area (Besser and others, this volume, Chapter D; Besser and Leib, this volume, Chapter E19), chemical methods are routinely used to measure water quality relative to biologic standards. In this study we used field and laboratory methods to obtain chemical analyses of mine-drainage water that can be evaluated in the context of water-quality standards. In addition, leach tests of mine waste (Fey, Desborough, and Church, 2000) provide a measure of *potential* for acid generation and metal release; those test results can be used to evaluate which waste materials are most reactive and possibly in need of remediation. Whereas leach tests provide reproducible and reliable chemical measurements, physical factors at the site such as the amount of rain and snowfall and the permeability of waste material can affect numerical estimates of potential acid or metals sources. The actual water quality measured from a mine adit or below a mine-waste dump is emphasized in this report because that is a real measure of conditions at a site. However, even these determinations are only an approximation of the effect on the watershed because they do not include processes that may improve or further degrade water quality after it leaves the mine adit, mill, or dump site. Whereas reactions of mine-adit water with mine-waste materials commonly add acid and metals to water, beneficial reactions with wallrocks and mixing of mine-adit drainage with

shallow ground water commonly improve water quality before the mine-related water enters a stream (Nash, 2002; Plumlee and others, 1999). Water-quality investigations by Kimball and others (this volume) indicate that only a few of the sites on public land described here provide major contributions of mine drainage to the major streams of the study area.

Purpose and Scope

The purpose of this study was to describe the magnitude of contamination contributed by mines (mine-adit water), mine-waste dumps, and mill tailings on public land.

1. Field observations and sampling were designed to obtain representative information for mine sites on public land and to compare and rank them as sources of contamination. A limited number of samples were collected at private sites, with the owner's permission. Mines with no road access and located more than about 2 mi from streams were not sampled because this situation was considered not amenable to remediation.

2. Sites were visited a second time for additional observations and sampling if the initial samples suggested a substantial source of contaminants.

3. Mine and mill-tailings sites were evaluated by two class-based ranking methods, rather than by numerical methods, to address uncertainties in field measurements and sampling.

Field Methods

Mine-waste and mill-tailings samples were collected with a protocol designed to provide a statistically reliable, representative sample of the upper 30 cm of a waste pile by combining 30 or more subsamples taken at uniform intervals across the pile and sieving through a 2-mm screen (Smith, Ramsey, and Hageman, 2000). Field studies from 1996 to 2000 included one or more visits to more than 300 sites (mines or prospects). At some sites we collected replicate samples at the same time, by a second sampler, or else during the following year. A total of 173 mine-waste dump and mill-tailings samples were collected from 97 mine-waste dump sites and 18 mill-tailings sites, most of which are on public land. Sites with mine-waste dumps smaller than approximately 100 tons generally were not sampled. Twenty samples of unmined, altered rock were also collected. Representative samples of dump rocks and mill tailings from 113 sites were analyzed chemically. A total of 193 samples of mine-waste dump material, mill tailings, and altered rocks were studied using a passive leach method. Laboratory methods used in leach tests of mine waste and rock are described by Fey, Desborough, and Church (2000), and analytical results are reported in Fey, Nash, and others (2000).

Water samples were collected using a simplified method described by Ficklin and Mosier (1999); we used a disposable 60 mL syringe and 0.45 µm (micrometer) cellulose filter and the addition of ultrapure nitric acid to stabilize metals until analysis by inductively coupled plasma–mass spectroscopy (ICP-MS) and inductively coupled plasma–atomic emission spectroscopy (ICP-AES) (Nash, 1999a; Nash, 2002). The analytical results for our samples of mine-adit drainage water and mineralized surface water are reported in the database (Sole and others, this volume, Chapter G). All adits on public land known to have flowing mine drainage were sampled, along with a limited number of samples from private sites for comparison. All water samples were collected in August or September, during low-flow conditions (as defined by von Guerard and others, this volume, Chapter B).

Discharge at mine portals, an important parameter in metal load calculations, is not easily measured. Discharges were measured carefully by Mast and others (2000), but in our work were based simply on a visual estimate by Nash. Herron and others (Jim Herron, Bruce Stover, and Paul Krabacher, Unpublished Lower Animas River reclamation feasibility report, Upper Animas River Basin, Colorado Division of Mines and Geology, 2000, and similar reports for Mineral Creek, Cement Creek, and Upper Animas River reclamation, 1997, 1998, and 1998) determined mine-adit drainage discharges using a portable weir. Comparison of the estimates by Nash with discharges measured by Mast and others (2000) at the same sites for similar dates suggests that the differences are between about 20 and 50 percent. We emphasize that all measurements and estimates at mine portals are minimum values, because water commonly is lost into alluvium or into fractures in bedrock. This is evident at sites discussed later, including Grand Mogul (mine # 35, caved adit, with flow through a waste dump on alluvium), the Lark and the Joe and Johns (mines # 86 and # 87, with caved adits on alluvium), and the Bandora (mine # 332, with caved adit on mine-waste dump and talus). Because of the loss of mine water through alluvium and bedrock fractures, discharge values used in this report may err on the low side by 25–75 percent at some sites. The effect of these errors in the calculated loads, discussed later, is not easily computed but could be large for the absolute values. However, because we use ranked metal-load score classes, the relative scores are less affected by erroneous discharge values than would be numerical scores. They could change the ranking score by as much as one class (for example, "very high" would be "high").

Site names are those in Church, Mast, and others (this volume, Chapter E5) insofar as possible, but many small mines and prospects on BLM land do not have accepted names. For those sites we use the numeric code employed by Hite (Barbara Hite, Unpublished mine land inventory report for the U.S. Bureau of Land Management, U.S. Bureau of Mines, 1995) with the prefix B, such as B015.

Mineral Deposits Classification and Changes in Mining Technology

Mineral deposits of the Animas River watershed study area and vicinity can be considered to be of just a few types, or they can be split into many subtypes for special purposes such as economic geology or mining engineering (Burbank and Luedke, 1969; Casadevall and Ohmoto, 1977; Guilbert and Park, 1986; Bove and others, this volume, Chapter E3). For the purposes of this report, we used a simple three-part classification of deposits.

1. Polymetallic veins, rich in pyrite, and having variable proportions of chalcopyrite, galena, sphalerite, and gold- and silver-bearing sulf-arsenide minerals as in the Sunnyside mine and the majority of mines and prospects in the study area. These deposits tend to be along major faults inside and outside the Silverton caldera that have moderate argillic alteration halos of pyrite and clay minerals 5–10 m wide (Bove and others, this volume). Manganese minerals (pyroxmangite and rhodochrosite) are locally abundant in some veins, and tungsten (as wolframite, an iron-tungsten-oxide) and fluorine (fluorite) are abundant in some places.

2. Polymetallic breccia pipes, similar in composition to the veins but tending to be richer in sulfide and arsenide minerals, as at the Lark mine (mine # 86, Prospect Gulch) and National Belle mine (northwest of the study area, at Red Mountain Pass). These deposits are restricted to the caldera fault zone, are highly localized as intense bodies of alteration and ore minerals, and are associated with broad alteration halos of the acid-sulfate type with disseminated pyrite-alunite-clay minerals, as in the Red Mountain area (Bove and others, this volume). “Polymetallic” is an appropriate descriptor for virtually all of the deposits of the Animas River watershed study area because many base metals and metalloids (collectively called metals for simplicity) are concentrated in these deposits, even if miners emphasized silver, gold, copper, lead, or zinc for economic reasons.

3. Porphyry deposits containing shattered zones filled by copper-molybdenum quartz-sulfide veinlets, as, the peak 3,792 m and Anvil Mountain areas; these mineralized areas, having large vertical and horizontal dimensions, have been drilled, but none has been mined in this area. Weathering of pyrite in the peripheral alteration halo is a source of acidic drainage today (Yager and others, 2000; Bove and others, 2000; Bove and others, this volume).

Placer deposits of gold in alluvial gravel were mined in a few places such as Arrastra Creek; placer deposits will not be mentioned further, as they were small and made only a minor contribution to the total production in the watershed. They are, however, a reminder that mineralized rocks and veins contributed metals to streams of the area prior to mining activity. Studies by Church, Fey, and Unruh (this volume, Chapter E12) have shown elevated metal concentrations in premining sediment collected throughout the watershed.

Changes in mining and milling technology through the years have had important influences on the materials left behind in the mines or placed on mine-waste dumps and mill-tailings piles (Jones, this volume, Chapter C). In the watershed at least two stages of technology can be highlighted:

1. Early (1871–1913), small-volume mining of high-grade ore zones, with small associated milling infrastructure. The miners lacked powered equipment, created very narrow stopes, and generally brought only hand-picked high-grade ore to the surface. Mine-waste dumps were small relative to the amount of ore removed.

2. Later (after 1913), increasingly large scale mining of lower grade ores was made possible by consolidation of workings, availability of electric- and pneumatic-powered machines, and new milling technology. Selective flotation was developed to recover specific sulfide minerals. The change in milling style was first made at Sunnyside with a new flotation mill built in 1917. Zinc, one of the toxic metals of prime concern in the Animas River (Besser and Brumbaugh, this volume, Chapter E18), was not deemed economic and therefore not recovered before 1904. Significant amounts of zinc are found in all of the ores and mine-waste dumps, and zinc-rich materials were intentionally left underground in many of the older workings because smelters levied a surcharge if the concentrates contained more than 10 percent sphalerite (Ransome, 1901). In this stage, mine tunnels became many miles in length (some crossing under natural drainage divides), tramways were used to carry distant ore to centralized mills, and large mine-waste dumps and mill-tailings piles were made. Tailings handling policies changed in 1935 when regulations required that mill tailings be confined to so-called “tailings ponds” rather than be allowed to go directly into surface streams (Chase and Kentro, 1938). The very large (millions of cubic yards) tailings piles of some of the large mills in the region are physically stable today (the older ones as at Eureka were breached during storm events; Vincent and Elliott, this volume, Chapter E22). Their contents remain a matter of study and concern, however, because the piles were not built on impermeable pads (thus infiltrating water can escape through the base into alluvium). This brief review of the history and technology of mineral extraction in the study area is a reminder that individual site evaluations must consider the mode of mining and milling used at the site before remediation technologies are considered.

Geochemical Characterization of Mining-Related Contamination

Passive Leach Tests and Rankings

Two procedures for determining leachable metals in mine waste and other material were applied to samples in this study. One of the leaching methods was the EPA-1312 protocol, which involves mixing mine-waste material with a dilute-acid extractant and tumbling for 18 hr. This procedure is designed to approximate the effect of rainfall on mine-waste material (U.S. Environmental Protection Agency (USEPA), 1986). Because the EPA-1312 procedure is more labor intensive than the passive leach described in the next section, it was not applied to all samples from this study. Results of the EPA-1312 method are not described here but are compared with results of other methods in Fey, Nash, and others (2000). Results for the EPA-1312 leach are in Fey, Nash, and others (2000) and in the database (Sole and others, this volume). The passive leach method, developed by Desborough and Fey (1997), is a simpler approach to determining leachable metals and was applied to all samples from sites described here. A chemical ranking method utilizing the pH and soluble metals derived from the passive leach was described in Desborough and Fey (1997) and was applied in this study.

The passive leach method was applied to samples collected in the 1997, 1998, and 1999 field seasons. Selected results for some of the more significant sites on public land are presented here. In the passive leach tests, a 100-g sample was exposed to 2L of laboratory de-ionized water (pH of 5.0±0.2) in an open 4L beaker, resulting in a sample/extractant ratio of 1:20. Samples were left at rest for 1 hr, and then gently stirred for 5 s (seconds) to prevent stratification of the leachate. The pH of the leachate was measured after 24 hr and then a 60 mL sample of the leachate was filtered through a Gelman 0.45-µm (micrometer) filter using a disposable 60 mL syringe, acidified with 6 drops of ultra-pure HNO_3, and refrigerated prior to analysis by ICP-MS.

Results from the passive leach tests show that the mine-waste materials generate a wide range of metal concentrations and pH values (table 1; fig. 1). The metal concentrations in the leachate solutions are a measure of the mobile metals in the sample, and the leachate pH is one measure of the acidity generated by the sample. The acidity produced in the passive leach is predominantly from the dissolution of water-soluble acid salts. These salts are mostly hydrous iron sulfate salts such as melanterite ($FeSO_4 \cdot 7H_2O$), copiapite (Fe, Mg) $Fe_4(SO_4)_6(OH)_2 \cdot 20H_2O$) and jarosite ($KFe_3(SO_4)_2(OH)_6$), formed as a result of the oxidation of pyrite (FeS_2) and other sulfides in the waste material. To characterize and rank the waste materials, we utilized the method of Desborough and Fey (1997), with slight modification, which assigns scores for pH and summed metal concentrations Σ(As+Cd+Cu+Pb+Zn, in µg/L). For pH values greater than 6.0, a score of 0 is given; for pH between 4.5 and 6.0, the score is 1; for pH between 3.5 and 4.5, the score is 2; and for pH less than 3.5, the score is 3. Similarly for summed metal content, scores are assigned as follows: less than 500 µg/L, 0; between 500 and 1,000 µg/L, 1; between 1,000 and 5,000 µg/L, 2; and greater than 5,000 µg/L, 3. Because both acid generation and metal release are significant characteristics of mine waste, we added the factors to represent the relative chemical potential for waste to adversely affect water quality. These chemical score values are shown in figure 1. For example, samples plotting in the upper left field of figure 1 score a six (three from the low pH, and three from the summed metals), and have the most potential for adversely affecting water quality. Sum scores of two, three, four, or five may result from the different possible combinations of pH and summed metal scores. Note that no samples plot in the upper three fields on the right hand side of the figure, where the high pH limits the concentrations of metals in the leachates. Although mine-adit drainage water or leachate solutions with high pH can have substantial zinc concentrations, none of our waste sample leachates had both high pH and high zinc concentrations.

The size of a mine-waste dump is also significant in estimation of its potential for contamination and should be included in the waste ranking. Size, in (2,000 lb) tons, was calculated from field estimates of length, width, and thickness; uncertainties in dump geometry and waste density suggest that the size value carries an error of roughly ±25 percent. We utilized five size categories to cover the large range in dump sizes in the study area, ranging from 1 (less than 300 tons)

Table 1. Summary of leachate chemistry for mine waste and mill tailings.

[pH in standard units; elements in µg/L (micrograms per liter)]

	pH	Al	As	Cd	Cu	Fe	Mn	Pb	Zn
Dump samples (*n*=150)									
Minimum	2.28	0.60	0.04	0.02	0.40	0.20	5.2	0.020	0.50
Median	3.44	150	1.20	5.50	28	500	188	120	300
Maximum	8.13	14,000	3,570	165	6,960	144,000	37,400	30,000	30,900
Mill tailings (*n*=25)									
Minimum	2.57	0.10	0.20	0.02	1.0	30	6.7	0.06	0.70
Median	3.90	11	0.30	14	111	35	405	8,000	1,710
Maximum	7.78	6,400	3.5	95	1,500	55,000	20,000	31,000	25,200

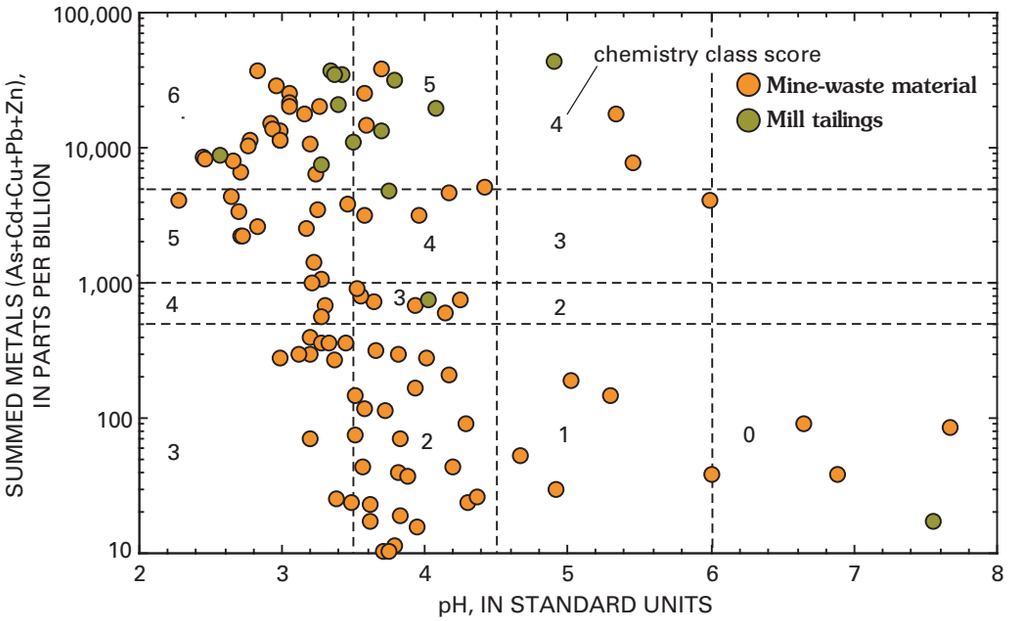

Figure 1. Composition of leachate solutions and classification of mine waste.

to 5 (greater than 50,000 tons), as shown in table 2. An overall *mine-waste score* is obtained by multiplying the dump size score by the chemistry score (sum of the pH and metal scores). Not included in the waste score are other factors such as proximity to stream, surface water flowing across waste material, draining adit water contacting waste material, proximity to ground water, substrate hydrologic conductivity, or other factors that are known to influence mine-related contamination—these attributes are considered in the verbal site descriptions later in this chapter. Finally, the mine-waste scores are converted into five classes that we define as *mine-waste rank*. The five mine-waste ranks, from "low" to "very high," connote the approximate potential to create contamination. Each of the three parameters in the waste score carries uncertainty and error; a numerical value was not used because it might appear to be more precise than its constituent measurements could support. The locations and rankings of mine-waste dump sites on public land are in figure 2.

Geochemistry of Mill Tailings and Tailings Drainage

Mills were numerous in the Animas River watershed study area, especially along the upper Animas River where waterpower was abundant and railroad transportation available (Jones, this volume). Physical evidence remains for more than 50 mills and about 23 mill-tailings sites (Nash, 2000). Mills and associated mill-tailings impoundments fall into three stages of operation: (1) early stage (pre-1913) relatively small stamp mills and unconfined mill tailings that were mostly lost to the nearby river (either poured into the river or washed away during storms); (2) middle stage (c. 1913–1935), larger mills that used flotation to recover zinc and created larger mill-tailings impoundments, many of which failed during major storm events; and (3) late stage (post-1935), large mills that placed tailings into designed impoundments after the Executive Order in 1935 instituted regulations on mill-tailings disposal; most of these tailings are in place today. Tailings from early stage 1 mills are not candidates for remediation because they have been dispersed downstream, where they contribute to the postmining baseline geochemistry of the watershed. Some of the stage 2 tailings pose problems today, either in place or as overbank fluvial deposits transported by flood water (Vincent and Elliott, this volume; Vincent and others, 1999). Some fluvial mill tailings have been reclaimed, such as those south of Eureka. Stage 3 mill tailings, notably the large tailings impoundments of the Mayflower mill, are mostly in place (Jones, this volume).

One estimate of the potential for contamination from mill tailings comes from leach tests. In our studies of 20 representative mill-tailings samples, half of the samples created leachate solutions of high acidity (pH <3.6), and these acidic solutions contained high to very high concentrations of cadmium, copper, lead, zinc, and other metals (fig. 1).

Samples of water that has reacted with mill tailings are difficult to obtain because seeps from tailings impoundments are rare in this area. In places one can collect pore water from within impounded mill tailings (from an auger hole) or water seeping from the sides of an impoundment. Pore water samples from two impoundments had pH values of 5.9 and 4.0, and high to extremely high concentrations of cadmium,

Table 2. Ranking of mine-waste sites based on size and passive leach test results.

[Site name and # from Church, Mast, and others (this volume); (3), number of samples in average. Size score, acid score, metal score, and waste score explained in text. Waste rank, VH, very high; H, high; M, medium; L, low]

Site name	Mine or site number	Size score	Acid score	Metal score	Waste score	Waste rank
Brooklyn (3)	141	5	3	3	30	VH
Kittimack tailings	192	5	2	3	25	VH
B157		4	3	3	24	VH
Grand Mogul (3)	35	4	3	3	24	VH
Lackawanna tailings	287	4	3	3	24	VH
Lark (6)	86	4	3	3	24	VH
Henrietta 700 (2)	85	4	3	2	20	VH
Henrietta 800	505	4	3	2	20	VH
May Day (2)	181	5	3	1	20	VH
Ruby Trust	169	4	3	2	20	VH
Clipper	114	3	3	3	18	VH
Bandora (3)	332	5	1.7	2	18	VH
Brooklyn tailings		3	3	3	18	VH
Monarch	180	3	3	3	18	VH
Ben Butler	9	3	2.7	3	17	H
Minnesota Gulch	144	3	3	2.5	17	H
Little Ida	15	4	3	1	16	H
Kittimack mine	201	4	3	1	16	H
Frisco tunnel	19	3	2	3	15	H
Mammoth tunnel	148	4	3	0.5	14	H
Silver Crown (2)	133	4	3	0.5	14	H
Bonner (3)	172	5	2.7	0	13	H
B237		3	2	2	12	H
Burbank	207	4	2	1	12	H
Joe and Johns	87	2	3	3	12	H
Sultan tunnel	266	4	2.5	0	10	H
Upper Brooklyn		2	3	2	10	H
B213		3	2	1	9	M
N. Denver Lake		3	2	1	9	M
Legal Tender	189	3	2.5	0.5	9	M
Forest Queen (2)	195	3	3	0	9	M
Henrietta 900	506	3	3	0	9	M
Imogene (3)	136	4	2.3	0	9	M
North Star tailings	310	3	1.5	1	9	M
Paradise West		3	3	0	9	M
Paradise (3)	168	4	2.3	0	9	M
Independence	171	3	3	0	9	M
Early Bird	8	4	2	0	8	M
Avalanche (2)	149	3	2.5	0	8	M
Last Chance	289	3	2	0.5	8	M
Columbine	260	3	2.5	0	8	M
B021 (2)		1	3	3	6	L
Mighty Monarch	285	3	2	0	6	L
East Burro bridge		3	2	0	6	L
Elk tunnel (2)	147	3	2	0	6	L
Ruby Trust tailings		1	3	3	6	L
Eveline	91	1	2	3	5	L
Ferricrete mine	137	2	2	0	4	L
Eagle Chief	14	3	1	0	3	L
B183		3	1	0	3	L
B229		3	1	0	3	L
B182		3	0	0	0	L
Highland Mary dump	357	5	0	0	0	L
Highland Mary tailings	351	5	0	0	0	L

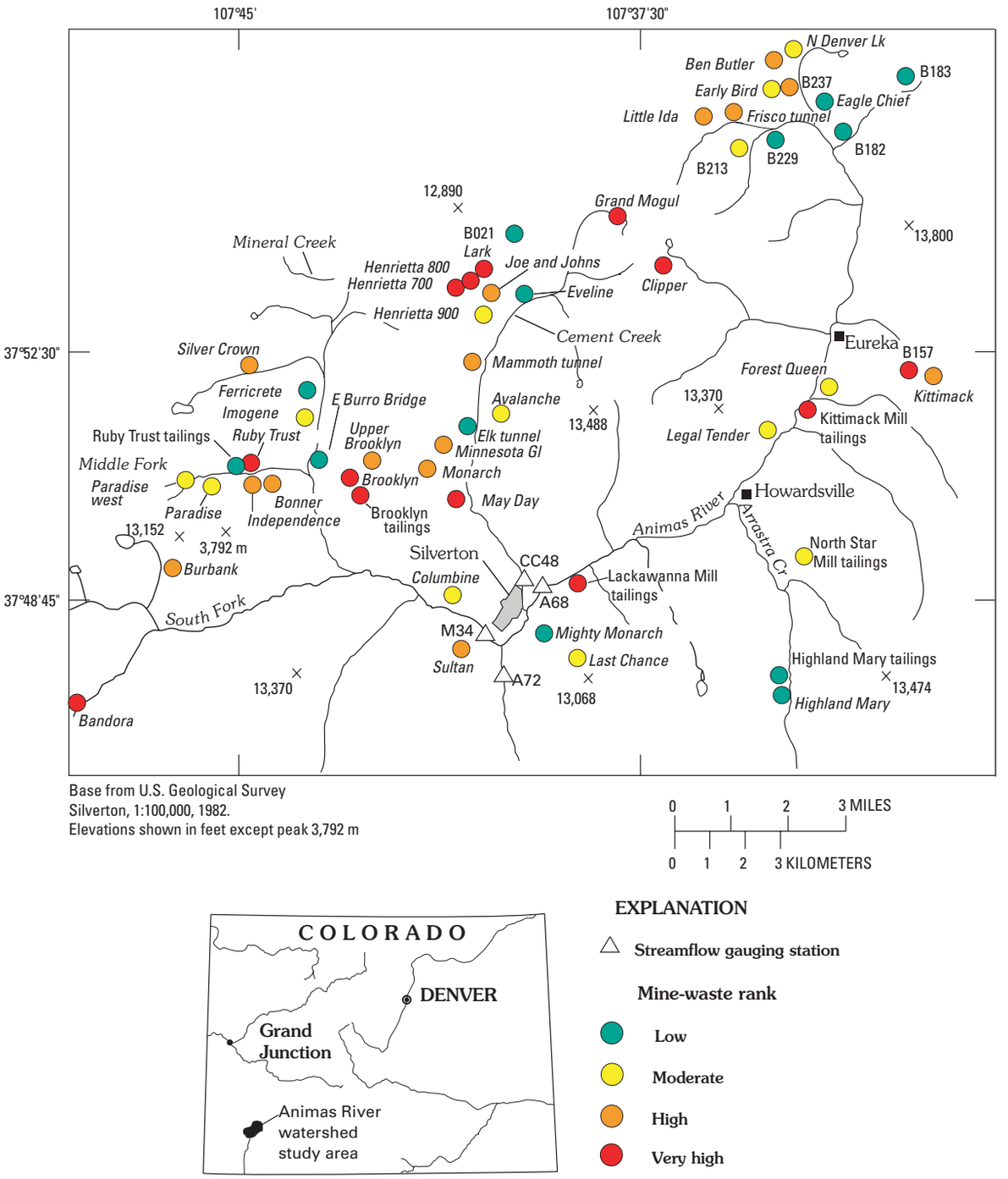

Figure 2. Location and ranking of mine-waste materials at sites on public land in the Animas River watershed study area. Rank is based on size, metal release, and acid-generating potential described in table 2. Map elevations are in feet, except for the prominent peak between Middle and South Forks Mineral Creek, designated as peak 3,792 m (its elevation shown in meters).

copper, lead, and zinc. Springs and diffuse inflows on the west bank of the upper Animas River near the Powerhouse (1 mi northeast of Silverton) are acidic, highly conductive, and rich in metals (Paschke and others, 2005; Kimball and others, this volume; J.T. Nash, unpub. data, 2000); these inflows and possible relations to mill tailings warrant further investigation. Water samples of this type, collected from geologically similar mill tailings elsewhere on the Western Slope of Colorado (Nash, 2002) also tended to be acidic (pH from 2 to 4), with high to extremely high concentrations of base metals.

Mine-Adit Drainage and Ranking

Mine-adit drainage is more common in this area than in most mining areas of the United States. The combination of high precipitation, extensive fracturing (Yager and Bove, this volume, Chapter E1; McDougal and others, this volume, Chapter E13), and high relief creates numerous springs and drainage from mine tunnels. Mine tunnels are common in the study area because they afforded efficient access to deep mine workings while also draining water from the mine. Vertical mine shafts in the study area are also commonly full of water, but this water does not usually flow from the shafts and will not be considered further. Mine tunnels, on the other hand, discharge from 1 to more than 400 gpm (gallons per minute); the water quality is highly variable, and most is degraded relative to water-quality standards for drinking water or for wildlife use. All observations and sampling were conducted in late August or early September of 1997 to 2000, during lower flow stages of the hydrograph (von Guerard and others, this volume). Repeated measurement and sampling of mine-adit drainage show that some adit drainages are relatively consistent in discharge or composition, but that others vary substantially through the year. Seasonal variations in discharge and water quality were studied in detail by Mast and others (2000) and are discussed elsewhere in this report (Wright, Simon, and others, this volume, Chapter E10; Leib and others, this volume, Chapter E11; Mast and others, this volume, Chapter E7). Variations in mine-adit discharge estimates and measurements may explain some differences in ranking by various studies discussed later.

The range in geochemical data from mine-adit drainages is summarized in table 3 and figure 3. Both highly acidic and moderately acidic mine-drainage water sampled in this investigation contains dissolved metal concentrations that could be threats to aquatic life. Based on the percentage of sampled water that exceeds chronic aquatic life water-quality standards (table 3), the most common problems are with zinc, pH, and iron, followed by aluminum, manganese, copper, and cadmium; other investigations have found similar tendencies. The concentrations of lead and arsenic are much less likely to exceed water-quality standards. Because base-metal concentrations generally correlate with acidity (fig. 3; Plumlee and others, 1999), drainage water with pH values from 2 to 4 tend to have highest *concentrations* of toxic metals such as cadmium, copper, and zinc. However, metal *loadings* in the study area tend to be highest from draining adits with water having pH values from 4 to 6 with discharges greater than about 50 gpm.

Highly acidic water (pH 2.3–3.5 observed, fig. 3) is found in 27 percent of mine-adit drainages in this study; some springs have pH values in this range (Mast and others, this volume). Moderately acidic mine-adit drainage (pH 3.5–5.5) is found in 38 percent of mine-adit water in this study; springs flowing from altered red rock in the study area also commonly have pH values in this range. Near-neutral pH values (5.5–7.9) are found in 35 percent of draining mine adits, generally where tunnels have cut sedimentary rocks or propylitically altered volcanic rocks (Yager and Bove, this volume, pl. 1; Bove and others, this volume). Metal concentrations range greatly, but in general increase with acidity.

Table 3. Summary of mine-adit drainage geochemistry.

[Elements determined by ICP-MS, in parts per billion (µg/L); 108 samples; µS/cm, microsiemens per centimeter]

	Minimum	Median	Maximum	Percent exceeding ALWQ[1]
pH	2.3	5.2	7.4	84
Conductivity µS/cm	17	380	>2,000	nc
Al µg/L	1.8	380	52,850	64
As µg/L	<0.03	1.1	186	5
Cd µg/L	<0.01	2.4	1,600	45
Co µg/L	0.06	9.4	154	nc
Cu µg/L	<0.1	15	12,000	51
Fe µg/L	20	4,000	28,800	75
Mn µg/L	1.4	1,030	87,200	53
Ni µg/L	0.1	8.8	105	nc
Pb µg/L	<0.1	2.0	2,520	19
Zn µg/L	8	980	76,000	87

[1]ALWQ, Aquatic life water quality standard (chronic) of CWQCD (2001) for other parts of Colorado; nc, not computed.

Metal Concentrations

Eight metals are generally considered to be potentially harmful to aquatic health—aluminum, arsenic, cadmium, copper, iron, manganese, lead, and zinc (Manahan, 1994; U.S. Environmental Protection Agency, 1999; 2001). For aquatic biota of the Animas River watershed study area, the two metals of prime concern are copper and zinc (J.R. Owen, unpub. report, CDPH, 1997). Besser and Leib (this volume) have shown that dissolved zinc and copper have the greatest effect on aquatic biota in the study area. Other potentially toxic metals, such as silver, cobalt, mercury, molybdenum, nickel, and selenium, were detected at low concentrations

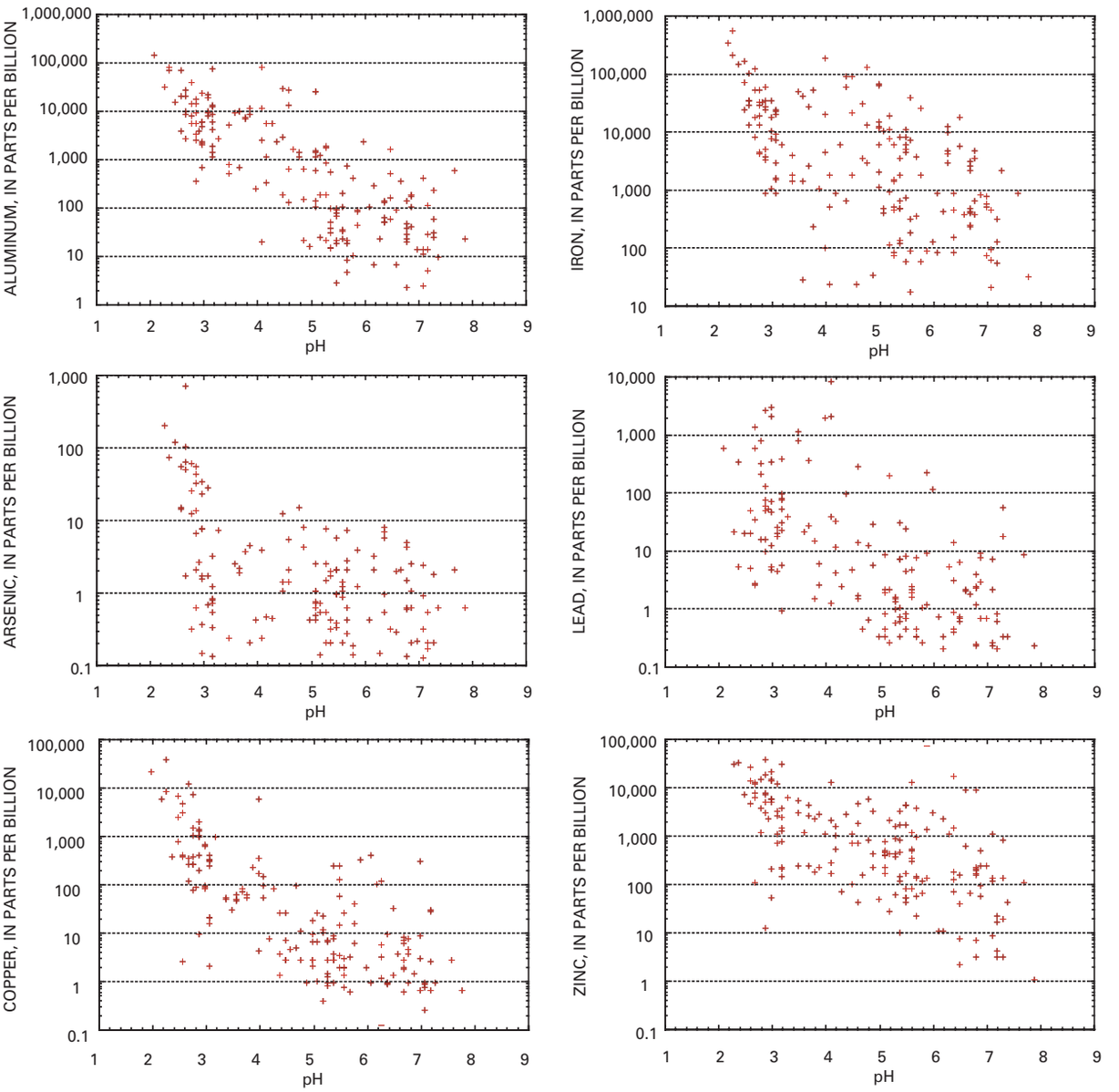

Figure 3. Composition of mine drainage water as a function of pH (standard units).

relative to standards for human and aquatic health; only in a few cases of extremely acidic mine-adit drainage water were these elements sufficiently concentrated to merit concern. Of the potentially toxic metals, some have elevated concentrations more commonly than others. Comparing our analyses of 108 water samples at mine portals and mine-waste dumps with chronic water-quality standards for aquatic life (table 3; CWQCD, 2001; Besser and others, this volume, Chapter D), we note that for more than half of the mine sites, water compositions exceeded the standards for aluminum, copper, iron, manganese, and zinc, whereas concentrations of arsenic and lead rarely exceeded the standards. In the descriptions of mine sites later in this chapter, metal concentrations in water will be described as “high” or “very high” relative to our analyses of mine-adit water (summarized in table 3): “high” denotes values greater than the median and “very high” denotes values greater than the 80th percentile of our analyzed samples. Water measurements termed “very high” are usually substantially in excess of chronic water-quality standards for aquatic life.

Metal Loads

Another measure of the degree of contamination from mine sites is the magnitude of metal loads. A metal load is the product of metal concentration and the discharge of a stream or mine adit (Mast and others, this volume; Kimball and others, this volume). Although health effects on wildlife and humans generally are related to metal concentrations, loads provide an alternative way of evaluating metal budgets in watersheds. We have calculated metal loads for representative examples of mine-adit drainage where the water composition has been determined and the discharge has been measured or estimated. Because of the time variability in discharge and metal concentrations over the year (Mast and others, 2000) and uncertainties in our discharge estimates, we have expressed the loads as ranked values (table 4). The calculated loads for sites sampled at similar times of the year over a 3-year period demonstrate substantial variations, but not enough to significantly change the relative rankings. For example, the loads calculated for the Grand Mogul mine (site # 35) for our three sample events all ranked it among the top eight sites.

Metal loads of mine-adit drainage from 49 sites have been ranked into four classes, from "very high" to "low" (fig. 4). These metal load ranks are an approximate measure of probable contamination to the watershed. The mine-adit drainage ranking (table 4) reflects the sum of scores for copper and zinc loads. The load scores for copper and zinc individually are shown in table 4. The locations and ranks of mine-adit drainages are shown in figure 4. Additional metals could be included in the ranking system, as was done by Butler, Owen, and Simon (Peter Butler, Robert Owen, and William Simon, Unpublished report to Colorado Water Quality Control Commission, Animas River Stakeholders Group, 2001). Arsenic was not included because most drainage water in the watershed has low arsenic concentrations relative to water-quality standards.

Mines on Public Land and in the Animas River Watershed Study Area: Contamination Potential from Waste Material and Adit Drainage

The following is an itemized discussion of inactive mines located on public land in the Animas River watershed study area. The discussion is broken down by basin: the upper Animas River basin, the Cement Creek basin, and the Mineral Creek basin. For each site, we present both the mine waste ranking (where waste material is present) and the mine drainage ranking (where applicable), along with field observations and other pertinent information from other reports.

Mines on Public Land in the Upper Animas River Basin

Setting

The majority of mine production in the study area was from the upper Animas River basin (Animas River upstream from Silverton), possibly as much as 80 percent of the total (estimated from production records; Nash, 2000). Much of this basin is underlain by weakly altered (propylitic) volcanic rocks in the central and eastern part of the Silverton caldera (Bove and others, this volume). Some of the large vein deposits in this subbasin are in radial faults east of the caldera, in weakly altered volcanic rocks; these weakly altered rocks provide some acid-neutralizing capacity from minerals such as calcite and chlorite. Tailings in several settings—private sites, public land, and fluvial deposits—are a significant source of contamination in this basin.

Most of the large and famous historical mines of the area, such as the Sunnyside (mine # 116), Mayflower (mine # 304), and Shenandoah-Dives (mine # 355), are on private land (Church, Mast, and others, this volume). Public land in this basin is administered by the U.S. Bureau of Land Management (BLM); more than 200 small mines and prospects are on BLM land, and 11 of these were considered to have waste piles large enough in tonnage and of sufficient reactivity to be candidates for remediation (Nash, 1999b). Fifteen mines on public land in this basin release adit drainage, and they are ranked in table 4. More than 30 historical mills were located in this basin, but most of these sites have little or no remaining mill tailings, because either (1) the tailings were not impounded and were lost to the Animas River by fluvial transport, or (2) some impounded tailings were removed and reprocessed during World War II (Jones, this volume). Fluvial mill tailings are still common in and along the upper Animas River, redeposited after floods breached mill-tailings impoundments. Fluvial mill tailings in the flood plain of the upper Animas River 1–3 mi south of Eureka are described in detail elsewhere (Vincent and Elliott, this volume).

Kittimack Mill and Lackawanna Mill Tailings

Two mill-tailings sites on (or partly on) BLM land, in close proximity to the upper Animas River, are among the largest sources of contaminants from public land in this basin. These are the Kittimack Mill tailings (site # 192) and the Lackawanna Mill tailings (site # 287). The magnitude of contamination is difficult to quantify, but geochemical analysis of the tailings materials shows them to be reactive and rich in metals of concern. Because of the large volume of mill tailings at these sites, they rank as very high sources of contaminants (table 2). Leach tests on one sample from each of these mill-tailings piles show similar results: the samples generate acidic leachate solutions with extremely high dissolved

Table 4. Ranking of mine-adit discharge for sites on public land.

[Site name and mine number from Church, Mast, and others, this volume; (3), samples in average; site names with B from Hite (unpub. report, U.S. Bureau of Mines, 1995); Cu R and Zn R, copper and zinc load ranks; MD rank, mine discharge rank; MD class, mine discharge class (VH, very high; H, high; M, medium; L, low); Cond., specific conductance in µS/cm (microsiemens per centimeter); Q, adit discharge in liters per minute]

Adit site	Mine No.	Sample ID	Cu R	Zn R	MD rank	MD class	pH	Cond	Q L/m
Grand Mogul (3)	35	NAW 530	1	2	1	VH	3.1	470	100
Natalie/Occidental	153	NAW 551	3	1	2	VH	5.2	498	1,600
Joe and Johns	87	NAW 217	2	4	3	VH	2.7	740	80
Brooklyn (3)	141	NAW 508	5	7	4	VH	3.5	590	80
Big Colorado	150	NAW 552	9	6	5	VH	3.6	960	400
Henrietta 800 (2)	505	NAW 213	4	9	6	VH	2.5	1,651	22
B 219 prospect		NAW 713	12	5	7	VH	3.2	1,110	20
Ben Butler (3)	9	NAW 156	8	11	8	VH	3.0	453	11
Kittimack (3)	201	NAW 235	7	14	9	VH	5.8	236	93
Henrietta 700	85	NAW 215	11	10	10	VH	2.5	1,550	20
Bandora (3)	332	NAW 399	21	3	11	VH	6.3	484	93
Bonner (3)	172	NAW 517	13	12	12	VH	2.9	545	53
Monarch	180	NAW 321	6	16	13	H	4.1	270	40
Paradise (3)	168	NAW 520	22	8	14	H	4.7	1,010	533
Lark	86	NAW 204	10	21	15	H	3.2	380	20
Mammoth	148	NAW 227	18	13	16	H	4.7	983	160
Ruby Trust (2)	169	NAW 524	17	15	17	H	6.0	272	1,200
Eveline	91	NAW 201	15	26	18	H	3.1	370	40
N. Denver Lake (3)		NAW 161	24	17	19	H	3.6	182	17
Elk tunnel (3)	147	NAW 311	25	19	20	H	6.0	938	400
U.S. Basin	143	NAW 582	14	33	21	H	5.6	807	20
Mogul South	30	NAW 329	23	25	22	H	4.4	380	12
Paradise small		NAW 869	32	18	23	H	5.1	605	160
Ferricrete (2)	137	NAW 512	28	22	25	M	5.2	280	140
Avalanche (3)	149	NAW 309	16	36	26	M	3.8	372	40
Early Bird	8	NAW 150	19	34	27	M	3.2	339	6
Little Giant	303	NAW 721	30	23	28	M	5.2	120	20
Burbank (2)	207	NAW 603	26	28	29	M	3.8	388	500
King Solomon	306	NAW 883	20	41	30	M	3.2	40	40
Little Ida	15	NAW 380	27	32	31	M	5.2	90	20
Imogene (3)	136	NAW 511	33	29	32	M	6.6	219	147
NW Burro Bridge		NAW 598	34	30	33	M	7.3	201	40
Chattanooga Curve	135	NAW 579	37	31	34	M	7.3	282	40
Sultan tunnel	266	NAW 298	29	39	35	M	5.4	494	100
Legal Tender	189	NAW 396	42	27	36	M	5.3	337	93
Paradise west		NAW 868	35	37	37	L	4.9	183	400
Forest Queen (2)	195	NAW 232	46	24	38	L	7.2	990	80
Silver Crown	133	NAW 577	36	38	39	L	5.2	360	40
Mighty Monarch	285	NAW 735	39	40	40	L	5.5	183	200
B015		NAW 412	38	47	41	L	5.2	600	12
Bandora east		NAW 647	48	35	42	L	3.2	505	20
Minnesota Gulch	144	NAW 878	40	37	43	L	5.6	264	40
Highland Mary	359	NAW 741	41	45	44	L	2.9	239	40
Chattanooga Moly		NAW 872	40	46	45	L	5.8	581	40
Last Chance	289	NAW 064	44	42	46	L	6.7	230	240
East Burro Bridge		NAW 597	43	48	47	L	7.2	148	12
Eagle Chief	169	NAW 144	45	44	48	L	4.6	80	20
Mazeba		NAW 651	49	43	49	L	5.7	210	20
Picayune prospect		NAW 852	47	49	50	L	6.8	164	20

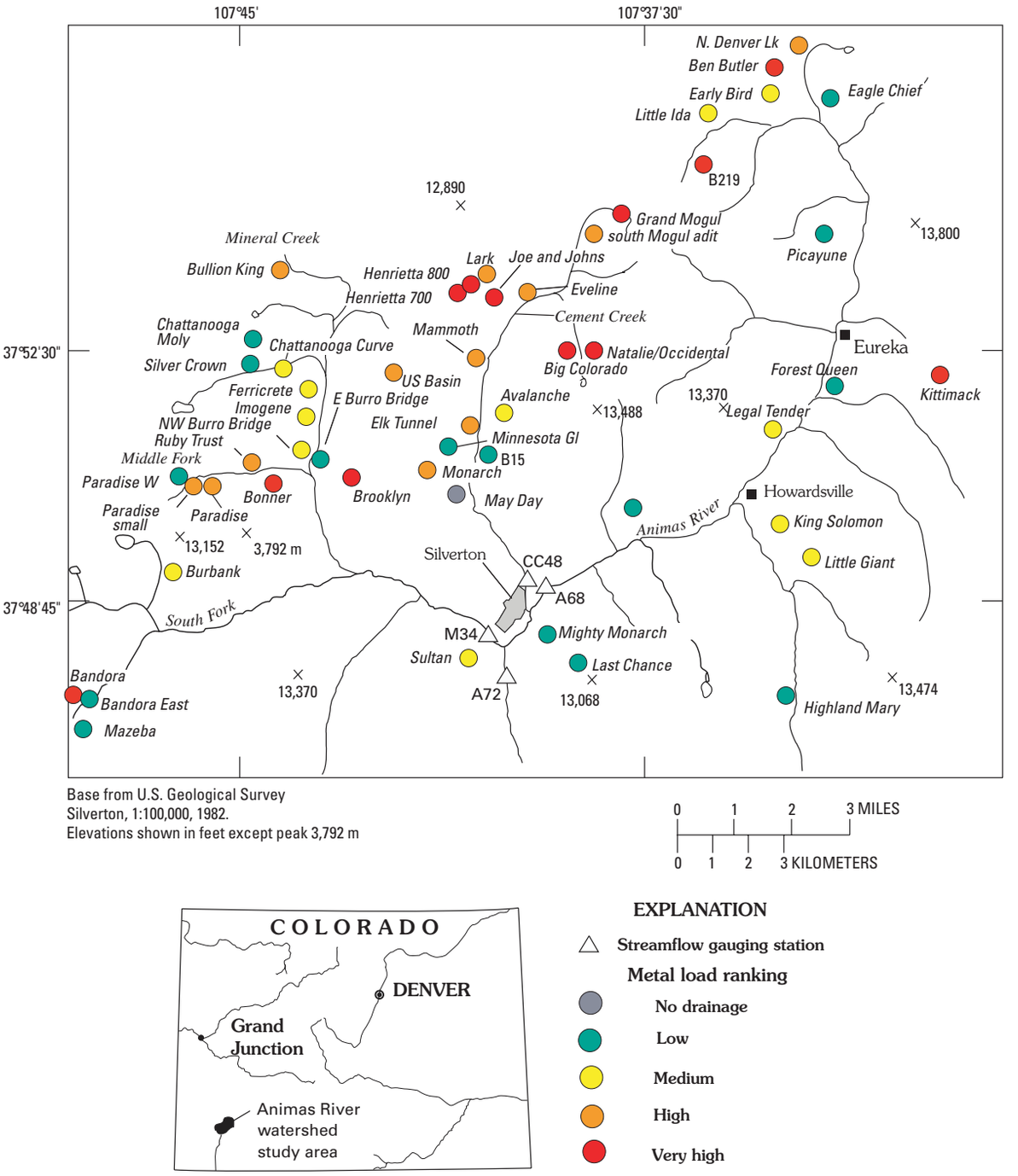

Figure 4. Location and ranking of mine drainage sites on public land, Animas River watershed study area. Ranking explained in text and in table 4. Map elevations are in feet, except for the prominent peak between Middle and South Forks Mineral Creek, designated as peak 3,792 m (elevation shown in meters).

concentrations of copper, manganese, lead, and zinc. Pore water from the Kittimack Mill tailings (site # 192, fig. 5) had a pH of 4.0, high cadmium, and very high copper, lead, and zinc concentrations. Pore water from the Lackawanna Mill tailings (site # 287, fig. 6) had a pH of 5.9, high copper and lead concentrations, and extremely high cadmium, iron, manganese, and zinc concentrations. These chemical results suggest a high potential for contamination. Results from a tracer study by Kimball and others (this volume) show that downstream from the Kittimack Mill tailings, colloidal Fe and dissolved Ca, Mg, Mn, Cu, Zn, and SO_4 increase. Their location on the flood plain made them vulnerable to erosion in extreme storms, and seepage or runoff from these impoundments can travel straight into the Animas River with little or no chance for natural attenuation. A series of shallow wells is needed to test for actual infiltration of contaminated water into alluvium beneath the mill tailings and the magnitude of ground-water flow toward the river.

Leach tests on one sample from the Lackawanna Mill tailings impoundment showed high acid generation and high metal release, for a waste rank of very high. Likewise, a leach test of one sample from the Kittimack Mill tailings impoundment showed moderate acid generation and high metal release; the Kittimack waste ranking is also very high because the volume of tailings appears to be larger than that at the Lackawanna site.

The Lackawanna Mill tailings, entirely on public land, were removed by the BLM in the fall of 2000 and transported to a new repository at the May Day mine site (# 181) on Cement Creek. Similar removal action or substantial remediation work should be considered for the Kittimack Mill tailings, which are partly on BLM land.

North Denver Lake and Ben Butler Mines

Two small mines on BLM land in the northern part of the upper Animas River basin are moderate sources of contamination (Nash, 1999b) because the dump materials are highly sulfidic and mine workings release acidic water. The adit north of Denver Lake (site B233, fig. 7) releases water with a pH of 3.0 and high to extremely high concentrations of cadmium, copper, lead, and zinc; the drainage load ranking is high. The open trench at the Ben Butler mine (mine # 9; fig. 8) contains water with a pH of 3.5 and very high cadmium, copper, lead, and zinc concentrations; the load ranking is very high. The acidic drainage from North Denver Lake mine infiltrates alluvium before it reaches wetlands at the headwaters of the upper Animas River. The water at the Ben Butler mine trench flows only slightly and cannot be traced on the surface to Burrows Creek, a tributary to the upper Animas River. Passive leach tests show that these sulfidic waste materials generate acidic leachate solutions (pH values 3.55 and 2.83) carrying high

Figure 5. Tailings from Kittimack Mill (site # 192) cover tens of acres in flood plain of upper Animas River. Because the mill tailings were piled on alluvial gravels, metals leached from the tailings would probably migrate through the permeable gravels to the river.

Figure 6. Yellow and gray tailings from Lackawanna Mill (site # 287) were placed in flood plain of the upper Animas River, east of Silverton. Because of evidence that the tailings were releasing contaminants to the river, the BLM removed the tailings in 2001 and emplaced them in a repository at the May Day mine.

Figure 7. A small mine north of Denver Lake was the source of the pile of sulfide-rich rocks in foreground. A small flow of water from the adit gains acid and metals on the dump, then flows east to wetlands at the source of the upper Animas River. Drainage in foreground is about ½ m across.

Figure 8. Large quartz-sulfide veins that were mined at the Ben Butler mine are exposed in these shallow trenches, and sulfidic mine waste covers the adjacent slope. Little water from the trenches flows onto the surface, but some may flow into the subsurface. Trench is about 2 m across.

concentrations of base metals. More specifically, the sample from Ben Butler mine released extremely high concentrations of lead and zinc and high concentrations of cadmium and copper. The waste leach ranking for North Denver Lake mine is medium and for Ben Butler mine is high (table 2).

Little Ida Mine

Major quartz-sulfide veins under Tuttle Mountain, west of the Ben Butler mine, were worked by several major mines. Other smaller mines explored parts of the vein system and produced sulfide-rich mine-waste dumps of moderate size. The Little Ida mine (site # 15) and a mine adjacent to the Frisco tunnel (site # 19) are on public land. Leach tests on mine waste from the Little Ida mine showed high acid generation and low metal release, for a waste rank of high. The leach test on waste from the mine near the Frisco tunnel showed moderate acid generation but high metal release, for a waste rank of high.

Kittimack Mine

This mine adit (mine # 201) high above Minnie Gulch (fig. 9) releases a moderate discharge of water with a pH of 5.5, but the metals are sufficiently concentrated to produce a load ranking of very high. Leach tests on mine-waste material showed high acid generation and relatively low metal release; the summary waste rank is very high. The relatively high metal loadings rank suggests that the mine-adit drainage merits attention. However, the fact that the rocks and alluvium in this area are propylitically altered suggests that natural attenuation of metals may occur as the mine-drainage water flows toward the upper Animas River, about 2 mi to the west.

Site B157

West of the Kittimack mine several north-trending adits explored sulfide veins. One of the dumps, B157, is of moderate size and highly sulfidic. The collapsed adit at site B157 does not release mine drainage. Leach tests on waste-dump material from B157 showed high acid generation and high metal release, for a very high waste score. Because this site is relatively dry, it may pose a lower risk of contamination than chemically similar waste dumps that are wet.

Clipper Mine

In the alpine Sunnyside Basin the Clipper mine (mine # 114) workings are small in comparison with others nearby. However, the medium-sized waste dump is highly sulfidic and produces a notable kill zone (an area downslope

Figure 9. The Kittimack mine has a dump of modest size and relatively low sulfide content, but water flowing from the caved adit (left side of photo) is of concern. Although the pH of the water (5.8) is not highly acidic, the water carries substantial amounts of zinc.

of a dump where vegetation has been killed and cannot be reestablished, due to mine drainage or the presence of waste material) for several hundred feet downslope, indicating acidic runoff. The workings release no mine drainage. Leach tests show high acid production and high metal release, for a waste rank of very high (table 2).

Site B219

Drainage from a small prospect in California Gulch has a drainage load ranking of very high because the small flow of water contains especially high metal concentrations. This prospect is so small as to be virtually a natural outcropping; a small mine tunnel explored a quartz vein 3 ft wide. No mine waste was studied because the volume is so small; thus we have no waste ranking for site B219.

Forest Queen

The Forest Queen mine (site # 195) was a problem because the mine tunnel released a substantial flow of water, and it formerly ran over the mine-waste dump into nearby wetlands. This site has been studied by several scientists (Stanton, Fey, and others, this volume, Chapter E25). Remediation was undertaken by the BLM in 1999 as a technology demonstration project. The mine-adit drainage was not unusually acidic, but the water quality was degraded. This drainage was measured and sampled at least 21 times by Mast and others (2000), who recorded pH values in the range of 3.7–6.6 during a 4-year period. In August 1997, the mine-adit drainage at the collapsed portal had a pH of 5.1 and high concentrations of cadmium, iron, and zinc (concentrations of arsenic, copper, and lead were lower than in most mine water). Concentrations of dissolved zinc ranged from 355 to 709 ppb (Church, Mast, and others, this volume, table 7); the one Nash sample contained 435 ppb zinc. The load ranking is low. Passive leach studies of two samples yielded similar results, a high score for acid generation and a very low score for metal release. The mine-waste rankings are medium. A water sample collected below the mine-waste dump in 1997 (prior to remediation) contained lower metal concentrations than did the water at the portal.

Mighty Monarch and Last Chance Mines

Two mine tunnels on Kendall Mountain east of Silverton release high flows of near-neutral water that contains only slightly elevated metal concentrations. The drainage load rankings are low for the Mighty Monarch (site # 285) and low for the Last Chance mine (site # 289). Leach tests on waste from the Mighty Monarch mine showed moderate acid generation but low metal release; the waste ranking is low. Tests on two samples of waste from the Last Chance mine showed moderate acid generation and low metal release, for waste rankings of medium (table 2).

Mines on Public Land in the Cement Creek Basin

Setting

Mine production from this basin was substantially smaller than from the adjacent upper Animas River basin, and only seven mills and one smelter were built. Although major production came out of the American tunnel, the ore was hauled to the Mayflower Mill on the upper Animas River and very little waste was placed nearby. Historical mill tailings impounded at Gladstone, prior to use of the American tunnel, were removed in 1996. Most of the public land in this basin is administered by the BLM. A high percentage of this basin is underlain by highly altered volcanic rocks, including parts of the three Red Mountains that contain acid-sulfate alteration and abundant disseminated pyrite (Bove and others, 2000; Bove and others, this volume). The seven mill sites were evaluated for remediation (Nash, 1999a). Fifteen sites in this basin are ranked by drainage loads in table 4.

Lark-Henrietta Mine Area

Four problematic sites are adjacent mines in upper Prospect Gulch: the Lark, Henrietta, and Joe and Johns mines, and the 1970s mine-waste dump from the 800 level of the Henrietta mine (site # 505). The Lark (site # 86) and the Joe and Johns (site # 87) mine workings are connected by a crosscut tunnel, and some evidence indicates that this crosscut carries mine drainage from the Lark workings to the Joe and Johns mine. This may explain why only a small discharge of water is released at the lowest level of the Lark mine (Lark Number 3 adit). Discharges from the Lark and the Joe and Johns adits are relatively small, but an unknown amount infiltrates into alluvium and bedrock fractures behind the collapsed portals. Remediation work in 1999 was directed at the discharge from the Joe and Johns adit. Surface water in Prospect Gulch has been studied in detail using tracer methods (Wirt and others, 1999; 2001) to quantify the sources of contamination. The work by Wirt and others demonstrates a large inflow of acidic, metal-rich water into Prospect Gulch creek in the vicinity of the Lark-Henrietta mines (fig. 10). However, these detailed studies coupled with reconnaissance studies by Nash do not provide conclusive evidence for the flow path of the acidic water. This area of about 60 acres, including both private mining claims and public land, is one of the larger sources of contamination in the Prospect Gulch subbasin and is so complex that it is difficult to reliably distinguish among many possible sources.

Mine-drainage load rankings (table 4) show how the drainages in Prospect Gulch compare with others in the study area. Drainage water from the Joe and Johns mine and the seep from the Henrietta 800-level waste pile are extremely

Figure 10. Lark mine on flank of Red Mountain # 3 created a dump of modest size but relatively high sulfide content; the dump was reclaimed by BLM in 2002. More complex are springs in the hillslope below the mine that are highly acidic and rich in metals; the springs are of uncertain origin despite several detailed studies.

high in metals and have load rankings of very high. Mine-adit drainage sampled at the portals of the Lark and Henrietta 700 (site # 85) tunnels has lower metal concentrations and load rankings of high and very high, respectively. These rankings do not consider details such as variability through the year or possible errors in flow estimates due to infiltration into bedrock fractures or alluvium that would lower the load values. The seeps in and near the Henrietta 800 waste dump are especially complex (Wirt and others, 2001).

Leach tests were made of six samples from the Lark mine upper and lower dumps (two levels of site # 86); all six samples showed high acid generation. Some variation occurred in metal release: high in three samples and medium in three samples. Considering the range in composition visible at the dump surface, the differences among samples and test results are not surprising. The average waste ranking for the Lark site is very high. Leach tests on two samples from the Joe and Johns waste dump (site # 87) showed high acid generation and high metal release, but the relatively small size of the dump makes the waste ranking high, instead of very high.

The waste dump between the Lark and Henrietta mines contains abundant sulfides and is generally less weathered than most dump piles in the area, which is consistent with reports that a lessee created this waste while exploring the 800 (deepest) level of the Henrietta mine in the 1970s. This waste pile is so close to Prospect Gulch that material slides into the creek, and runoff flows directly into the creek. A leach test on waste from the 800 mine-waste dump showed high acid generation and moderate metal release; the waste ranking is very high. Less clear is the nature of very acidic water that flows from the long narrow waste pile in several places. One possibility is that the acid and associated metals are leached from the dump when surface runoff crosses the dumps. However, there is also evidence for a series of acidic seeps between the dump and the road; these seeps have pH values near 2 and extremely high metal concentrations. Surface water, after flowing over and through the dump, has lower metal concentrations, but the higher flow volumes result in higher loadings. This surface water flows into Prospect Gulch, and related acidic, metal-rich seeps may enter the creek as diffuse inflows, which would explain at least part of the increases measured by Wirt and others (1999; 2001). A series of wells would be required to document the flow and composition of this shallow ground water and its flow path.

The Henrietta 900 tunnel (site # 506) was driven in the 1970s from a lower elevation in Prospect Gulch with the goal of intercepting ore under the Henrietta 700 level. The tunnel is dry, which is difficult to explain, and the dump contains sparse sulfide minerals, suggesting that the target was not reached (as described by Jim Herron, Bruce Stover, and Paul Krabacher, Unpublished Cement Creek reclamation feasibility report, Upper Animas River Basin, Colorado Division of Mines and Geology, 1998). The waste was tested by passive leach and found to generate acid, but it released very little metal; the waste ranking is medium. Remediation is needed to minimize the slumping of waste into Prospect Gulch, but the waste is not as problematic as most mine waste in the study.

Grand Mogul Mine

This mine (site # 35) in the northern part of the Cement Creek basin is one of the larger sources of contamination among all sites on public land. Drainage from the collapsed mine tunnel seeps through the sulfidic dump and emerges at the edge of Cement Creek (fig. 11). Because the flow is diffuse, it was difficult to determine the discharge, suspected to be on the order of 10–20 gpm but possibly higher. The dump is in the flood plain of the creek and there is no chance for natural attenuation before the mine drainage enters the stream. The mine drainage was detected as an acidic inflow enriched in aluminum, iron, copper, and zinc in the tracer studies of Cement Creek (Kimball and others, this volume). Three seep samples were collected and analyzed in 1997 and 1998 (Nash, two; Mast and others, 2000, one). The pH values ranged from 2.9 to 3.4, and concentrations of cadmium, copper, iron, manganese, lead, and zinc ranged from very high to extremely high. Computed metal loads for the Grand Mogul seepage are the highest in this study (load rank very high). Loads calculated for several repeat sampling events differ by about 20 percent, but they all rank in the very high group.

The Grand Mogul dump is highly sulfidic, and sphalerite and galena are visible. Leach tests on three samples show similar results: high acid generation and high metal release. The leach solutions were highly acidic (pH values 3.3 and 2.7) and carried extremely high concentrations of lead and zinc and very high amounts of cadmium and copper. The waste ranking is very high. The drainage water carried high concentrations of lead but not as high as suggested by the leach tests.

The flow paths of mine-adit drainage and dump seepage at the Grand Mogul are not well defined but sufficient to guide remediation planning. Ownership of the mine and waste dump is in question; the dump itself appears to be on public land.

May Day Mine

This site on lower Cement Creek (site # 181) has a relatively large dump that is rich in sulfide minerals (fig. 12; Stanton, 2000). The mine adit is dry, but water of uncertain origin flows below the dump according to piezometer data and geophysical studies (Smith and others, 2000; Wright, Kimball, and Runkel, this volume, Chapter E23). No mine-adit drainage was sampled by us, thus we have no load ranking for comparison with other sites. Leach tests on two samples of dump materials from upper and lower levels showed very different compositions, as expected from the visible differences in mineralogy. The sample from the upper level yielded an acidic solution near pH 3 that carried very high concentrations of cadmium and copper, and extremely high concentrations of lead and zinc. The second sample from the lower level,

Figure 11. Grand Mogul mine in headwaters of Cement Creek looks like hundreds of other mine sites, but tests show that the waste dump is highly reactive, capable of high acid generation and metal release. Of more direct concern is water flowing from the base of the dump, probably related to the mine workings northeast (left) of the dump; metal loadings from these seeps are among the highest found in this study.

Figure 12. May Day mine, excavated to explore veins west of Cement Creek, created these large waste piles of sulfidic rock. To minimize reactions from snowmelt and rain, the BLM reclaimed the dump in 2001 by emplacing a geosynthetic liner and covering with clean soil. Lackawanna Mill tailings were also emplaced there at that time.

with low sulfide and jarosite content, yielded much less acid and metals. The average of the two waste samples yields a mine-waste ranking of very high. In the summer of 2001, this site was made into a repository by the BLM for mill tailings from the Lackawanna Mill. A geosynthetic clay liner was installed and the site covered with clean soil for revegetation (Rob Robinson, BLM, oral commun., 2004).

Elk Tunnel

This tunnel on the west side of Cement Creek (site # 147) was driven westward to access vein deposits. The material on the dump is weakly mineralized, suggesting that the target vein was not reached. Today, the adit releases a large flow (135–260 gpm; Mast and others, 2000) of water that deposits conspicuous orange iron deposits outside the mine and down the slope to Cement Creek (fig. 13). The dump is relatively small and composed mostly of propylitically altered volcanic rocks with low sulfide content. A leach test showed moderate acid generation and very low metal release; the waste rank is low. The mine-adit drainage flows along the edge of the dump but does not appear to react with the waste materials. The mine-adit drainage has been sampled many times (10 samples, Church, Mast, and others, this volume, table 7; 3 by Nash; and several by Herron and others (Unpub. Cement Creek reclamation feasibility report, CDMG, 1998)). The pH values ranged from 6.1 to 7.2, and analyses show consistently low concentrations of most metals. Iron concentrations are high, ranging from about 2,200 to 10,000 ppb, possibly because dissolved oxygen content is very low. The metal of prime concern, zinc, ranges in concentration from about 140 to 210 ppb. The mine-drainage load rank of this site is high.

Figure 13. Elk tunnel, driven west of Cement Creek, did not intersect veins of value but does collect water from deep in the mountain. The pH of the water and the metal concentrations are not extreme, but because of the high flow, the metal loads are high.

Natalie/Occidental and Big Colorado Mines

These mines on South Fork Cement Creek release large quantities of mine-adit drainage (fig. 14) that flow directly into the creek. The weakly acidic water carries high iron concentrations and substantial concentrations of other metals. The loading ranks are among the highest in this study (very high), largely due to the high discharge. The dumps at the Big Colorado (site # 150) may be contributing metals to the drainage, but the dump at the Natalie/Occidental (site # 153) does not appear to react much with the mine water. Because of uncertainties in property status when we sampled in 1998, no waste samples were collected at these sites.

These mines clearly are significant sources of contamination in the Cement Creek basin and rank among the highest loaders in the entire study area. The Natalie/Occidental tunnel in particular should be evaluated for remediation. It is one of about eight sites in this study that release a large flow (>100 gpm) of near-neutral pH water with substantial concentrations of copper and zinc and thus are high copper and zinc loaders (table 4).

Avalanche Mine

This small site (# 149), in a canyon east of Cement Creek, is of concern chiefly because the adit releases acidic drainage. Three samples (Nash, two; Mast and others, 2000, one) show pH values ranging from 3.6 to 3.8 and very high concentrations of copper, iron, and zinc. The acidic water flows over a small mine-waste dump and into a small tributary east of Cement Creek. The drainage load rank is medium, near the median for all draining mines on public land. Leach tests on two samples produced solutions with pH values of 3.6 and 3.8, and low metal concentrations relative to other samples in this study. Concentrations of iron and cadmium in the leachates were elevated relative to biologic criteria. The average waste rank for this site is medium.

Figure 14. Collapsed adit of Natalie/Occidental mine releases one of the larger flows of mine water in the study area. Metal concentrations of the pH 6 water are not unusually high, but because of the high flow rate, loads of copper and zinc are high. Adit is about 1½ m across.

Eveline Mine

This very small mine (site # 91) on Dry Gulch, about 1,000 ft north of the west-flowing reach of Cement Creek, releases a small volume of pH 3.1 water carrying high concentrations of metals. Despite the low discharge, the load ranking is high. The dump is small, but reacts with mine-adit drainage. The leach test on one waste sample shows high metal release and moderate acid generation; because the volume of waste is small, the waste rank is medium.

This site is atypical in that it creates a high loading from a small flow of water. The mine is one of several sites studied here that was excavated into a zone of ferricrete. The co-location in and along the ferricrete zone probably indicates that this mine is along a natural flow path of mineralized water. (See Wirt and others, this volume, Chapter E17.) Partial remediation of the low discharge should be feasible, but if the metal-rich flow is largely related to unmined altered rocks on Red Mountain, then remediation might not achieve the intended results.

Minnesota Gulch Mines

Several small mines in Minnesota Gulch (site # 144) created small dumps with very high concentrations of sulfide minerals, and one adit creates drainage with a pH of 2.9. Although small in size, these mines and dumps create drainage that is rich in base metals. The metal load rank of low reflects the small discharge. This drainage enters the Minnesota Gulch creek at the base of the mine-waste dumps; the creek disappears into the alluvial fan before it can reach Cement Creek, but the subsurface flow must eventually enter Cement Creek. Minnesota Gulch was determined in a tracer study to add substantial loads of aluminum, manganese, copper, and zinc to Cement Creek (Kimball and others, this volume).

Leach tests on two samples collected from two adjacent and compositionally similar waste dumps show similar results: very high acid generation and high to moderate metal release. The average waste rank for this site is very high.

Another very small prospect, site B015, just a few meters from Cement Creek, also creates a small flow of metal-rich, pH 3.2 water that flows into the creek. Due to the small discharge, the drainage load ranking for this site is low.

Monarch Mine

The Monarch mine (site # 180) in Porcupine Gulch was the site of relatively recent mining, possibly the 1970s. The collapsed lower tunnel releases a small flow of drainage, and because of high metal concentrations its drainage rank is high. Leach tests on two samples from the Monarch mine-waste dumps (upper and lower levels) showed high acid generation and high metal release; the average waste ranking for the site is very high. Mine-adit drainage and dump runoff from this site have ample opportunity to react with propylitically altered volcanic rocks before entering Cement Creek. The relatively small size of the mine and waste dumps and good road access suggest that the site would be amenable to remediation.

Mines on Public Land in the Mineral Creek Basin

Setting

Mines in this basin are much smaller than in the central part of the study area, and the amount of patented land is less than in the basins to the east. The majority of the public land in this basin is administered by the USDA Forest Service. The geology of this basin is more diverse than the other basins as it lies astride the western margin of the Silverton caldera, includes several intrusive centers and associated highly altered rocks with prominent red colors, and is the only basin with a

significant amount of sedimentary rock. Seven mills were built in this basin, but all were quite small; the largest two mills were on Mineral Creek near Silverton, not far from the confluence with the upper Animas River. Mill tailings do not appear to be a significant factor in this basin. The metal load rankings of 19 sites in this basin are in table 4.

Brooklyn Mine Area

An area of about 100 acres in Browns Gulch in the vicinity of the Brooklyn mine (site # 141) is one of the most highly disturbed areas in the Mineral Creek basin and clearly is degrading the water quality of the creek. This mined area, of mixed private and public ownership, has evidently been worked by several operators over the years, with more activity in the past 20–40 years than has taken place in most of the Animas River watershed study area. The most significant problems relate to sulfidic mine-waste dumps, a small mill and tailings pond, and drainage from the major mine adit.

Water drains from the adit at about 10–20 gpm; composition of the water at the adit mouth appears to be variable over time, as analyses of pH and metals reported by Lovekin and others (Jonathan Lovekin, Michael Satre, William Sheriff, and Matthew Sares, Unpublished abandoned mine land report for San Juan Forest, Columbine Ranger District, Colorado Geological Survey, 1997), Mast and others (2000), Herron and others (Jim Herron, Bruce Stover, Paul Krabacher, and Dave Bucknam, Unpublished Mineral Creek reclamation feasibility investigations report, Upper Animas River Basin, Colorado Division of Mines and Geology, 1997) and from our work differ and show a larger range than for most mine-adit drainages. Measured pH values range from 3.2 to 4.8, and metal concentrations range from relatively low for mine water (near aquatic life standards) to highly degraded (4 to more than 20 times the aquatic life standards). The bigger problem is what happens to this water after it leaves the adit and reacts with sulfidic waste rocks on the long face of a large mine-waste dump (fig. 15).The mine-adit drainage reacts with the waste to become more acidic, dropping to a pH of 2.9, and metal concentrations rise dramatically. Iron, copper, and zinc are the most significant contaminants; zinc, at about 150 times the aquatic life standard, is possibly most problematic. The load ranking for the Brooklyn adit drainage is among the highest in this study (very high), and the loads are even higher after the water's reaction with dump materials.

Leach tests on three waste-dump samples showed consistent results: very high acid generation and moderate to high metal release. The averaged waste ranking for this site is very high. The ranking for the mill tailings also is very high; the tailings behave like the mine waste and release large amounts of metal and acid.

The Upper Brooklyn mine dump, north of the Brooklyn mine, created waste that is chemically similar to that of the Brooklyn mine, and likewise released a high amount of acid

Figure 15. Drainage from Brooklyn mine flows down over sulfidic waste rocks for more than 100 m, gaining acid and metals. Water quality degrades considerably between the adit and the base of the dumps.

in the leach test. The mine-waste ranking for the upper dump site rank is high, but the score is considerably lower than for the Brooklyn mine dump because the amount of waste is much smaller.

Browns Gulch was noted as a substantial contribution of aluminum, manganese, lead, and zinc in the Mineral Creek tracer study (Kimball and others, this volume). Multiple sources of contamination lie in this subbasin, including mines and altered rocks above and below the Brooklyn mine, but the mine and dump drainage from the Brooklyn mine area appear to be the largest source of contaminants.

Bandora, Burbank, Imogene, and Ruby Trust Mines

These four mines are problems chiefly from their release of relatively large amounts (approximate range 50–200 gpm) of near-neutral-pH but contaminated water; they will be discussed together because of their geochemical similarities. Median flow volumes include: Bandora, 45 gpm; Burbank, 39 gpm; Imogene, 75 gpm (Mast and others, 2000); Ruby Trust, 100–150 gpm (Nash estimate). Seven samples from these four sites were collected by Nash from 1997 to 1999, and 15 samples are described by Mast and others (2000). The water from these mines has near-neutral pH values (5.4–7.4), but zinc concentrations are sufficiently large to create substantial loadings. Most metal concentrations are low, but iron and manganese are high, and zinc ranges to more than 15,000 ppb. The high iron concentrations are reflected by the red iron oxyhydroxides that precipitate from the drainage water. The drainage load rankings are as follows: Bandora, very high; Ruby Trust, high; Imogene, medium; and Burbank, medium.

Bandora Mine

Leach tests were made on three samples from the Bandora mine (site # 332; fig. 16). Two samples yielded similar results—high metal release and moderate acid generation, for waste rankings of very high. One of the leachate solutions carried the highest lead concentration of this study; however, lead concentrations in mine-adit drainage water were relatively low in this study. A sample of predominantly gray sedimentary rock on one of the lower dumps released little metal and a low amount of acid, for a ranking of low. The average waste ranking for the Bandora site is very high.

Burbank Mine Tunnel

The Burbank mine tunnel (site # 207) was excavated about 20 years ago to access veins identified higher on the mountain, but our examination of the dump rocks suggests that little ore was encountered. The tunnel collects a large amount of water (fig. 17), and the pH of 6.6–7.4 suggests that much of the water had reacted with propylitically altered volcanic rocks of the type that crop out at the site. The load rankings for copper and zinc (table 4) were medium, suggesting that this is not a major source of those two metals of concern. A leach test on one dump sample showed moderate acid generation and low metal release, and a waste rank of high.

Figure 16. The Bandora mine created a series of mine-waste dumps that are relatively unreactive because they are calcareous sedimentary rocks. However, the mine tunnels collect and release water with substantial amounts of zinc, despite the near-neutral pH.

Figure 17. The Burbank mine tunnel failed to intersect veins exposed higher on the mountain, but it continues to release a large flow of water carrying enough zinc at pH 5.4–6 to be a significant loader.

Imogene and Ferricrete Mines, and Unnamed Mine Northwest of Burro Bridge

These mines are on the west side of Mineral Creek in an area of extensive ferricrete deposits. They release relatively large flows (20–100 gpm) of near-neutral-pH water that immediately deposits prominent iron oxhydroxide floc (fig. 18). Ferricrete is exposed at the mine portals, suggesting that the tunnels were made to explore fracture zones that were premining water pathways. The mine workings appear to be relatively small, judging from the small volume of waste at the portals, and the mine waste is not highly sulfidic. The concern at these sites is for the drainage waters; the drainage load rankings for all three mines are medium.

Leach tests on three samples from the Imogene mine (site # 136) showed very low metal release and moderate to high acid generation. The average waste ranking for this site is medium. A sample from the Ferricrete mine (site # 137) dump showed moderate acid generation and low metal release, for a waste ranking of low. No leach test was made of waste from the site northwest of Burro Bridge.

Although metal-enriched water flows from these tunnels, the source of metals in these mine waters may be largely from unmined altered rocks. Although remediation methods such as plugging the tunnels would be expected to reduce metal loads, analyses of flow paths and fracture systems are needed to design effective seals.

Silver Crown Mine

Near Chattanooga horseshoe curve are several prospects for molybdenum and base metals related to an intrusive complex (Bove and others, this volume). The Silver Crown mine (site # 133) is in volcanic rocks, like the majority

Figure 18. The Ferricrete mine adit was driven to explore large outcrops of ferricrete but found no ore. The mine water is typical of many in the study area with near-neutral pH but high iron content. Although zinc concentration in the water is lower than in many mine-adit waters, high flow volume creates a substantial zinc load.

of mines in the study area, but has a mineral assemblage that suggests higher temperatures of a contact or skarn-type deposit. At the surface, the volcanic rocks are not highly altered (propylitic). The predominant green colors on the dump do not suggest that acid is being generated by waste or mine discharge, but two leach tests show high acid generation; metal release was relatively low. The waste rank is high, in part because the site is relatively large. Mine-adit discharge is ranked low (table 4) and is clear; it has a pH value of 5.7, seemingly buffered by the propylitic rocks. Seepage through the dump has essentially the same pH, suggesting little or no reaction with the dump waste. The site is close to a tributary of Mineral Creek, and mine drainage and dump seepage waters flow directly into the tributary.

Ruby Trust Tunnel

The Ruby Trust tunnel (site # 169) was driven northward to intersect veins that crop out higher on the mountain. The tunnel facilitated haulage of ore to the mill and also served to drain water from the mine workings. As with numerous other deep tunnels in the area, this one continues to carry a large volume of water. Load ranking is high. The pH of 5.5–6.0 and the composition of the water suggest that the mine drainage reacted with propylitically altered rocks cut by the tunnel. Because mine-adit drainage flows over the dump and into nearby Middle Fork Mineral Creek, work to minimize reactions with the mine waste may reduce metals loading.

A leach test on one dump sample showed high acid generation and moderate metal release, for a waste ranking of very high. A leach test on a sample of mill tailings showed similar acid generation but high metal release; only a small volume of mill tailings remains at the site.

Bonner Mine

This mine (site # 172) on Middle Fork Mineral Creek had workings and dumps on several levels, and drainage is released on three levels (fig. 19). Based on 11 water samples collected from 1997 to 1999 (Nash, 4; Mast and others, 7), we know that the pH values are consistently acidic (from 2.7 to 3.4) and concentrations of cadmium, copper, iron, manganese, and zinc are high. Concentrations of zinc ranged from about 1,500 to 3,700 ppb. Concentrations of copper also were very high. Remediation work in 2000 was designed to improve water quality and water management. Information gained during excavation in September 2000 (William Simon, oral commun., 2000) suggests that the several mine levels were not interconnected, or had become sealed off, because water in the upper levels did not drain through the lowest tunnel. Mine water at three levels flowed out over mine waste prior to remediation.

Figure 19. Lower adit of Bonner mine, and drainage discharge that flows to Middle Fork Mineral Creek.

Leach tests on three Bonner mine-waste samples showed high acid generation and very low metal release; the average waste rank is high. The concentrations of copper and zinc in leachates were above the median for the study. Because these dumps are close to the creek, runoff can enter the creek with little or no attenuation. The dump may also be adding acid and metals to the percolating mine-adit drainage water.

Independence Mine

Independence mine (mine # 171), west of the Bonner mine complex, has a mine-waste dump that is much smaller than those at the Bonner, but the mineralogy and host rocks are similar. Leach tests show high acid generation, but low metal release, similar to waste samples from the Bonner. The waste rank is medium.

Paradise Mine Area

Several small adits near the headwaters of Middle Fork Mineral Creek release large flows of water (pH 4.7–5.2) that create prominent white and red deposits close to the portals. The largest of these, the Paradise mine (site # 168), is famous for the extremely high aluminum concentration in mine-adit drainage and the snow-white precipitate that forms on the dump (fig. 20). Mineralogical studies show that the white material is the hydrous aluminum-sulfate mineral basaluminite [$Al_4(SO_4)(OH)_{10}\bullet 5H_2O$]. This mine-adit drainage has a metal-load ranking of high. Load ranking for aluminum is the highest of mine-adit waters in this study, but zinc and copper loads are not as high. Load ranking for the Paradise adit is high. Nearby adit drainages (informally here named Paradise small and Paradise west) have similar compositions but lower flow. Paradise west had lower metal load rankings.

Figure 20. The white color and high flow from the Paradise mine make it famous. Several research investigations have documented the very high aluminum concentration in this water; the bright white material is an aluminum oxyhydroxide phase (basaluminite) that precipitates from the mine water.

Leach tests were made on three samples from the Paradise waste dump and one sample from the smaller dump to the west. The tests of dump waste showed moderate acid generation and low metal release; the average mine-waste rank for this site is medium. One sample of red iron floc on the Paradise mine-waste dump showed high acid generation but low metal release. A sample of the white aluminum-rich precipitate showed moderate acid generation and low metal release.

The Paradise mine workings are relatively small, judging from the size of the dumps, and the pH of the water (5.1) is relatively high. Arguments were made (Nash, 1999a; Mast, Verplanck, and others, 2000) that most of the water has reacted with unmined, altered rocks of peak 3,792 m. Steep topography and the large volume of altered rocks that make up that peak (Bove and others, this volume) produce metal-enriched shallow ground water that can flow into the mine workings or fractures. One remediation option, sealing the tunnel, would minimize water contact with mineralized rocks in the workings, but we suspect that water of similar character would be released along other fractures and that the net improvement in water quality in Middle Fork Mineral Creek would be small.

Sultan Tunnel

This site (# 266) is unusual for the study area in that the tunnel and mine workings are in a stock of granitic rock (Yager and Bove, this volume). The waste dump contains abundant pyrite, but few base-metal sulfide minerals were visible. A leach test showed high acid generation, but low release of copper and zinc; the waste rank is high because of the large dump size and high acidity. Mine drainage from the adit has substantial flow, a pH value of 6.2 (quite high), and moderate copper and zinc concentrations. The mine drainage is diverted into a simple ditch, which to some extent minimizes the interaction of mine drainage with the dump waste.

Discussion and Conclusions

Comparison with Other Studies of Mine Waste

The study of mines and their waste dumps in the Animas River watershed study area by Herron and others (Jim Herron, Bruce Stover, and Paul Krabacher, Unpublished Lower Animas River reclamation feasibility report, Upper Animas River Basin, Colorado Division of Mines and Geology, 2000) included leach analyses of waste materials from more than 130 sites in which leachate solution pH, metal concentrations, and total acidity were determined. The waste characterization studies by Herron and others are similar to our studies, and the rankings are generally similar. Comparison of rankings for 32 sites that both groups studied showed most to be similar, but rankings were substantially different for some sites. The discrepancies may reflect differences in sampling or leach protocols. If the discrepancies influence remediation planning,

further studies should be made to resolve the rankings in question. Herron and others (Unpub. Mineral Creek feasibility investigation report, 1997; Unpub. Cement Creek reclamation feasibility report, 1998; Unpub. Upper Animas River reclamation feasibility report, 1999; Unpub. Lower Animas River reclamation feasibility report, 2000) are the sole source of information for mine-waste sites that are on private land.

Mine waste from representative mines and mill tailings in 22 adjoining mining districts on the Colorado Western Slope were studied by the same techniques as used here (Nash, 2002). Passive leach results for 116 samples from those mining areas span a larger range than reported here, including more values that would rank as low in the scale used here. That study supplements the results described here, and suggests that release of acid and high concentrations of heavy metals is characteristic of polymetallic mine-waste dumps in the region.

Comparison with Other Studies of Mine-Adit Drainage

Previous studies of mines on BLM land (Barbara Hite, unpublished mine land inventory report for the U.S. Bureau of Land Management, U.S. Bureau of Mines, 1995) and on USDA Forest Service land (Unpub. abandoned mine land inventory report, San Juan Forest, Columbine district, CGS, 1997) provide additional descriptions, hydrogeochemical data, and interpretations that are generally similar to those of this study. Differences of data or opinion for some specific sites have been discussed elsewhere (Nash, 1999a, 1999b). Some of those differences are matters of emphasis placed on metal concentrations rather than metal loads; the previous studies tended to emphasize problems of some mine-adit drainages having high concentrations but discharges of less than 10 L/m, whereas we emphasized the importance of sites with higher discharges and higher loads.

The metal-load rankings determined (table 4) are in fair accord with the results from Herron and others (Unpub. Mineral Creek feasibility investigation report, CDMG, 1997; Unpub. Cement Creek reclamation feasibility report, CDMG, 1998; Unpub Upper Animas River reclamation feasibility report, CDMG, 1999; Unpub. Lower Animas River reclamation feasibility report, CDMG, 2000), but the rankings for some drainage sites differ substantially. Explanations of the differences could involve numerous factors, such as time of sampling, sampling protocol, or analytical methods. Hydrogeochemical results, discharges, and computed metal loads vary in time; thus, no single sampling event should be used to determine remediation strategy.

Mine-drainage water in the headwaters of the Uncompahgre River and San Miguel River (Nash, 2002), just a few miles north and west of the Animas River watershed study area, spans a compositional range that is similar to the mine-adit drainages described here and includes some extremely acidic water that is even more metal-rich than any sampled in our study area. The Western Slope study (Nash, 2002) included sampling and chemical analysis of 180 surface-water samples; no loads were calculated. The compositional similarities are especially strong for the mine-adit drainages in Red Mountain Creek basin, north of Red Mountain Pass. This area is geologically continuous in the Red Mountain acid-sulfate alteration system (Dalton and others, this volume, Chapter E2; Bove and others, this volume) and is characterized by acidic springs and very acidic mine-adit drainage that mimic the springs and mine-adit drainages of the Prospect Gulch area (Wirt and others, 2001) and the Koehler tunnel–Carbon Lakes area (Kimball and others, this volume). Iron-rich mine-adit drainages, natural springs, and ferricrete deposits continue west from Middle Fork Mineral Creek into the Howard Fork of San Miguel River in the Iron Springs mining area near Ophir. A regional pattern of acid, iron-, copper-, and zinc-rich spring and surface waters radiates from the Red Mountain complex.

Mine Sources in Relation to In-Stream Loads

Quantification of the amount of contamination from mine-adit drainages and mine-waste dumps that moves into streams is difficult. Although great effort was made to sample inflows to streams, especially in the vicinity of the area's inactive mines, the tracer studies of Kimball and others (this volume) were not able to directly quantify the contributions from most mines in the watershed. Even for draining mine adits within a few hundred feet of the streams, the contributions of loads are ambiguous because the hydrology and chemical reactions that add or attenuate metals in surface and shallow subsurface flows are very complex in the setting of these mines (Kimball and others, this volume). Most of the mines described here are more than a mile from the major streams that were characterized by tracer studies, and for them the contributions are especially ambiguous.

Out of the 40 or so mine sources that we identify as potentially significant, only a few are close enough to streams studied by tracer methods to possibly allow quantification of their contributions. The substantial discharges of contaminated water from mines such as Bandora, Paradise, and Bonner flow into the South and Middle Forks of Mineral Creek, streams that were not subjected to a tracer study. Two of the sites highlighted here (Grand Mogul and Kittimack Mill tailings) were among the 24 major sources of loadings detected in the tracer studies (Kimball and others, this volume), and eight of the mine sites that we ranked high or very high for mine drainage presumably contributed to high loadings on five tributaries highlighted by the tracer studies (Prospect Gulch, Minnesota Gulch, Browns Gulch, South Fork Cement Creek, and Middle Fork Mineral Creek). Three mines close to Cement Creek that are highlighted in our rankings (Mammoth tunnel, Elk tunnel, and May Day mine) were detected in the 1996 Cement Creek tracer study (Kimball and others, 2002). The contributions from the Lark, Joe and Johns, Henrietta, Minnesota Gulch, Natalie/Occidental, Brooklyn, Bonner, and Paradise mines cannot be ascertained at the point of mixing with the major

streams. More detailed studies, possibly utilizing tracers injected into underground mine workings, would have to be made to quantify the influence of these and similar mines.

Significant Sources for Remediation

The Animas River watershed study area contains hundreds of potential sources of mining-related contamination (Church, Mast, and others, this volume, fig. 1), but the majority of the excavated sites shown on topographic maps are exploration prospects that disturbed less than about 50 tons of rock. The majority of mines with substantial underground workings and waste dumps are patented claims, on private property. Fewer than 100 mines and prospects on public land were of substantial size, with hundreds of meters of workings and hundreds of tons of mine waste. Out of these sites on public land, fewer than 40 create mine-adit drainage or are situated close enough to major streams to introduce contamination to the watershed that we consider to be significant.

Problematic mining sites on public land were discussed by Nash (1999a, 1999b). Two new sites have been added here, mill tailings placed on public land from the Lackawanna Mill and the Kittimack Mill. Remediation activities at these or other sites will be decided when restoration goals are defined. Dozens of mine sites in the study area release water that at times exceeds water-quality standards set by CWQCD or the Clean Water Act—at the point of discharge. However, these sources of contamination may not be measurable in major streams or at gauging station A72 south of Silverton.

The magnitude of contamination from "dry" sites—those with no obvious surface discharge—is difficult to determine. The monitor wells and detailed studies of the May Day mine (Wright, Kimball, and Runkel, this volume) demonstrate what technologies are needed to evaluate subsurface discharge from either dry or draining sites. Because reactions take place in surface and ground water between the sources and the streams, the contamination predicted by mine site water samples, or from laboratory leach tests, may not accurately reflect what enters the streams. If the abundant geochemical information available for sites on public land is insufficient to guide remediation decisions, then detailed engineering studies will have to be conducted. If required, those studies should include the drilling of wells to document shallow ground water in the vicinity of mine adits, waste dumps, and mill-tailings impoundments. Also, further study is needed on methods to identify the flow paths from mine sources to streams and the water:rock reactions along those paths that change water quality.

This study has addressed issues of mine waste and mine-adit drainage on public land administered by the BLM or the USDA Forest Service, but the same issues obviously exist for mines on private property. Studies of representative private sites by Herron and others (Unpub. Mineral Creek feasibility investigation report, CDMG, 1997; Unpub. Cement Creek reclamation feasibility report, CDMG, 1998; Unpub. Upper Animas River reclamation feasibility report, CDMG, 1999; Unpub. Lower Animas River reclamation feasibility report, CDMG, 2000), using methods similar to those described here, provide data for evaluating the private sites. Such an evaluation was done by Peter Butler, Robert Owen, and William Simon (Unpublished report to Colorado Water Quality Control Commission, Animas River Stakeholders Group, 2001). Although questions of detail may remain about the magnitude or ranking of some individual private or public sites, a general trend seems clear: most of the waste or mine-adit drainage sites with highest potential for watershed contamination (highest loads or leachate concentrations) are on private or mixed private-public sites.

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Mine Inventory and Compilation of Mine-Adit Chemistry Data

By Stanley E. Church, M. Alisa Mast, E. Paul Martin, and Carl L. Rich

Chapter E5 of
Integrated Investigations of Environmental Effects of Historical Mining in the Animas River Watershed, San Juan County, Colorado
Edited by Stanley E. Church, Paul von Guerard, and Susan E. Finger

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Chapter E5
Mine Inventory and Compilation of Mine-Adit Chemistry Data

By Stanley E. Church, M. Alisa Mast, E. Paul Martin, and Carl L. Rich

Abstract

An inventory of inactive mines and mine-related sites in the Animas River watershed study area was compiled from published and unpublished State and Federal sources. Site locations were spatially verified using digital orthophoto quadrangles to ensure an accurate, geographically referenced inventory. The inventory provides, where available, descriptive information for mine-related sites, the estimated volume of mine-waste piles and mill-tailings deposits, and the discharge and pH of mine adits with flowing water. Water-quality and discharge data for 232 samples collected at 110 mine sites during low-flow conditions in 1995–99 have been compiled. In addition, time-series data are presented for water quality at seven adits sampled over the annual hydrologic cycle. These data provide site-specific information about potential sources of deposit-related acidity and trace elements that can be used to support an environmental evaluation of the effect of historical mining in the study area.

Analysis of the spatial variation in water-quality data from mine adits at low flow shows considerable variability. Mine-adit water chemistry is controlled by the degree of hydrothermal alteration in the surrounding bedrock and the type and extent of base-metal sulfides in the mine workings. Time-series data collected from seven draining adits show that increases in discharge generally are not associated with spring runoff and that concentrations of many metals remain very nearly constant or show a slight increase during this seasonal event. Increases in discharge from a few mines during spring runoff may be controlled by surface water that infiltrates into the mine, forcing mine-pool water out at the adit. Mine-adit flow may represent a long-term source of metals that affect surface water quality.

Introduction

This chapter describes the mine inventory compiled for the Animas River watershed study area. One of the most important facets of a complete characterization of watersheds affected by historical mines is to determine the location of, as well as gather and report information about, the mines, mills, and other mine-related sites. Within the Animas River watershed, data on mine and mine-related sites were available from several previous investigations. However, these data had not previously been compiled into one database, and many of the sites identified in these investigations had only approximate locations.

Every mine, mill, or smelter site in a watershed represents a potential source of deposit-related acidity and trace metals that could affect water quality and ecosystem health through direct drainage, seepage, erosion, or runoff. Although more than 5,300 mining-related features have been mapped in the study area (fig. 1), the vast majority of these sites were small prospect pits, many of which were located along the large and extensively exposed quartz veins described in the area by Purington (1905). (See the account of the discovery of the Sunnyside mine in Bird, 1999.) Other prospects were located on iron-rich springs, or in areas covered with oxidized iron deposits where there might have been other interesting features potentially indicative of sulfide mineralization at depth (Verplanck and others, this volume, Chapter E15; Yager and Bove, this volume, Chapter E1, pl. 2).

Four mining districts lie within the Animas River watershed study area. Raymond (1877, p. 324) reported that the San Juan area was initially divided into two mining districts:

> The Animas district includes all locations made on the Animas River and its tributaries to a point two miles above Howardsville.
>
> The Eureka district joins the Animas at this point and extends to the divide between the waters of the Animas and those of the Gunnison and the Uncompahgre.

The Red Mountain district originally was defined by the basin of Red Mountain Creek north of Red Mountain Pass in Ouray County, but Schwarz (1888) suggested that it be expanded

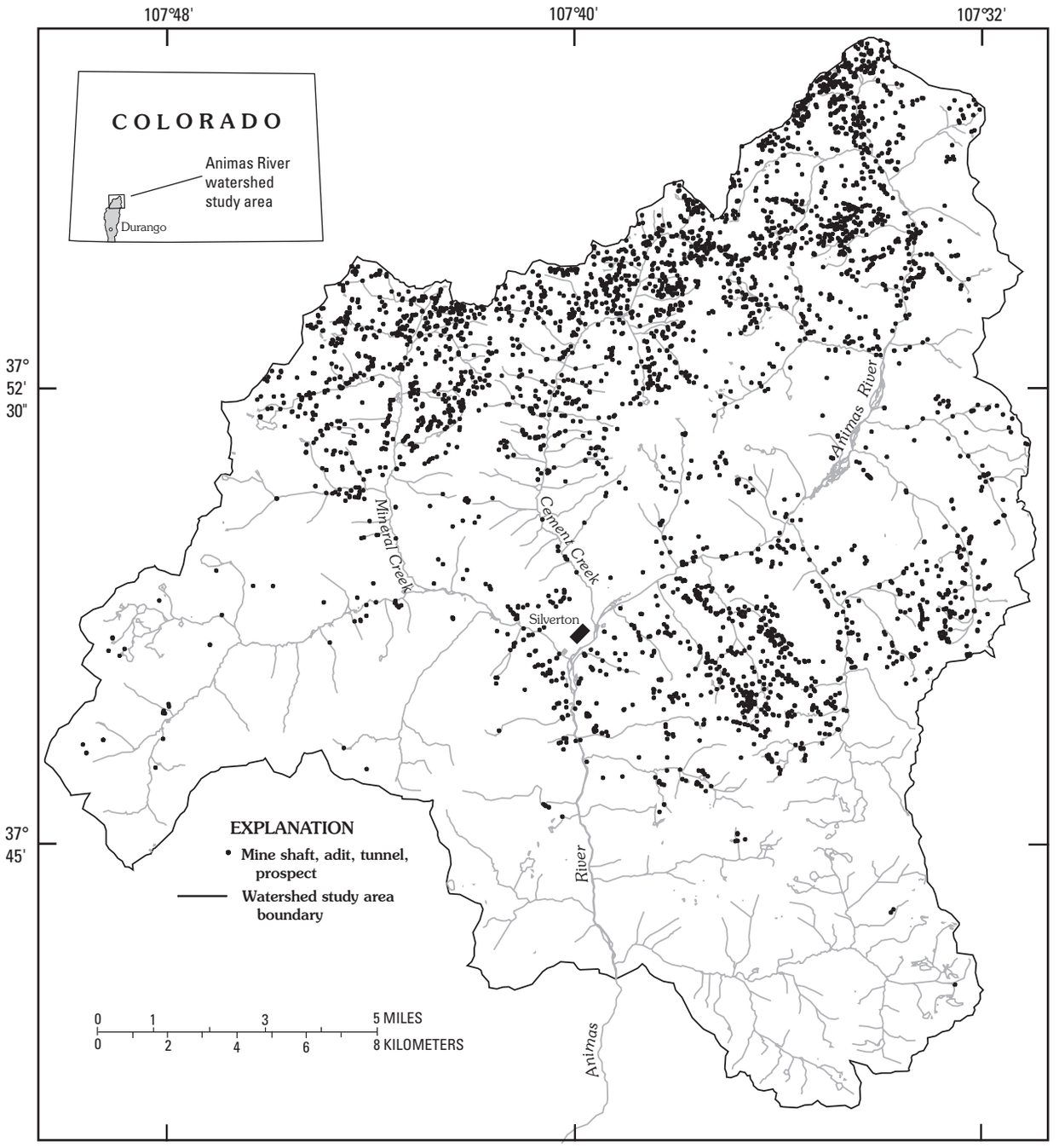

Figure 1. Locations of 5,397 mine shafts, adits, tunnels, and prospects from U.S. Geological Survey 1:24,000 scale topographic maps (Handies Peak, 1955; Howardsville, 1955; Ironton, 1955; Ophir, 1955; Silverton, 1955) and 373 AMLI_MINE_ID locations in Animas River watershed study area.

southward to include ores in chimney deposits associated with Red Mountain. Ransome (1901, p. 104) described the Red Mountain district as follows:

> ***bounded on the northeast by Grey Copper Creek, on the northwest by Red Creek, on the west and south by Mineral Creek, and on the east, with one or two exceptions near Red Mountain, by the ridge crest extending from Anvil Mountain northward to Red Mountain and thence northeast to the saddle at the head of Grey Copper Gulch.***

The Ice Lakes district in the headwaters of South Fork Mineral Creek was mentioned by Hodges (1899) in the report of precious-metal production by the U.S. Bureau of the Mint. Boundaries are not defined in the literature we examined, but the district includes the mines and mills in the headwaters of South Fork Mineral Creek. Approximate boundaries of the four mining districts are in figure 2.

Varnes (1963) described the mines and ores from the area of the Animas district south and east of Silverton, which he referred to as the "south Silverton mining area." Ores from this area are hosted in Paleozoic and Precambrian rocks and have different water chemistry than those from within the Silverton caldera (Bove and others, this volume, Chapter E3).

Purpose and Scope

This inventory focused on creation of a database of mine-related sites that have the potential for significant environmental effect to streams. The Animas River watershed study area contains numerous prospects and inactive mines. Although the potential exists for any one of these sites to adversely affect the environment, only a small fraction of them were considered likely to cause significant effects. Mine sites with draining adits, large workings, large mills, mine-waste dumps or rail loading zones were the primary focus of the mine inventory. Thus, prospects and smaller mine sites in the Animas River watershed study area were not inventoried in this study, and our survey is thereby not an exhaustive one (fig. 2). The primary objectives for this mine inventory were

- To create a modern digital database with accurate location data of mine and mill sites, large mill-tailings deposits, and smelter sites that have significant potential to cause environmental effects in streams
- To provide information, such as the size of mine-waste piles and mill-tailings deposits, ground- and surface-water quality, and numbers of mine features, that may be needed to assess site remediation and stream restoration activities
- To tabulate water-quality data collected over the 1995–99 period of study and provide a temporal and geologic framework for interpreting these data.

The mine inventory for the Animas River watershed study area was compiled from a variety of published references and maps of the districts. The inventory combines geographically referenced locations and descriptive information in a format that lays the foundation for answering environmental and remediation questions. The inventory includes inactive mines and mine-related sites in the upper Animas River basin, Cement Creek and Mineral Creek basins, and South Fork Mineral Creek subbasin in the vicinity of Silverton, Colo. (von Guerard and others, this volume, Chapter B, fig. 2).

Acknowledgments

We thank the following local residents, all familiar with historical mining in the watershed, for their assistance in locating and verifying mine sites: Steve Fearn, Larry Perino, William Simon, and especially Bill Jones, who provided extensive reviews of our mine location maps. We thank Jerry Hassemer for compiling unpublished data (table 5) from the Animas River Stakeholders Group, the Colorado Geological Survey, and the Colorado Division of Mines and Geology.

Methodology

The process used to compile the mine inventory included the following steps. First, data from previous investigations were assembled. We reduced the number of sites to be included in the inventory considerably by eliminating sites that likely had no environmental effect. Factors for inclusion or exclusion in the mine-site inventory focused on a site's contribution to environmental degradation, the physical hazard risk, and past production. Sites excluded from the inventory included numerous small prospects, sites located some distance from watercourses, and sites for which evidence of any environmental effect was lacking. For the remaining sites, representative locations were determined and features considered important relative to environmental effects were tabulated from existing sources. Published data, primarily from Ransome (1901), Henderson (1926), Burbank (1933), Varnes (1963), and Burbank and Luedke (1969), and unpublished data as well as our field investigations suggest that the inventory presented in this chapter is comprehensive in terms of identifying the larger and more environmentally significant historical mines and mine-related sites.

Determination of the representative location for a mine-related site involved review of public records and data obtained from the State of Colorado, United States Department of Agriculture (USDA) Forest Service, U.S. Bureau of Land Management (BLM), and U.S. Geological Survey (USGS) databases and published studies cited in the references. These location data then were combined into a single digital layer,

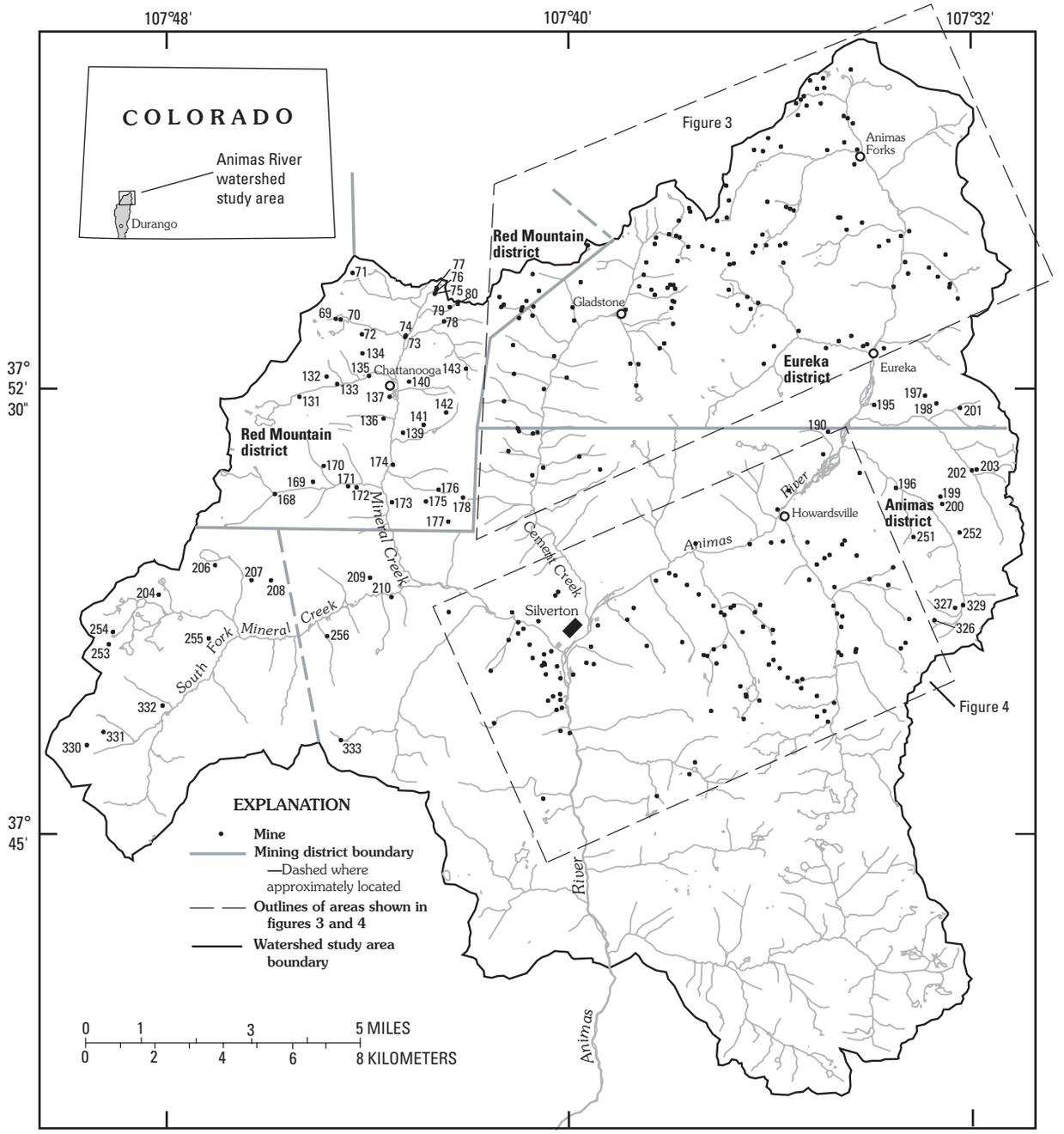

Figure 2. Approximate mining district boundaries and mine locations in Animas River watershed study area and vicinity; mine names are listed in tables 1 and 2. Extensions of boundaries of Red Mountain district to north into Ouray County, as described by Ransome (1901), are indicated by dashed lines.

and each site location was resolved to one representative point based on 1998 digital orthophoto quadrangles (DOQ). In some cases, the site location had to be determined strictly from a written description. Using DOQ image plots containing the resolved mine locations, USGS personnel and local residents familiar with the mines of the study area verified and revised the locations of the mine-related sites based on site visits, survey plats, and local knowledge of the area. Unpublished field inventories were used extensively to develop the final location data, as follows:

- U.S. Bureau of Mines (Barbara Hite, Unpublished mine land inventory report for the U.S. Bureau of Land Management, 1995)
- Colorado Geological Survey (Jonathan Lovekin, Michael Satre, William Sheriff, and Matthew Sares, Unpublished abandoned mine land inventory report for San Juan Forest, Columbine Ranger District, Colorado Geological Survey, 1997)
- Colorado Division of Minerals and Geology (Jim Herron, Bruce Stover, Paul Krabacher, and Dave Bucknam, Unpublished Mineral Creek feasibility investigations report, Upper Animas River Basin, Colorado Division of Minerals and Geology, 1997; Jim Herron, Bruce Stover, and Paul Krabacher, Unpublished Cement Creek reclamation feasibility report, Upper Animas River Basin, Colorado Division of Minerals and Geology, 1998; Jim Herron, Bruce Stover, and Paul Krabacher, Unpublished Upper Animas River reclamation feasibility report, Upper Animas River Basin, Colorado Division of Minerals and Geology, 1999; Jim Herron, Bruce Stover, and Paul Krabacher, Unpublished Lower Animas River reclamation feasibility report, Upper Animas River Basin, Colorado Division of Minerals and Geology, 2000)
- Local citizens who collectively make up the Animas River Stakeholders Group, ARSG (Peter Butler, Robert Owen, and William Simon, Unpublished report to Colorado Water Quality Control Commission, Animas River Stakeholders Group, 2001).

Data

The mine inventory for the Animas River watershed study area contains locations, site characteristics and features, and water-quality data for inactive mines and mine-related sites in a single data layer in the project database. (See Sole and others, this volume, Chapter G, for a complete explanation of how to access the mine inventory and project database.) Each of the 373 sites in the mine inventory has been assigned a site number called the AMLI_MINE_ID. This site number is a unique identifier and allows each site to be associated with scientific data and selected field sampling sites contained in the study database. Some historical mine sites contain extensive underground workings or have multiple shafts and adits within a small area. In some cases, these sites are represented in the mine inventory by a single site number. In other cases, particularly at complex sites where mines were consolidated or have been referred to by different names in the published literature, different mine levels were assigned different site names and numbers.

Table 1 lists the 373 mines, mills, large mill-tailings deposits, and smelter sites included in the inventory, and provides the geographic coordinates for each site. The location status field provides a relative measure of how accurately the site has been located. The decision to encode the location status field in table 1 with “verified” or “approximate” was determined by our comparison of the source description and field diagrams with the DOQ and locations symbolized on existing maps. A verified value means that USDA Forest Service, BLM, or USGS personnel, or local residents involved in the mining industry checked the mine-related location and agreed on its position with a high degree of confidence. Table 2 contains just the mine sites in the inventory and lists these sites alphabetically by name to facilitate cross-referencing of mine names with locations. Although we have not made an exhaustive search of the literature for synonyms, we have included them, where we have that information, in table 2. Table 3 provides an alphabetical list of the locations of mills, large mill-tailings deposits, and smelters in the study area. Figures 2–5 show locations of the inventoried sites. Locations of mines are shown in figures 2–4. Figures 3 and 4 provide more detailed maps of the upper Animas River basin near Eureka and the south Silverton mining area. Locations of mills, large mill-tailings deposits, and smelters are shown in figure 5. Together, these illustrations and tables should facilitate location of any of the mines, mills, large mill-tailings deposits, or smelter sites referred to in this volume and provide the identifier which can be used to find additional data from the database for each of these sites.

Production records for most mines in the watershed are largely proprietary. Jones (this volume, Chapter C) gives the total production for the entire watershed for various commodities by year. He also lists the sizes of the mills and dates of expansion, gives information on mining and milling technology, and provides a link between mineral production and the transportation network in the watershed.

The mine names in the inventory are those generally referred to in the published references, the most thorough of these early reports being that of Ransome (1901). Mine

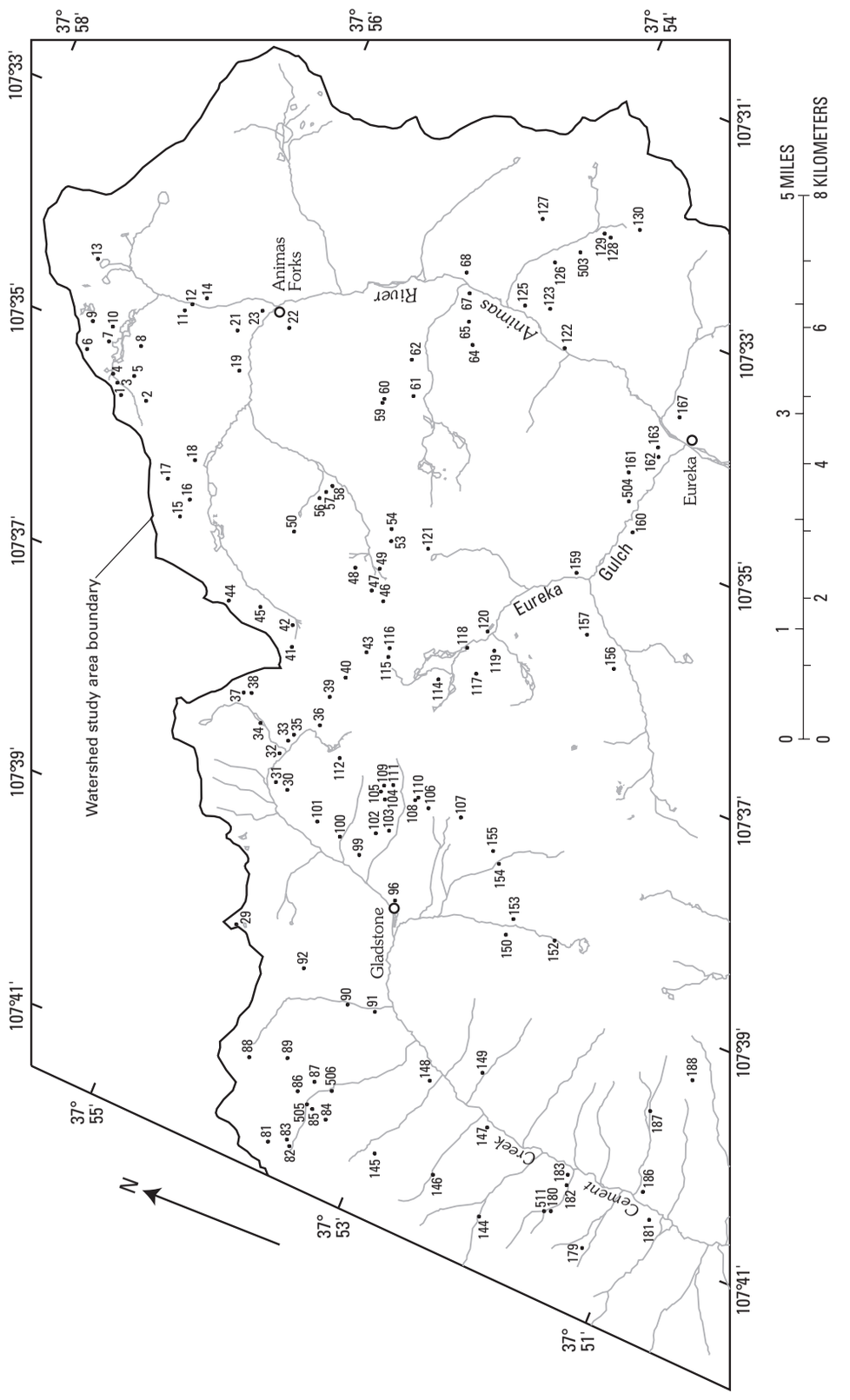

Figure 3. Eureka area showing mine locations; mine names are listed in tables 1 and 2.

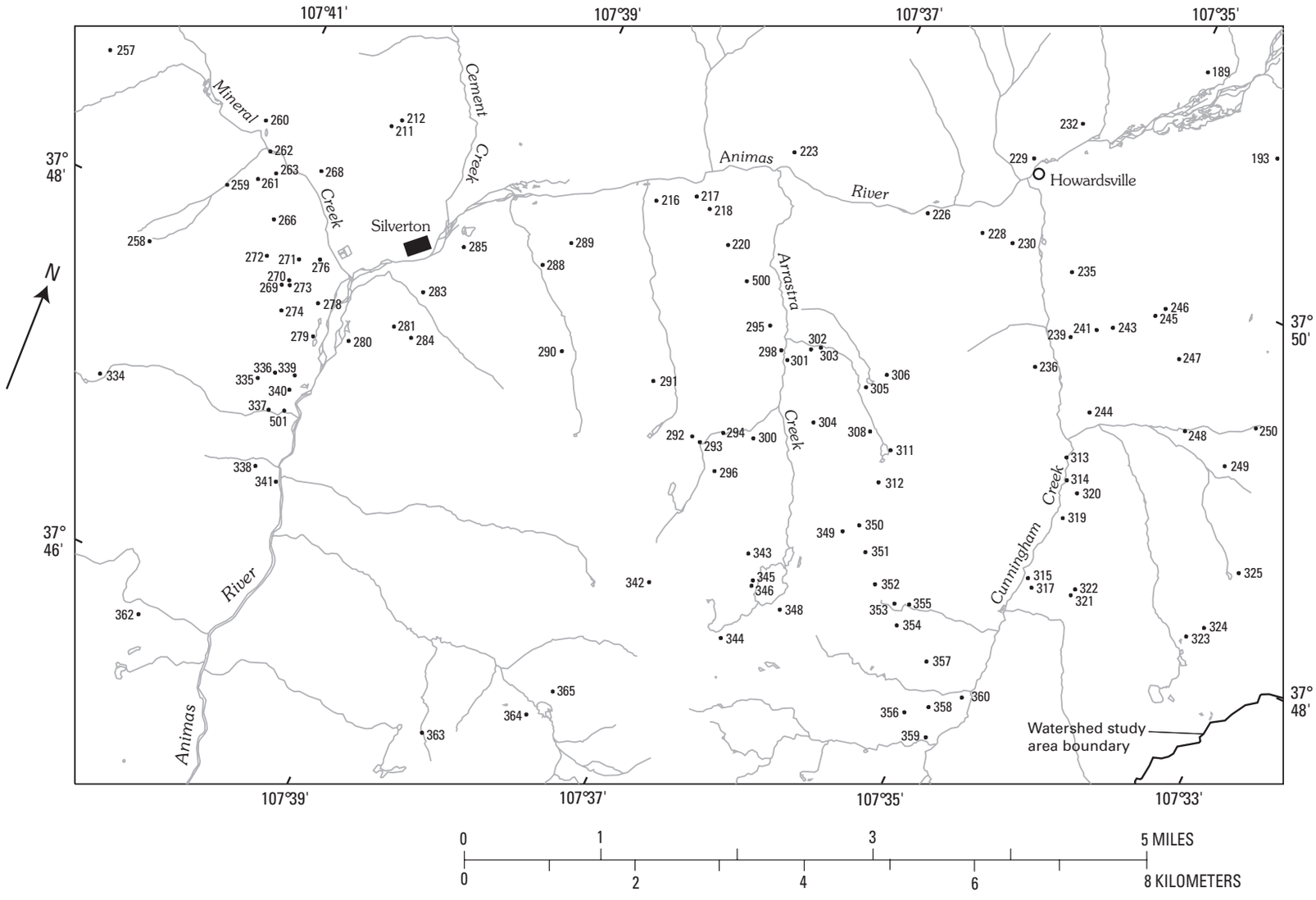

Figure 4. South Silverton area showing mine locations; mine names are listed in tables 1 and 2.

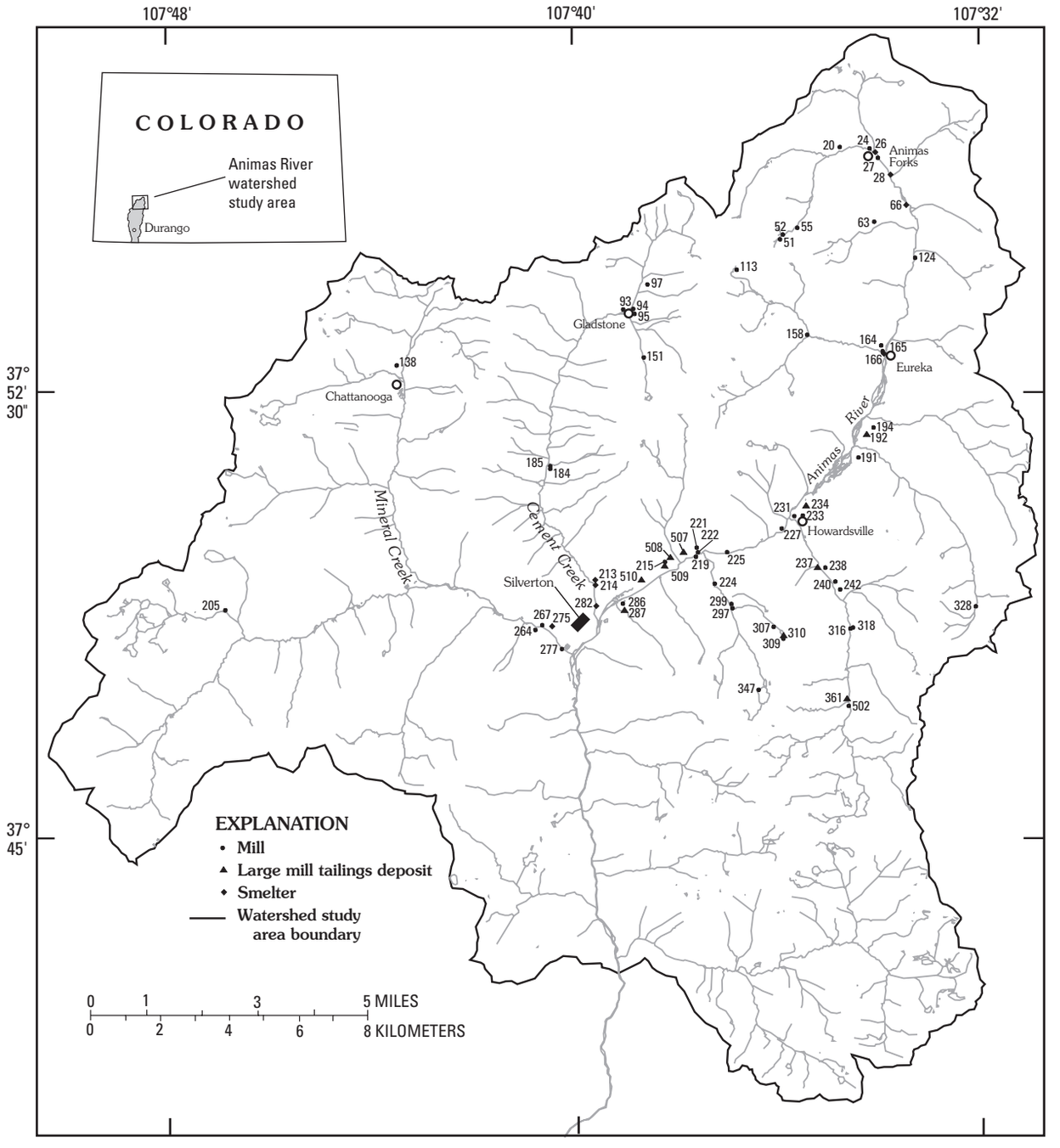

Figure 5. Locations of mill sites, large mill-tailings deposits, and smelter sites; site names are in table 3.

names or spellings often change with ownership during the development of a mining district. Furthermore, during times of economic downturn, consolidation of properties often occurred. For example, of the 110 mines listed as silver producers in the commodity report of the study area by the U.S. Bureau of the Mint (Munson, 1889), 68 mines that had previously reported silver production did not produce silver during 1889. Only 49 of 110 mines listed in Munson (1889) are in the mine inventory. Also, we have not attempted to document the many changes in mine names due to change in ownership or by consolidation of claims throughout the history of mining. As a result, not all mine names used in the literature or on claims records may be included in this mine inventory. One can conclude from this brief summary that mine names as well as mine features are transitory, especially in the early history of mining in the study area.

Table 4 presents descriptive information for many of the inventoried sites related to the potential for environmental effects. Sites that had only a single adit or shaft generally were associated with smaller disturbances, and these sites typically constitute only a physical hazard. They were not generally included in table 4. The shafts and adits columns give an indication of the extent of the surface workings at that site. Important point-source information typically used to evaluate sites for remediation included (1) number of flowing adits, (2) whether or not the adit drainage flowed over the mine waste, (3) whether the vegetation surrounding the outflow has died, or has a kill zone, (4) volume of the mine waste, (5) size of the area disturbed, and (6) distance to the receiving stream. Flow rates from the mine adits were highly variable throughout the year; discharge values are given at low flow in tables 5 and 6.

Results from the survey of mine sites conducted by the Animas River Stakeholders Group, the Colorado Geological Survey, and the Colorado Division of Mines and Geology are summarized in table 5. These data complement the work done by the USGS in that they include data from properties held privately to which USGS personnel did not have access. Analytical results from flowing adits sampled at low flow were done by contract EPA laboratories. These data supplement the low-flow adit water chemistry data collected by Mast and others (2000) and data of Nash and Fey (this volume, Chapter E6). Adit water chemistry data were used in the evaluation and ranking of mine and mill sites for remediation by the ARSG (Unpub. report to Colorado Water Quality Control Commission, ARSG, 2001). In a somewhat different approach, ratings of the mine waste, water quality and adit flow, and distance from the stream are factors that were considered in ranking the mine sites on public land for possible remediation (Nash and Fey, this volume).

Adit Flow and Chemistry

A primary focus of studies of abandoned historical mines in a watershed often has been to locate flowing adits. These adits represent point sources that discharge variable amounts of acid and potentially toxic trace elements, in many cases directly into streams. Identification of mine sites that have large discharges of acidic, metal-rich water is clearly an important goal for watershed remediation. We have compiled water-quality and discharge data for 232 samples collected at 110 mine sites during low-flow conditions in 1995–99. Mine-water data for 76 samples collected by the ARSG, Colorado Geological Survey, and Colorado Division of Mines and Geology are in table 5; data for 156 samples collected by the USGS are in table 6. These data were compiled to provide information on the spatial variability of mine-water chemistry in the basin and to estimate metal loads from mining-related sources. In table 7, we present time-series data from Mast and others (2000) for selected mine sites in the study area sampled for 1–3 years. Characterization of seasonal patterns in metal concentrations and discharge for mines is often lacking in mine remediation studies but is important for estimating annual metal loads from mining-related sources. In addition, this information provides an important seasonal context for interpretation of mine-water chemistry at sites where time-series data are not available.

Flow from mines in the watershed exhibited a wide range in discharge and chemistry (tables 5 and 6 and fig. 6). Adit discharge during the low-flow sampling period ranged from <0.002 at several small mine workings to as much as 1.2 ft^3/s (cubic feet per second) at the Yukon tunnel adit (mine # 186). The pH of adit water ranged from 2.3 at the Hercules mine (mine # 83) to as high as 8.6 at Pride of the West (mine # 319). Specific conductance ranged from 32 µS/cm (microsiemens per centimeter) at the Bandora mine (mine # 332) to 3,520 µS/cm at the Koehler tunnel (mine # 75). Mine drainage was dominantly a calcium-sulfate type water with sulfate ranging from 6.6 to 2,720 mg/L (milligrams per liter) and calcium ranging from 1.6 to 580 mg/L. The dominant base metals in mine drainage were copper and zinc. Copper concentrations ranged from the limit of detection (0.5) to 98,600 µg/L, although only 25 percent of samples had concentrations above 280 µg/L. Zinc concentrations ranged from 5 to 250,000 µg/L, but only 25 percent of samples had concentrations above 3,900 µg/L. The wide range in the chemical composition of mine water is primarily due to the variability in degree of hydrothermal alteration in the surrounding bedrock and the type and extent of base-metal sulfides in the mine workings. In general, acid-sulfate and quartz-sericite-pyrite altered rock produced mine water with low pH and high metal concentrations, whereas propylitically altered rock produced mine water with neutral pH and high calcium concentrations (fig. 6; Bove and others, this

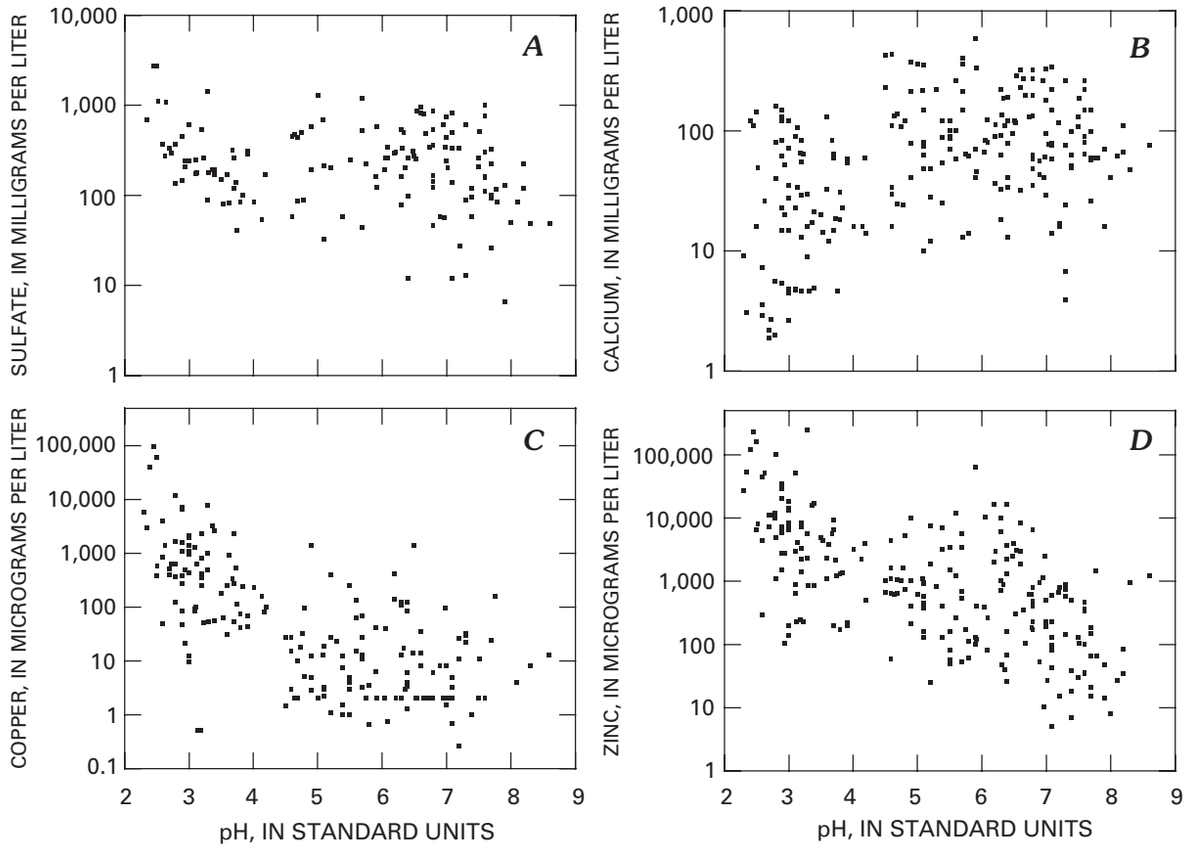

Figure 6. Dissolved concentrations of *A*, sulfate; *B*, calcium; *C*, copper; and *D*, zinc concentrations versus pH for mine-water samples collected in the Animas River watershed from 1995 to 1999. See tables 5 and 6 for complete tabulation of the data. Limit of detection, DL, for copper is 2 µg/L.

volume). Base-metal concentrations were highest in mines that had some historical production. A more detailed discussion of the relation between mine-water chemistry and hydrothermal alteration appears in Bove and others (this volume).

Temporal variations in mine-water discharge and chemistry are illustrated in figures 7–15 for seven mines sampled approximately monthly over the snowmelt hydrograph in 1995–2000 (von Guerard and others, this volume, fig. 3). Discharge at the adits did not show a pronounced increase during snowmelt, except for a slight increase at the Forest Queen (mine # 195) in 1997, and the Avalanche (mine # 149) in 1998 (fig. 7). These results contrast markedly with streams and rivers in the watershed, which show large increases in flow during the snowmelt period. For example, flow in the Animas River downstream from Silverton increased by as much as 30-fold between winter base flow and peak snowmelt in 1997–99, whereas adit discharge varied by only 3- to 5-fold over the same period. Similar to discharge, the chemistry of water at the sampled mines also remained relatively constant throughout the year as illustrated by the time-series plot of mine-water pH in figure 8 and chemical constituent plots in figures 9–15. One possible hydrologic explanation for the lack of seasonality in mine discharge is that adits are primarily fed by ground water that discharges from fracture networks in the bedrock. The relatively constant chemistry even during snowmelt could be explained by a piston flow mechanism whereby chemically mature water at the bottom of the ground-water reservoir is pushed into the mine pool as snowmelt recharges the top of the ground-water system. These time-series data from different mines are important because they show that concentrations of metals from adit discharge may be relatively constant through the year and, without intervention, may represent a long-term source of metals to the watershed. In addition, these data provide an indication that low-flow sampling of adits may be sufficient to characterize annual metal concentrations and loads from most mines.

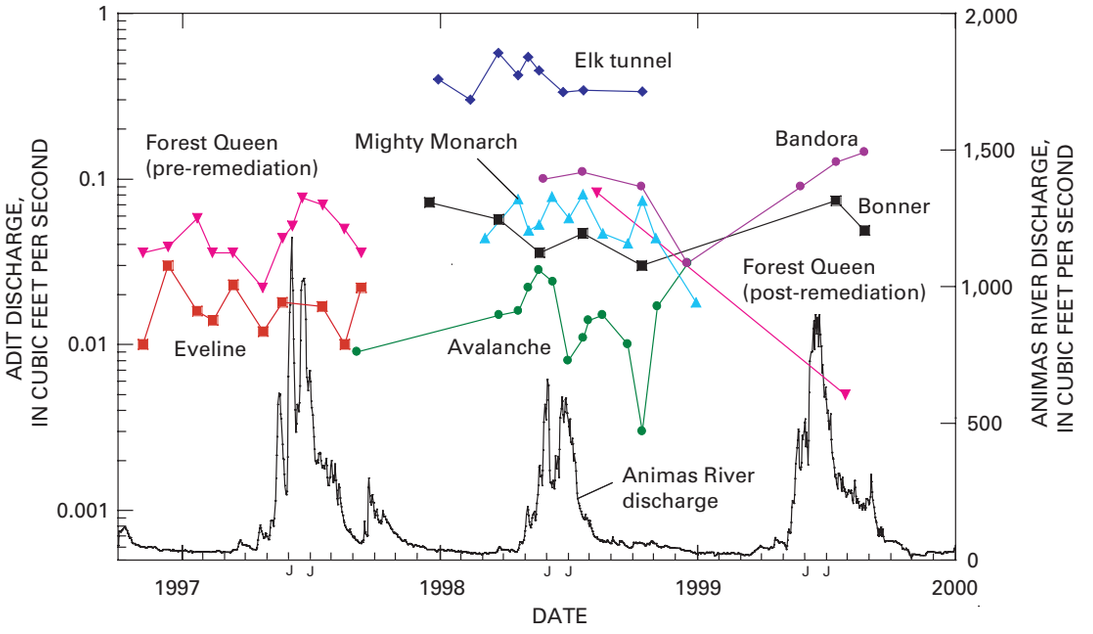

Figure 7. Graph of adit discharge versus date (beginning with January 1) from seven mines (Mast and others, 2000). The hydrograph determined at the Animas River gauge downstream from Silverton (USGS gauge 09359020) indicates periods of spring runoff, primarily during June and July where flow exceeds 150 ft^3/s (von Guerard and others, this volume). During summer 1999, the Animas River was at high flow through October because of abundant summer rains.

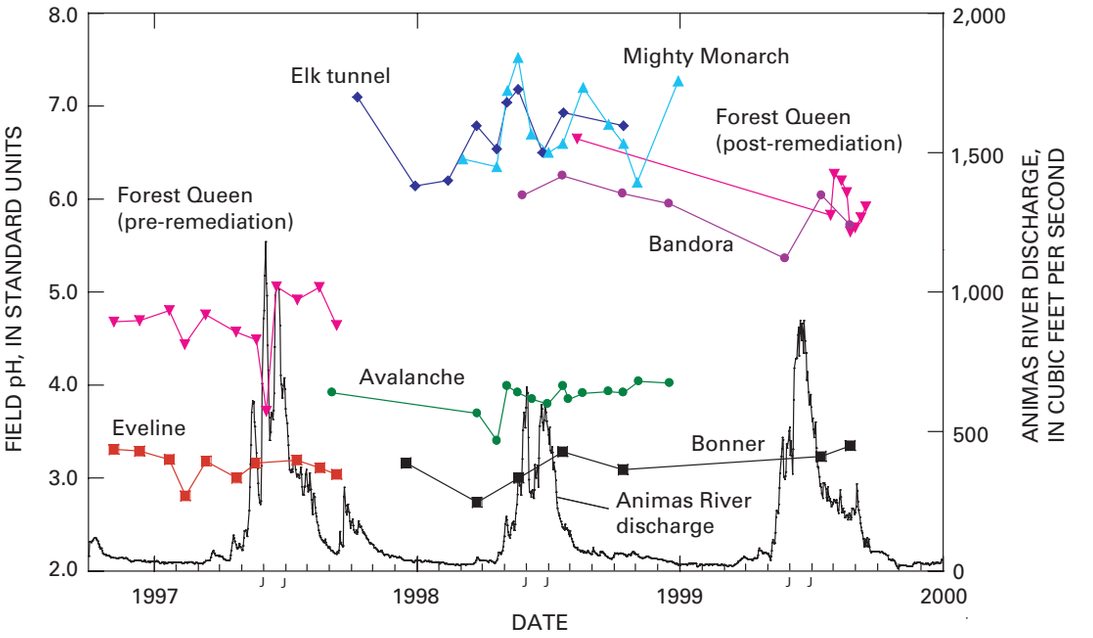

Figure 8. Graph of field pH versus time for mine adit water (Mast and others, 2000). The hydrograph determined at the Animas River gauge downstream from Silverton (USGS gauge 09359020) indicates periods of spring runoff, primarily during June and July where flow exceeds 150 ft^3/s (von Guerard and others, this volume). The Forest Queen mine data are labeled pre- and post-remediation.

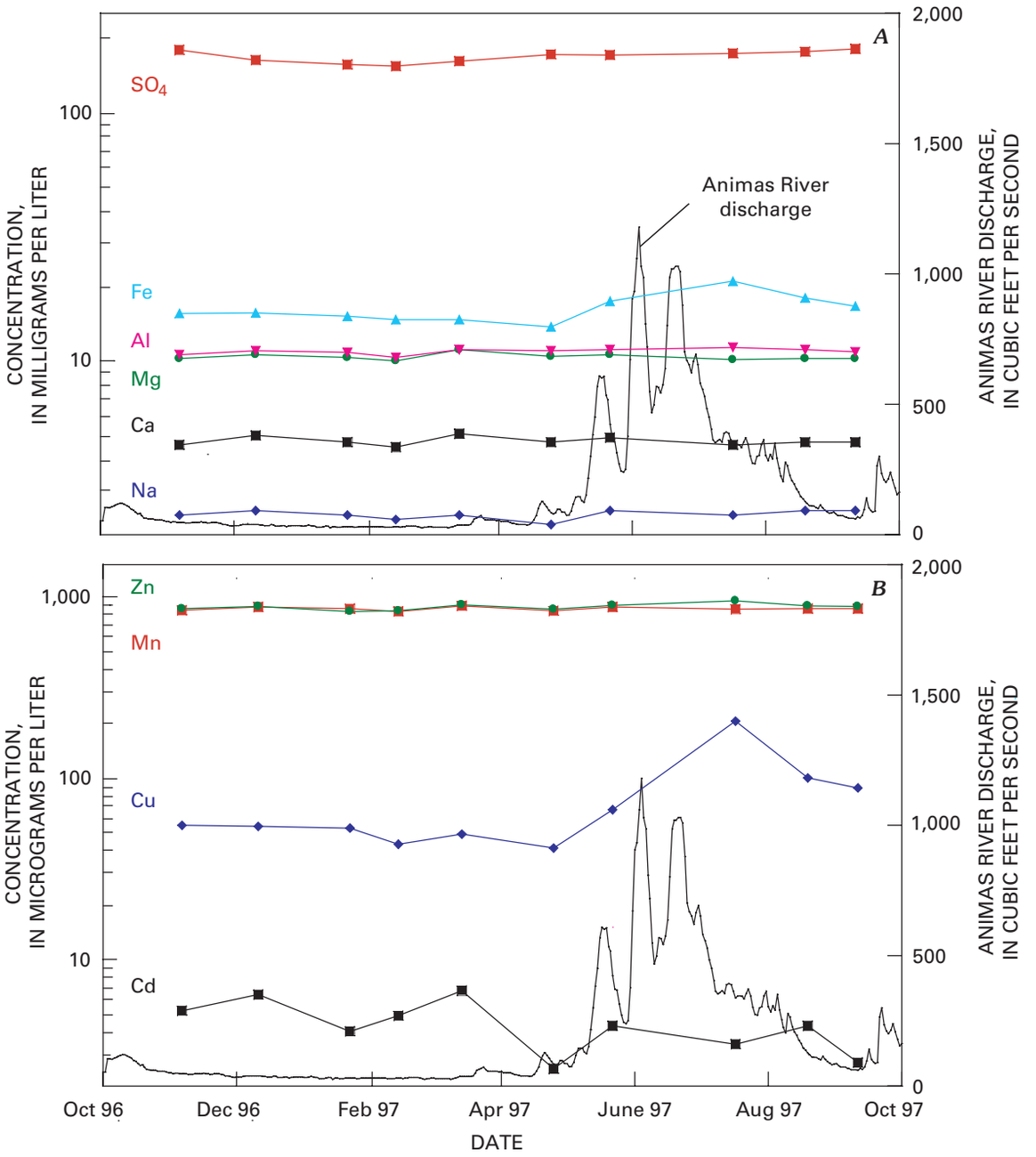

Figure 9. Concentrations of *A*, major, and *B*, trace elements in adit discharge from Eveline mine (site # 91; data from table 7). No lead was detected in the adit discharge (DL, detection limit=30 µg/L).

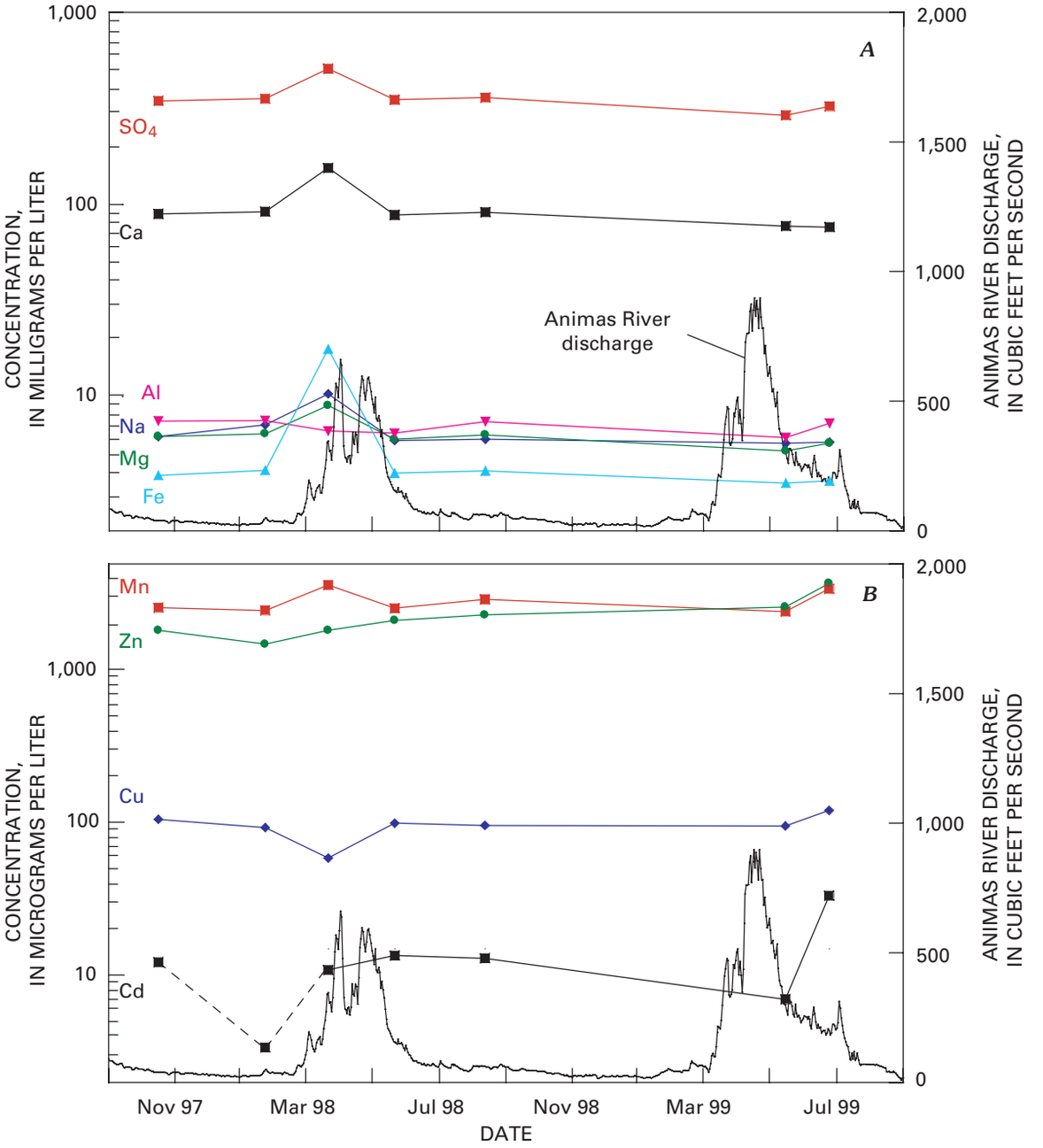

Figure 10. Concentrations of *A*, major, and *B*, trace elements in adit discharge from Bonner mine (site # 172; data from table 7). No lead was detected in the adit discharge (DL, detection limit=30 µg/L); cadmium was detected in some adit discharge samples (DL, detection limit=2 µg/L; connected using a dashed line).

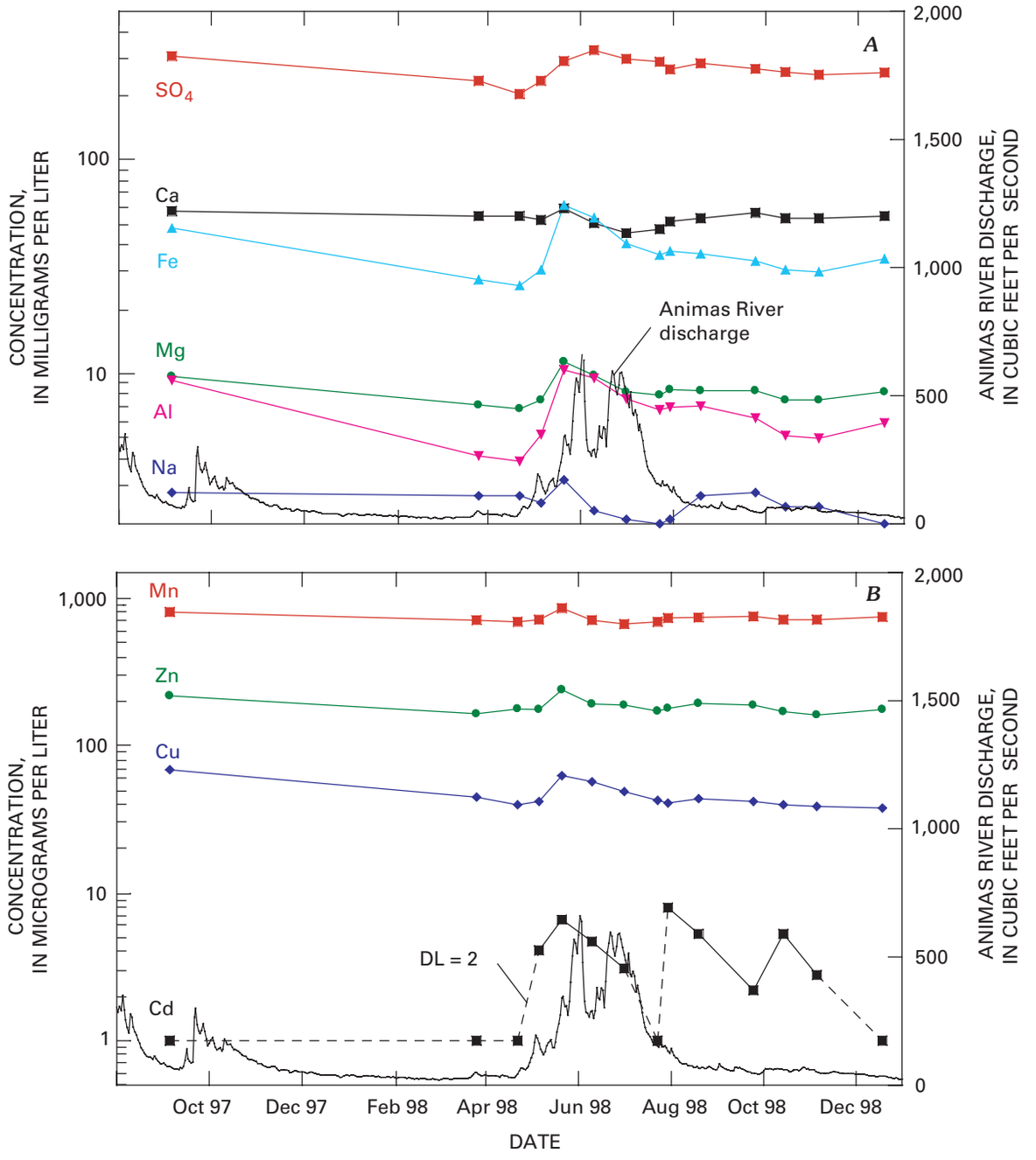

Figure 11. Concentrations of *A*, major, and *B*, trace elements in adit discharge from Avalanche mine (site # 149; data from table 7). No lead was detected in the adit discharge (DL, detection limit=30 µg/L); cadmium was detected in some adit discharge samples (DL, detection limit=2 µg/L; data points connected using a dashed line).

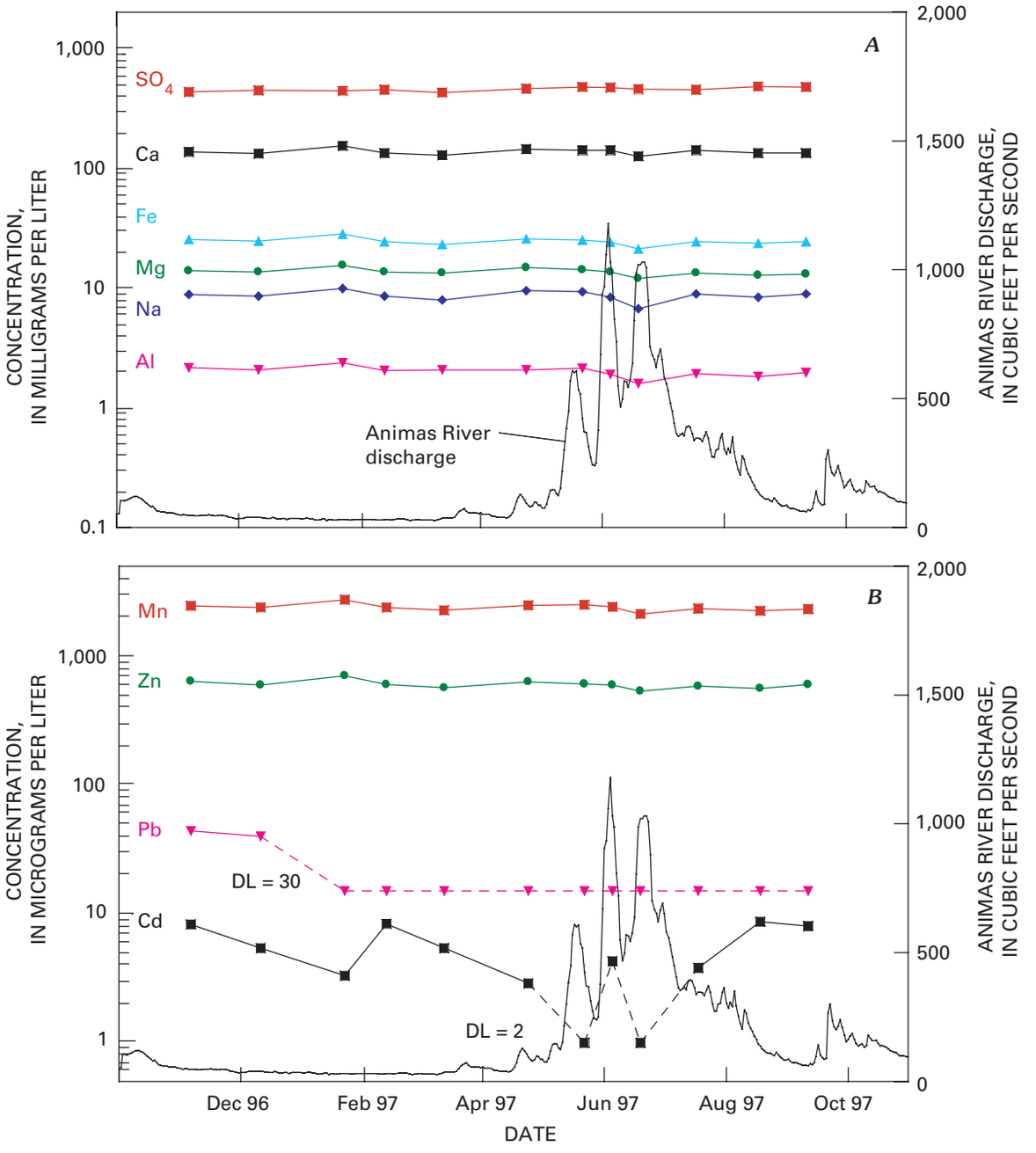

Figure 12. Concentrations of *A*, major, and *B*, trace elements in adit discharge from Forest Queen mine (site # 195; pre-remediation data from table 7). No copper was detected in the adit discharge (DL, detection limit=4 µg/L); cadmium and lead were detected in some adit discharge samples (DL, detection limit=2 µg/L and 30 µg/L, respectively; data points connected using a dashed line).

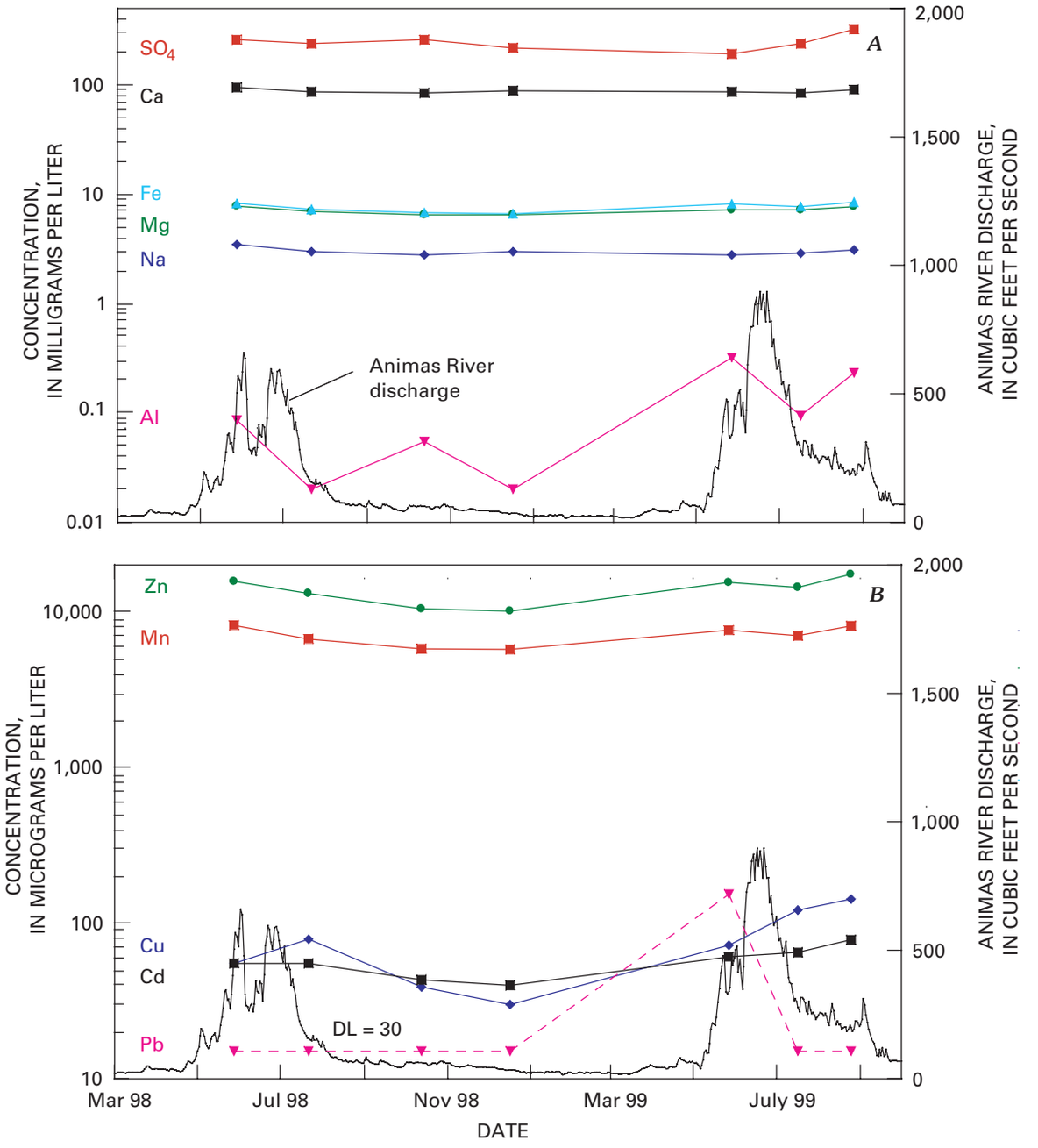

Figure 13. Concentrations of *A*, major, and *B*, trace elements in adit discharge from Bandora mine (site # 332; data from table 7). Lead was detected in only one sample (DL, detection limit=30 µg/L; data points connected using a dashed line).

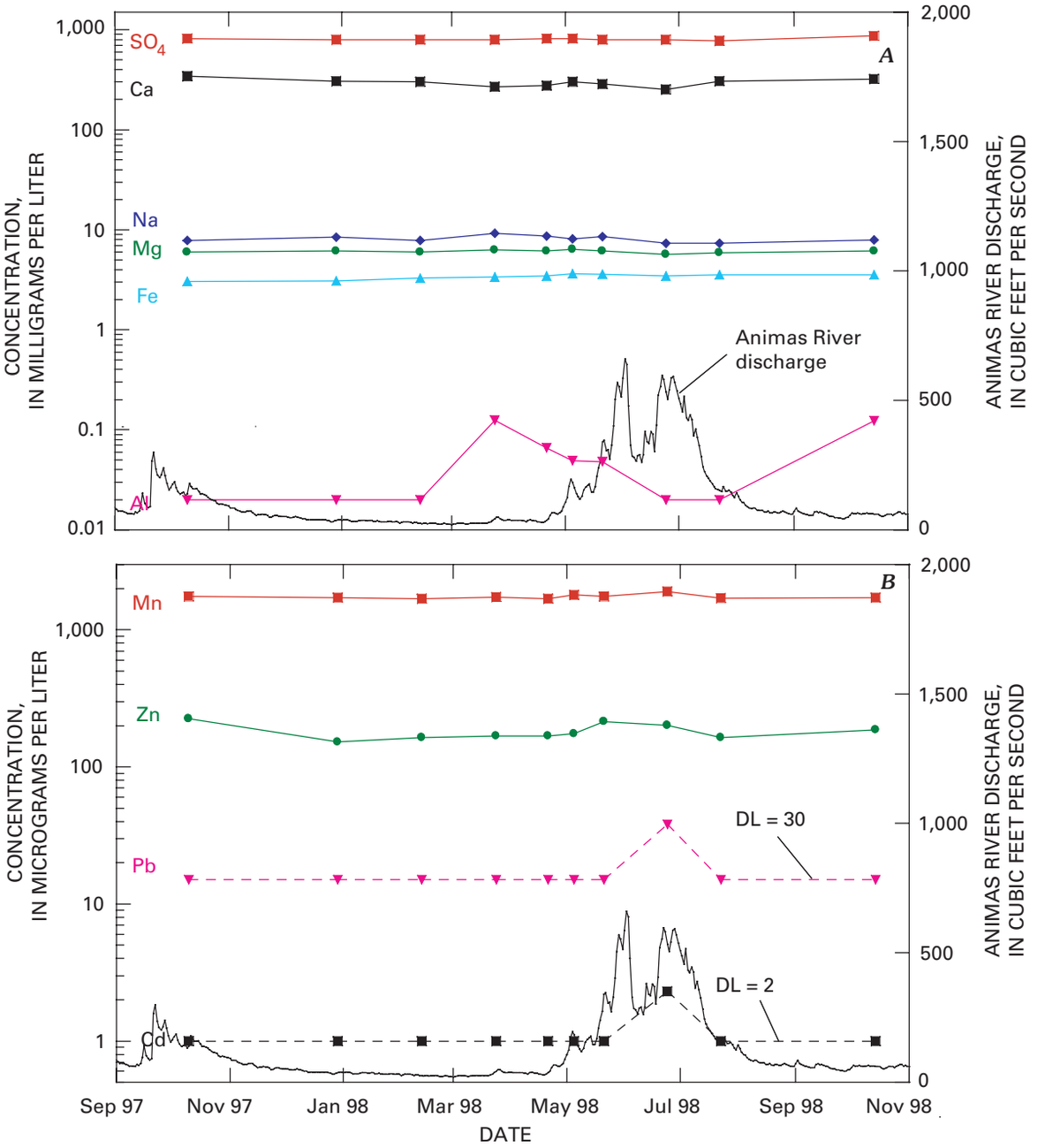

Figure 14. Concentrations of *A*, major, and *B*, trace elements in adit discharge from Elk tunnel (site # 147; data from table 7). No copper was detected in the adit discharge (DL, detection limit=4 µg/L, table 7); cadmium and lead were detected in some adit discharge samples (DL, detection limit=2 µg/L and 30 µg/L, respectively; data points connected using a dashed line).

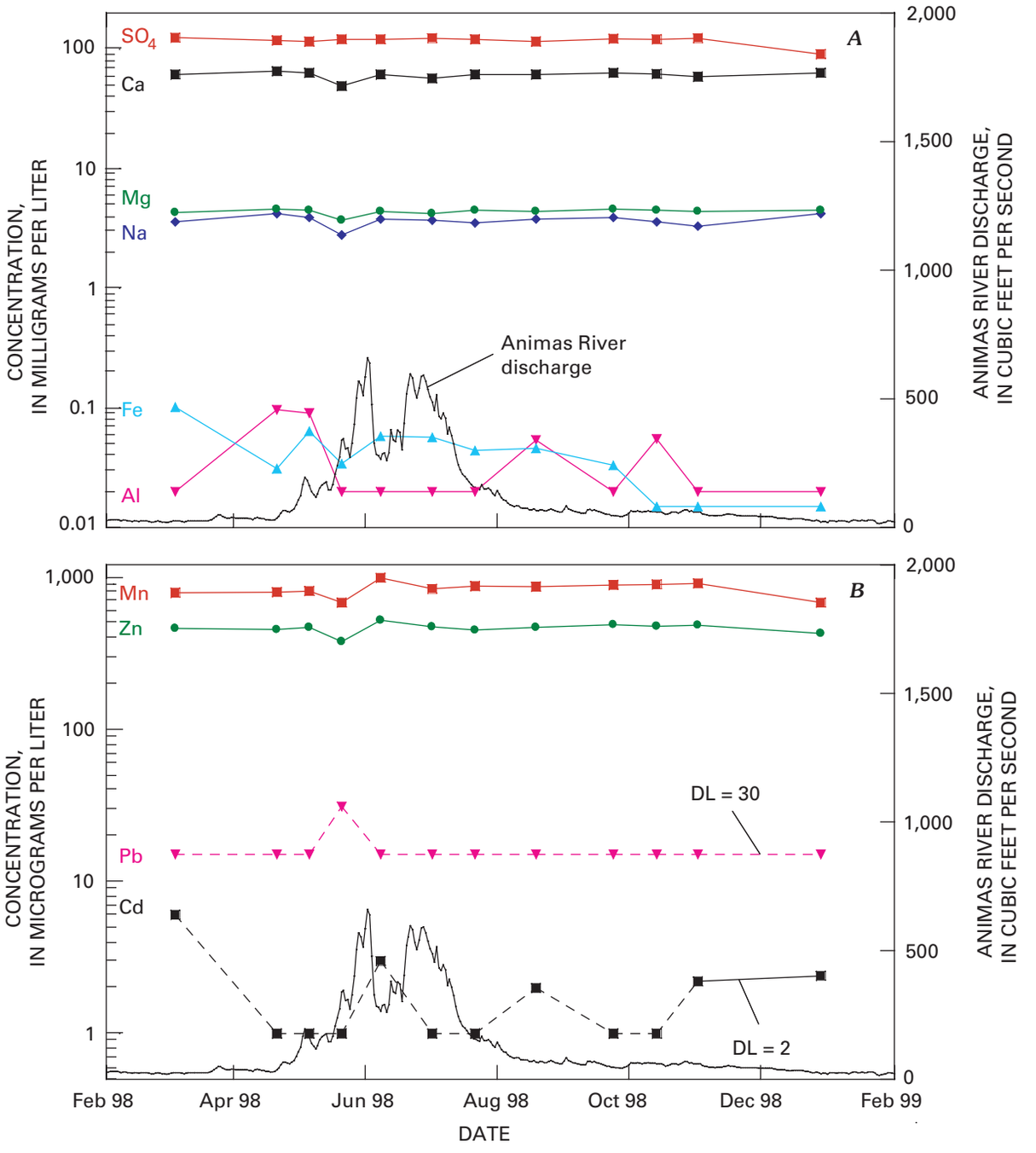

Figure 15. Concentrations of *A*, major, and *B*, trace elements in adit discharge from Mighty Monarch mine (site # 285; data from table 7). No copper was detected in the adit discharge (DL, detection limit=4 µg/L); cadmium and lead were detected in some adit discharge samples (DL, detection limit=2 µg/L and 30 µg/L, respectively; data points connected using a dashed line).

Figures 9–15, in which data are ordered by increasing values of pH of the adit drainage, show the variations of major- and trace-element concentrations for each suite of mine-water samples with time. The Eveline (mine # 91) and Bonner (mine # 172) are located on the margins of some of the most intensely altered areas of the watershed. The Eveline mine, which drains a localized area of quartz-sericite-pyrite altered rock, has the most acidic mine water (fig. 8) and was characterized by high concentrations of sulfate, zinc, and manganese with low concentrations of calcium (fig. 9). Discharge from the Eveline mine varied between 0.01 and 0.03 ft^3/s and did not appear to increase during spring snowmelt (fig. 7). For the dissolved constituent concentrations, iron and copper increased slightly following peak flow in 1997, although the other constituents remained remarkably constant during snowmelt. The Bonner mine is on the margins of an area of pervasive quartz-sericite-pyrite altered rock, and drainage is characterized by low pH (fig. 8), and high concentrations of sulfate, zinc, and manganese (fig. 10). Discharge from the Bonner mine varied between 0.03 and 0.07 ft^3/s and did not appear to increase during spring snowmelt (fig. 7). A slight increase evident in the concentration of some constituents at the adit in the May sample in 1998 may reflect flushing of solutes from the adit pool and waste materials at the onset of snowmelt. Constituent concentrations through the remainder of the sampling period remained relatively constant.

The Avalanche (mine # 149) and Forest Queen (mine # 195) drain areas of propylitically altered rock with zones of quartz-sericite-pyrite alteration localized along vein margins. Mine adit drainage from the Avalanche mine was acidic and was similar in composition to that of the Bonner mine (fig. 11). Discharge at the Avalanche mine varied from 0.003 to 0.031 ft^3/s and showed a distinct increase during snowmelt in 1998 (fig. 7). Concentrations of most dissolved constituents at the Avalanche mine also increased during spring runoff in 1998, although concentrations of aluminum and iron appeared to increase much more dramatically than other dissolved constituents. Discharge at the Forest Queen mine (pre-remediation) ranged from 0.022 to 0.077 ft^3/s during 1997 and was highest in June and July following peak snowmelt (fig. 7). Although most mine adits were monitored for a period of about a year, the Forest Queen mine was monitored for a longer period because it was opened and the discharge routed to a constructed passive treatment wetlands system in the summer of 1998 to remediate the water quality of drainage from this adit (data labeled pre- and post-remediation, fig. 7). Studies of the Forest Queen wetlands are in Stanton, Fey, and others (this volume, Chapter E25). Mine water from the Forest Queen mine was less acidic than at the Avalanche mine but had significantly higher concentrations of sulfate, manganese, and zinc (fig. 12). Despite the 3-fold increase in discharge observed in 1997, concentrations of dissolved constituents (except for cadmium) were remarkably constant throughout 1997.

The Bandora (mine # 332) is in the Precambrian and Paleozoic sedimentary rocks outside the Silverton caldera margin in weak sericite-pyrite altered rock. Mine drainage from the Bandora is characterized by neutral pH (fig. 8), low concentrations of sulfate, and high concentrations of zinc and manganese relative to the other mines (fig. 13). Discharge from the Bandora mine varied from 0.03 to 0.14 ft^3/s and was lowest during base flow in December 1998 (fig. 7). Dissolved constituent concentrations were relatively constant in 1998–99, although some metals, particularly zinc and manganese, appeared to be slightly higher during snowmelt than during base flow.

The Elk tunnel (mine # 147) and Mighty Monarch (mine # 285) drain areas of propylitically altered rock and have the highest pH values of the seven mines (fig. 8). Although field pH values and metal concentrations at the two mines were similar, sulfate and calcium concentrations were much lower at the Mighty Monarch mine (fig. 15) than at the Elk tunnel (fig. 14). Seasonal variations in discharge, which ranged from 0.041 to .081 ft^3/s at the Mighty Monarch mine and 0.30 to 0.57 ft^3/s at the Elk tunnel, did not appear to be related to snowmelt (fig. 7). Concentrations of major and trace elements in adit water at the two mines also showed little variation during 1998 except for aluminum at the Elk tunnel and aluminum, cadmium, and iron at the Mighty Monarch mine.

Concentrations of both the major and the trace elements vary between mines and reflect the alteration and sulfide mineralogy (Bove and others, this volume). Concentrations of dissolved iron, aluminum, copper, and lead are clearly functions of both the alteration suite and the pH of the mine water (table 7 and figs. 9–15; dissolved lead concentrations are often below the limit of detection). Concentrations of magnesium and calcium, which provide acid neutralization, are a function of the geologic setting and the alteration. Loads (concentrations of dissolved constituent times the discharge) calculated for sulfate, calcium, copper, and zinc increase directly with discharge (fig. 16). Calculated loads for some other metals, such as iron and aluminum, do not show these same simple relationships because of solubility changes caused by differences in pH of the adit discharge. The preceding relationships indicate that the mine pool water is being forced out of the mine adits as the hydrologic head increases due to infiltration during spring runoff. Identification of those mine sites that have large discharges of acidic, metal-laden water is clearly an important goal for watershed remediation.

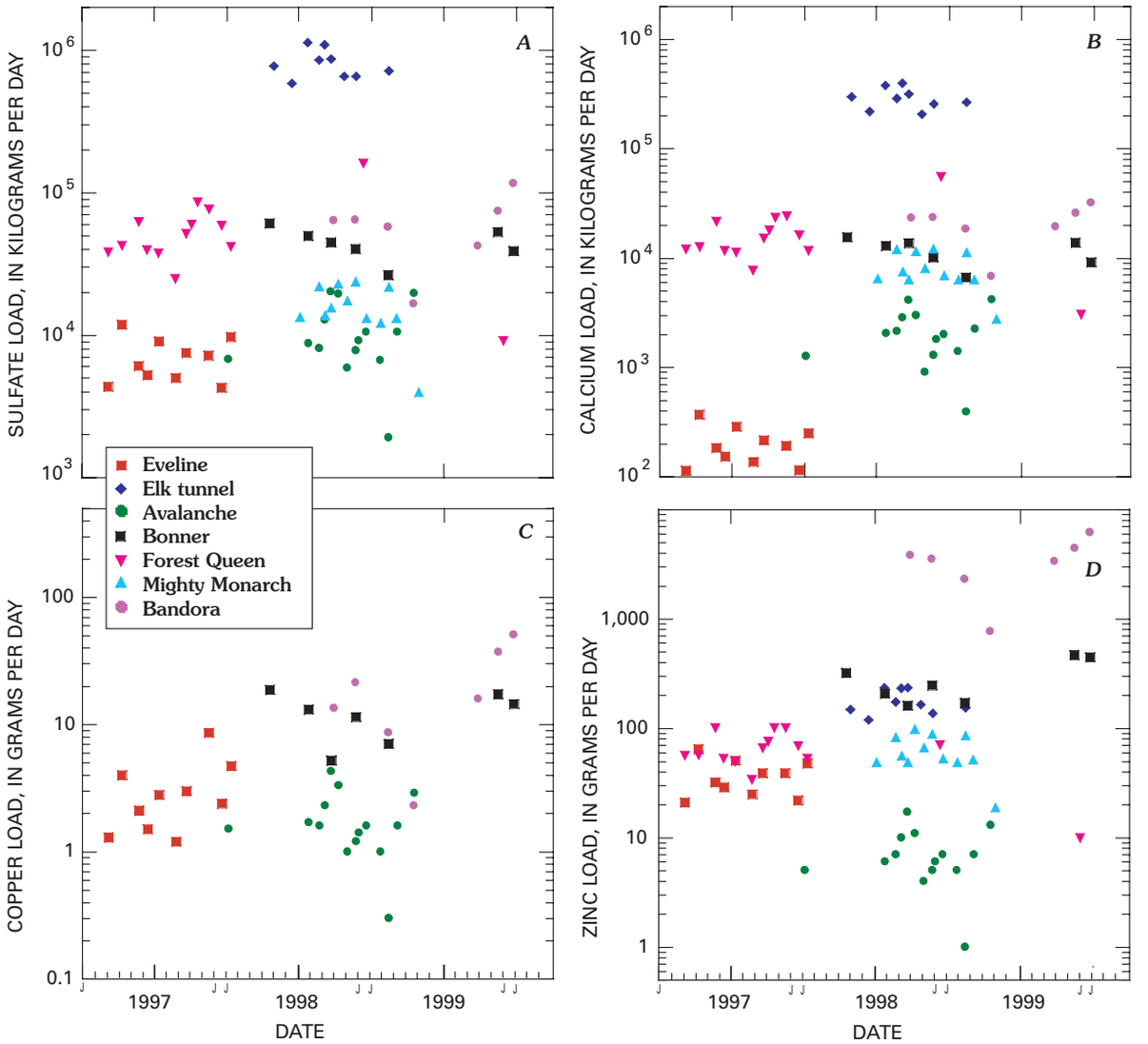

Figure 16. Loads of *A*, sulfate; *B*, calcium; *C*, copper; and *D*, zinc from the time-series adit discharge data from seven mine sites. The hydrograph determined at the Animas River gauge downstream from Silverton (USGS gauge 09359020) indicates periods of spring runoff, primarily during June and July where flow exceeds 150 ft^3/s (von Guerard and others, this volume).

Summary

Research of the historical record combined with modern digital mapping methods using digital orthophoto quadrangles (DOQ) and GIS technology has resulted in a new and more accurate inventory of the important past-producing mines, mills, and smelters in the Animas River watershed study area. Mine locations have been verified by project personnel or by local residents of Silverton and the surrounding area who have a working knowledge of the mining industry in the region. Compilations of new and existing data on the number of flowing adits, range of pH and dissolved metal concentrations, size of mine-waste piles and affected areas at these mine sites are summarized so that the data are available for use in potential remediation activity. Analysis of time-series data from seven mine sites (Mast and others, 2000) shows that the chemistry of the adit discharge from individual mines does not vary much of the year, but that the discharge at some sites shows a seasonal effect. Acidic mine drainage from historical mines represents a long-term source of contamination that affects surface water quality in the Animas River watershed study area.

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Tables 1–7

Table 1. Mines, mills, large mill-tailings deposits, and smelter sites listed by AML_MINE_ID number.

[Numbers refer to locations in figures 2–5 and in the Animas River watershed database; locations are either verified or approx. (approximate) on the basis of site visits or knowledge of resident experts; S-D, Shenandoah-Dives. Some mills located at the same sites were not originally numbered; we have added numbers in brackets for clarity]

Name	AMLI_MINE_ID	Latitude	Longitude	Location verified
Red Cloud mine	1	37.94532	107.59085	verified
Sewell mine	2	37.94221	107.59024	verified
Boston mine	3	37.94630	107.58929	verified
Dewitt mine	4	37.94720	107.58826	verified
Little Chief mine	5	37.94470	107.58737	verified
Uncompahgre Chief mine	6	37.95128	107.58621	verified
London mine	7	37.94914	107.58385	verified
Early Bird crosscut	8	37.94528	107.58268	verified
Ben Butler mine	9	37.95190	107.58187	verified
Prairie mine	10	37.94938	107.58150	verified
Hermes group	11	37.94194	107.57503	verified
Riverside mine	12	37.94136	107.57370	verified
Lucky Jack mine	13	37.95416	107.57264	verified
Eagle Chief mine	14	37.93998	107.57201	verified
Little Ida mine	15	37.93307	107.60487	verified
Burrows mine	16	37.93273	107.60190	verified
Vermillion mine	17	37.93617	107.60016	verified
Vermillion tunnel	18	37.93395	107.59594	verified
Frisco tunnel	19	37.93299	107.58053	verified
Bagley Mill (Frisco)	20	37.93287	107.58024	verified
Adit with unknown name	21	37.93503	107.57487	verified
Silver Coin mine	22	37.92926	107.57153	verified
Columbus mine	23	37.93308	107.57061	verified
Columbus Mill	24	37.93249	107.57045	verified
Animas Forks Smelter	26	37.93153	107.56856	verified
Gold Prince Mill	27	37.93007	107.56772	verified
Brown, Epley & Co. Smelter	28	37.92567	107.56361	verified
Corkscrew Pass mine	29	37.90803	107.66011	verified
Mogul South mine	30	37.90838	107.63789	verified
Mogul mine	31	37.91003	107.63744	verified
Mogul North mine	32	37.91092	107.63309	verified
Grand Mogul stope complex	33	37.91053	107.63079	verified
Queen Anne mine	34	37.91448	107.62986	verified
Grand Mogul	35	37.91014	107.62961	verified
Lower Ross Basin mine	36	37.90763	107.62676	verified
Columbia mine	37	37.91778	107.62645	verified
Upper Queen Anne mine	38	37.91687	107.62607	verified
Brenneman mine	39	37.90780	107.62212	verified
George Washington mine	40	37.90689	107.61843	verified
Mountain Queen mine	41	37.91439	107.61714	verified
Mountain Queen tunnel	42	37.91529	107.61396	verified
Lake mine	43	37.90567	107.61359	verified
Silver Chord mine	44	37.92367	107.61413	verified

Table 1. Mines, mills, large mill-tailings deposits, and smelter sites listed by AML_MINE_ID number.—Continued

Name	AMLI_MINE_ID	Latitude	Longitude	Location verified
Indian Chief mine	45	37.91981	107.61321	verified
Sunnyside Extension	46	37.90610	107.60532	verified
Mastodon mine (Handies Peak quadrangle)	47	37.90789	107.60442	verified
Independence mine (Handies Peak quadrangle)	48	37.91079	107.60209	verified
Gold Prince mine	49	37.90798	107.60085	verified
Custer mine	50	37.91941	107.60046	verified
Hanson Mill (Sunnyside Extension Mill)	51	37.90887	107.59989	verified
Mastodon Mill	52	37.91013	107.59899	verified
Silver Queen mine	53	37.90794	107.59624	verified
Sound Democrat mine	54	37.90845	107.59447	verified
Sound Democrat Mill	55	37.91188	107.59423	verified
Sunbank group, upper level	56	37.91805	107.59420	verified
Sunbank group, lower level	57	37.91757	107.59292	verified
Evening Star mine	58	37.91714	107.59171	verified
Scotia mine	59	37.91525	107.57688	verified
Golden Fleece mine	60	37.91522	107.57622	verified
San Juan Queen mine	61	37.91204	107.57415	verified
Sandiago tunnel	62	37.91388	107.56902	verified
Treasure Mountain Mill	63	37.91342	107.56898	verified
Toltec mine, upper level	64	37.90765	107.56339	verified
Toltec mine, middle level	65	37.90912	107.56027	verified
Eclipse Smelter	66	37.91776	107.55841	verified
Toltec mine, lower level	67	37.91035	107.55617	verified
Adit with unknown name	68	37.91163	107.55335	verified
Upper Bullion King	69	37.88872	107.74383	verified
Lower Bullion King mine	70	37.88856	107.74219	verified
Mineral Basin mine	71	37.90081	107.73827	verified
Lower Porphyry Gulch mine	72	37.88465	107.73515	verified
Silver Ledge mine	73	37.88394	107.72082	verified
Bradley Pit	74	37.88436	107.72059	verified
Koehler tunnel	75	37.89531	107.71101	verified
Junction mine	76	37.89627	107.71050	verified
Longfellow mine	77	37.89685	107.71036	verified
St. Paul mine	78	37.88806	107.70787	verified
Congress mine	79	37.89179	107.70601	verified
Carbon Lake mine	80	37.89263	107.70330	verified
JSP mine	81	37.89446	107.68946	verified
Galena Queen mine	82	37.89184	107.68887	verified
Hercules mine	83	37.89242	107.68806	verified
Henrietta mine, #3 level	84	37.88892	107.68295	verified
Henrietta mine, #7 level	85	37.89093	107.68222	verified
Lark mine	86	37.89341	107.68050	verified
Joe and Johns mine	87	37.89192	107.67819	verified
Webster mine	88	37.90046	107.67844	verified
Joe and Johns mine, upper level	89	37.89607	107.67635	verified
Galty Boy mine	90	37.89169	107.66520	verified
Eveline mine	91	37.88826	107.66467	verified

Table 1. Mines, mills, large mill-tailings deposits, and smelter sites listed by AML_MINE_ID number.—Continued

Name	AMLI_MINE_ID	Latitude	Longitude	Location verified
Burns group	92	37.89833	107.66251	verified
Mogul Mill	93	37.89067	107.65146	verified
Gold King Mill	94	37.89079	107.64814	verified
Lead Carbonate Mill	95	37.88953	107.64773	verified
American tunnel, Sunnyside mine	96	37.89106	107.64755	verified
Red and Bonita Mill	97	37.89716	107.64349	verified
Red and Bonita mine	99	37.89723	107.64308	verified
Adams mine	100	37.90026	107.64157	verified
Pride of Bonita mine	101	37.90352	107.64072	verified
Salomon group	102	37.89633	107.63902	verified
Gold King mine, #7 level	103	37.89494	107.63788	verified
Gold King mine, Sampson level	104	37.89685	107.63364	verified
Gold King mine, upper Sampson level	105	37.89765	107.63273	verified
Lead Carbonate mine	106	37.89150	107.63237	verified
Minnehaha mine	107	37.88738	107.63185	verified
Mocking Bird mine	108	37.89336	107.63198	verified
Gold King mine, Paul level	109	37.89757	107.63169	verified
Benitoite mine	110	37.89312	107.63145	verified
Gold King mine, #1 level	111	37.89655	107.63111	verified
Adelphin mine	112	37.90388	107.63031	verified
Sunnyside-Thompson Mill	113	37.90097	107.61417	verified
Clipper mine	114	37.89626	107.61332	verified
Belle Creole mine	115	37.90298	107.61301	verified
Sunnyside mine	116	37.90322	107.61168	verified
Ben Franklin prospect	117	37.89222	107.61034	verified
Ben Franklin mine	118	37.89442	107.60714	verified
Bavarian mine	119	37.89122	107.60602	verified
Terry tunnel of Sunnyside mine, F level	120	37.89286	107.60362	verified
Lake Parson mine	121	37.90340	107.59519	verified
Tom Moore tunnel	122	37.89702	107.55855	verified
Tom Moore mine	123	37.90048	107.55376	approx.
Silver Wing Mill	124	37.90403	107.55555	verified
Silver Wing mine	125	37.90348	107.55473	verified
Silver Bell mine	126	37.90205	107.54681	verified
Fredericka group	127	37.90543	107.54129	verified
Great Eastern	128	37.89685	107.54004	verified
Lower Great Eastern	129	37.89772	107.53982	verified
Klondyke mine	130	37.89388	107.53726	verified
Upper Mill Creek mine	131	37.86820	107.75593	verified
Silver Cloud mine	132	37.87354	107.74688	verified
Silver Crown mine	133	37.87158	107.74339	verified
Silver King mine	134	37.87966	107.73501	verified
Chattanooga Curve mine	135	37.87373	107.73281	verified
Imogene mine	136	37.86248	107.72797	verified
Ferricrete mine	137	37.86823	107.72598	verified
Silver Ledge Mill	138	37.87615	107.72586	verified
Lower Browns Gulch mine	139	37.85875	107.72151	verified

Table 1. Mines, mills, large mill-tailings deposits, and smelter sites listed by AML_MINE_ID number.—Continued

Name	AMLI_MINE_ID	Latitude	Longitude	Location verified
Gold Finch group	140	37.87220	107.71951	verified
Brooklyn mine	141	37.86083	107.71468	verified
Upper Browns Gulch	142	37.86407	107.70719	verified
U.S. Basin mine	143	37.87561	107.70060	verified
Minnesota Gulch mine	144	37.86706	107.68800	verified
Kansas City mine, #1 level	145	37.88181	107.68498	verified
Hoosier Boy mine	146	37.87421	107.68466	verified
Elk tunnel	147	37.87021	107.67475	verified
Mammoth tunnel	148	37.87887	107.67137	verified
Avalanche mine	149	37.87325	107.66717	verified
Big Colorado mine	150	37.87691	107.64606	verified
King mine	152	37.87111	107.64408	verified
Natalie/Occidental mine	153	37.87676	107.64336	verified
Occidental mine	154	37.88094	107.63630	verified
Black Hawk mine	155	37.88220	107.63478	verified
South Fork mine #16	156	37.87679	107.60172	verified
South Fork mine #17	157	37.88140	107.59836	verified
Sunnyside Mill #1	158	37.88401	107.59107	verified
Midway tunnel	159	37.88543	107.59010	verified
Moonbeam mine	160	37.88090	107.58105	verified
Ransom mine, upper level	161	37.88409	107.57269	verified
Sunnyside “Mill-level tunnel” 1937-38	162	37.88140	107.56875	verified
Senator mine	163	37.88189	107.56742	verified
Sunnyside Eureka Mill	164	37.88123	107.56677	verified
Sunnyside Mill #2	165	37.87974	107.56627	verified
Winspear Smelter	166	37.87907	107.56586	verified
Protection mine	167	37.88082	107.56184	verified
Paradise mine	168	37.84263	107.76407	verified
Ruby Trust	169	37.84585	107.75141	verified
Freda mine	170	37.85004	107.74789	verified
Independence mine (Silverton quadrangle)	171	37.84469	107.73976	verified
Bonner mine	172	37.84437	107.73694	verified
Molly Gulch mine	173	37.84045	107.72521	verified
Magnet mine	174	37.85032	107.72485	verified
Liberty Bond Creek mine	175	37.84066	107.71395	verified
Brobdignad mine	176	37.84379	107.70975	verified
Zuni mine	177	37.83537	107.70652	verified
Irene mine	178	37.84170	107.70164	verified
Omaha mine	179	37.85391	107.68654	verified
Monarch	180	37.85914	107.68306	verified
May Day mine (synonym: Mayday)	181	37.84758	107.67863	verified
Anglo Saxon mine, upper level	182	37.85855	107.67843	verified
Anglo Saxon mine	183	37.85888	107.67687	verified
Yukon Mill	184	37.84923	107.67544	verified
Boston & Silverton Mill	185	37.84990	107.67545	verified
Yukon tunnel (Gold Hub)	186	37.84957	107.67499	verified
Lamont mine	187	37.85244	107.66298	verified

Table 1. Mines, mills, large mill-tailings deposits, and smelter sites listed by AML_MINE_ID number.—Continued

Name	AMLI_MINE_ID	Latitude	Longitude	Location verified
Uncle Sam mine	188	37.84905	107.65613	verified
Legal Tender mine (Howardsville quadrangle)	189	37.85299	107.58202	verified
Auburn tunnel	190	37.85891	107.58043	verified
Hamlet Mill	191	37.85206	107.57429	verified
Kittimack tailings	192	37.85822	107.57155	verified
Hamlet mine	193	37.84805	107.56993	verified
Kittimack Mill	194	37.85987	107.56930	verified
Forest Queen mine	195	37.86593	107.56509	verified
Ruby mine	196	37.84408	107.55797	verified
Occident tunnel	197	37.86834	107.54820	verified
Caledonia mine	198	37.86630	107.54443	verified
Gold Nugget mine	199	37.84178	107.54319	verified
Dewey mine	200	37.83983	107.54259	verified
Kittimack mine	201	37.86512	107.53659	verified
Esmeralda mine, lower level	202	37.84867	107.53273	verified
Esmeralda mine, upper level	203	37.84887	107.53113	verified
Golden Gate mine	204	37.81614	107.80257	verified
Ice Lake Mill	205	37.81240	107.78206	verified
Waco mine	206	37.82392	107.78391	verified
Burbank mine	207	37.81996	107.77184	verified
Ensle tunnel	208	37.81992	107.76531	verified
Black Diamond mine	209	37.82061	107.73250	verified
Molly group	210	37.81554	107.72538	verified
Coming Wonder	211	37.81595	107.67100	verified
Little Casino mine	212	37.81687	107.67011	verified
Kendrick-Gelder Smelter (Ross)	213	37.82024	107.66069	verified
Greene Smelter	214	37.81894	107.66061	verified
William Crooke Mill	215	37.82496	107.63784	verified
Blair Mountain tunnel	216	37.81978	107.63758	verified
Amy tunnel	217	37.82175	107.63323	verified
Aspen mine	218	37.82115	107.63117	verified
Silver Lake Mill #2	219	37.82629	107.62765	verified
Legal Tender mine (Silverton quadrangle)	220	37.81867	107.62731	verified
Mayflower Mill (S-D Mill)	221	37.82865	107.62743	verified
MearsWilfley Mill	222	37.82743	107.62699	verified
Valley Forge mine	223	37.82954	107.62447	verified
Ward and Shepard Mill	224	37.81927	107.62150	verified
Contention Mill	225	37.82748	107.61742	verified
Joseph Neff mine	226	37.82939	107.60647	verified
Pride of the West Mill [#2]	227	37.83362	107.59950	verified
Little Nation mine	228	37.82979	107.59935	verified
Union tunnel (Silver Star)	229	37.83847	107.59726	verified
Hidden Treasure mine	230	37.83007	107.59547	verified
Little Nation Mill	231	37.83684	107.59537	verified
Progressive mine	232	37.84348	107.59351	verified
Pride of the West Mill [#4] (Dixilyn, P&G, Howardsville, Silver Wing)	233	37.83698	107.59259	verified

Table 1. Mines, mills, large mill-tailings deposits, and smelter sites listed by AML_MINE_ID number.—Continued

Name	AMLI_MINE_ID	Latitude	Longitude	Location verified
Pride of the West Mill tailings	234	37.83966	107.59151	verified
Hemetite mine	235	37.82983	107.58736	verified
Smuggler mine	236	37.81994	107.58678	verified
Old Hundred Mill tailings	237	37.82357	107.58655	verified
Old Hundred Mill	238	37.82342	107.58522	verified
Old Hundred mine, Mill-level tunnel (3200 level)	239	37.82399	107.58427	verified
Green Mountain Mill	240	37.81978	107.58193	verified
Old Hundred mine, #2 level	241	37.82565	107.58171	verified
Vertex Mill	242	37.81775	107.58036	verified
Old Hundred mine, #5 level	243	37.82649	107.57999	verified
Emma mine	244	37.81803	107.57840	verified
Old Hundred mine, #7 level (new)	245	37.82923	107.57581	verified
Old Hundred mine, #7 level (old)	246	37.83025	107.57502	verified
Veta Madre tunnel	247	37.82631	107.57101	approx.
Gary Owen mine	248	37.82014	107.56677	verified
Antiperiodic mine	249	37.81857	107.56055	verified
Big Ten mine	250	37.82317	107.55893	verified
Ridgeway mine	251	37.83115	107.55216	verified
Little Maud mine	252	37.83234	107.53684	verified
Diamond mine (Ophir quadrangle)	253	37.80311	107.81913	verified
Lucy mine	254	37.80636	107.81780	verified
Kinney tunnel	255	37.80466	107.78597	verified
Copper Gulch mine	256	37.80528	107.74674	verified
Silverheel mine	257	37.81159	107.70637	verified
Belcher mine	258	37.79613	107.69243	verified
North Star (Sultan), #4 level	259	37.80423	107.68652	verified
Columbine mine	260	37.81148	107.68538	verified
North Star (Sultan), #6 level	261	37.80596	107.68335	verified
Blanchard placer	262	37.80891	107.68334	verified
North Star (Sultan), #7 level	263	37.80718	107.68160	approx.
North Star (Sultan) Mill	264	37.80729	107.68037	verified
Sultan tunnel	266	37.80299	107.67956	verified
Victoria Mill	267	37.80853	107.67810	verified
Victoria mine	268	37.80917	107.67664	verified
Blue Jay mine	269	37.79749	107.67542	verified
Ricker tunnel	270	37.79817	107.67482	verified
Ajax tunnel	271	37.80043	107.67475	verified
Gladstone mine	272	37.79947	107.67853	verified
Little Dora mine	273	37.79777	107.67451	verified
Jenny Parker mine	274	37.79519	107.67418	verified
Martha Rose Smelter	275	37.80822	107.67485	verified
Empire tunnel	276	37.80124	107.67238	verified
Hercules Mill (Empire)	277	37.80231	107.67167	verified
Diamond mine (Silverton quadrangle)	278	37.79727	107.67044	verified
Ideal placer	279	37.79413	107.66934	verified
Marcella mine	280	37.79513	107.66512	verified
Kendall Lode	281	37.79820	107.66075	verified

Table 1. Mines, mills, large mill-tailings deposits, and smelter sites listed by AML_MINE_ID number.—Continued

Name	AMLI_MINE_ID	Latitude	Longitude	Location verified
Rough & Ready Smelter	282	37.81347	107.66039	verified
Idaho mine	283	37.80241	107.65918	approx.
Clara mine	284	37.79788	107.65827	verified
Mighty Monarch mine	285	37.80804	107.65687	verified
Lackawanna tailings (removed)	286	37.81447	107.65173	verified
Lackawanna Mill	287	37.81409	107.65163	verified
Lackawanna mine	288	37.80956	107.64713	approx.
Last Chance mine	289	37.81265	107.64501	verified
Scranton City mine	290	37.80265	107.64069	verified
Happy Jack mine	291	37.80361	107.62894	verified
Nevada mine, upper level	292	37.80021	107.62182	verified
Nevada mine, lower level	293	37.80000	107.62067	verified
Unity tunnel level of Silver Lake mine	294	37.80174	107.61850	verified
Grey Eagle mine	295	37.81315	107.61859	verified
New York mine	296	37.79800	107.61758	verified
Iowa Mill	297	37.81289	107.61569	verified
Ezra R mine	298	37.81140	107.61610	verified
Little Giant Mill	299	37.81399	107.61605	verified
Last Chance tunnel	300	37.80245	107.61486	verified
Argentine tunnel	301	37.81076	107.61493	verified
Jess mine	302	37.81265	107.61282	verified
Little Giant mine	303	37.81319	107.61178	approx.
Mayflower mine (S-D mine, main level)	304	37.80624	107.60891	verified
Black Prince tunnel	305	37.81145	107.60475	verified
King Solomon mine	306	37.81338	107.60303	verified
Big Giant Mill	307	37.80802	107.60219	verified
Big Giant mine	308	37.80767	107.60209	verified
North Star Mill [#1]	309	37.80492	107.59899	verified
North Star Mill tailings	310	37.80587	107.59897	verified
Gold Lake mine	311	37.80681	107.59886	verified
Potomac mine	312	37.80347	107.59861	verified
Galena Mountain group	313	37.81312	107.57875	verified
Lawrence tunnel (Osceola mine)	314	37.81109	107.57758	verified
Green Mountain mine, lower level	315	37.80084	107.57709	verified
Pride of the West Mill [#3]	316	37.80754	107.57700	verified
Green Mountain mine, middle level	317	37.80014	107.57621	verified
Pride of the West Mill [#1]	318	37.80782	107.57617	verified
Pride of the West mine, #1 level	319	37.80755	107.57616	verified
Compromise tunnel	320	37.81033	107.57578	verified
Green Mountain mine, upper level	321	37.80101	107.57143	approx.
Little Fanney mine	322	37.80170	107.57123	verified
Oyama tunnel	323	37.80189	107.55642	verified
Old Abe mine	324	37.80334	107.55484	verified
Buffalo Boy mine	325	37.80960	107.55366	verified
Mastodon mine (Howardsville quadrangle)	326	37.80925	107.54527	verified
Queen of Maggie mine	327	37.81251	107.53838	verified
Intersection Mill	328	37.81326	107.53584	verified

Table 1. Mines, mills, large mill-tailings deposits, and smelter sites listed by AML_MINE_ID number.—Continued

Name	AMLI_MINE_ID	Latitude	Longitude	Location verified
Iron Mask mine	329	37.81321	107.53572	verified
Rolling Mountain mine	330	37.77659	107.82640	verified
Big Three mine	331	37.77999	107.82088	verified
Bandora mine	332	37.78699	107.80130	verified
Putnam Basin mine	333	37.77791	107.74216	verified
Deadwood Gulch mine	334	37.78238	107.69139	verified
Champion mine, #3 level	335	37.78824	107.67347	verified
Champion mine, #4 level	336	37.78940	107.67179	verified
Alletha mine	337	37.78584	107.67067	verified
Turk tunnel	338	37.78031	107.66935	verified
Pittsburg tunnel, Champion mine	339	37.78993	107.66945	verified
Fairview mine	340	37.78844	107.66935	verified
King tunnel	341	37.77972	107.66627	verified
Titusville mine	342	37.78552	107.61939	verified
Silver Lake mine, #1 level	343	37.79200	107.60969	verified
Buckeye mine	344	37.78338	107.60857	verified
Iowa mine	345	37.78979	107.60784	verified
Melville mine	346	37.78925	107.60772	verified
Silver Lake Mill #1	347	37.79164	107.60714	verified
Royal Tiger mine	348	37.78824	107.60337	verified
Terrible mine	349	37.79769	107.60021	verified
North Star (Solomon) mine, #4 level (S-D 1700 level)	350	37.79888	107.59865	verified
North Star (Solomon) mine, #5 level	351	37.79674	107.59661	verified
Dives mine	352	37.79426	107.59394	verified
Spotted Pup tunnel	353	37.79330	107.59080	verified
Shenandoah tunnel	354	37.79144	107.58945	verified
Shenandoah-Dives mine, 900 level	355	37.79381	107.58910	verified
Mountaineer mine (Highland Mary, #1 level)	356	37.78402	107.58428	verified
Trilby tunnel	357	37.78940	107.58431	verified
Bradley tunnel	358	37.78543	107.58182	verified
Highland Mary, #7 level	359	37.78263	107.58064	verified
Innis tunnel (Highland Mary, #8 level)	360	37.78759	107.57857	verified
Highland Mary Mill tailings	361	37.78940	107.57813	verified
Molas group	362	37.76248	107.67508	verified
Mabel group	363	37.76313	107.63738	verified
Montana mine	364	37.76889	107.62659	verified
Little Ray mine	365	37.77198	107.62476	verified
Upper Aspen mine	500	37.81618	107.62341	verified
Thunder tunnel	501	37.78637	107.66888	verified
Highland Mary Mill	502	37.78740	107.57761	verified
Sioux City	503	37.89963	107.54390	verified
Ransom mine	504	37.88275	107.57682	verified
Henrietta mine, #8 level	505	37.89174	107.68185	verified
Henrietta mine, #9 level	506	37.88954	107.67850	verified

Table 1. Mines, mills, large mill-tailings deposits, and smelter sites listed by AML_MINE_ID number.—Continued

Name	AMLI_MINE_ID	Latitude	Longitude	Location verified
Mayflower Mill tailings repository # 1	507	37.82761	107.63177	verified
Mayflower Mill tailings repository # 2	508	37.82624	107.63609	verified
Mayflower Mill tailings repository # 3	509	37.82400	107.63794	verified
Mayflower Mill tailings repository # 4	510	37.82040	107.64553	verified
Mine with unknown name	511	37.85992	107.68346	verified

Table 2. Mine sites listed alphabetically.

[Numbers refer to locations in figures 2–4; synonyms where referenced are from the data tables in Wilson (2003), MAS data from the former U.S. Bureau of Mines, and MRDS data from the U.S. Geological Survey (McFaul and others, 2000); S-D, Shenandoah-Dives]

Name	AMLI_MINE_ID	Synonyms	Reference
Adams mine	100		
Adelphin mine	112		
Adit with unknown name	21		
Adit with unknown name	68		
Ajax tunnel	271	Montezuma, Boston tunnel	
Alletha mine	337	Alethea group	MAS
American tunnel, Sunnyside mine	96	Gold King Mill-level tunnel	
Amy tunnel	217		
Anglo Saxon mine	183		
Anglo Saxon mine, upper level	182		
Antiperiodic mine	249		
Argentine tunnel	301	Iowa tunnel	
Aspen mine	218		
Auburn tunnel	190	Auburn group	MAS
Avalanche mine	149		
Bandora mine	332		
Bavarian mine	119		
Belcher mine	258		
Belle Creole mine	115		
Ben Butler mine	9		
Ben Franklin mine	118		
Ben Franklin prospect	117		
Benitoite mine	110		
Big Colorado mine	150		
Big Giant mine	308		
Big Ten mine	250		
Big Three mine	331		
Black Diamond mine	209		
Black Hawk mine	155		
Black Prince tunnel	305		
Blair Mountain tunnel	216		
Blanchard placer	262		
Blue Jay mine	269		
Bonner mine	172		
Boston mine	3		
Bradley Pit	74		
Bradley tunnel	358		
Brenneman mine	39		

Table 2. Mine sites listed alphabetically.—Continued

Name	AMLI_MINE_ID	Synonyms	Reference
Brobdignad mine	176	Bobdignad mine	Munson (1889)
Brooklyn mine	141		
Buckeye mine	344		
Buffalo Boy mine	325		
Burbank mine	207		
Burns group	92		
Burrows mine	16		
Caledonia mine	198	Caldonian mine	MAS
Carbon Lake mine	80		
Champion mine, #3 level	335	Mystery Gold group	
Champion mine, #4 level	336		
Chattanooga Curve mine	135		
Clara mine	284		
Clipper mine	114		
Columbia mine	37		
Columbine mine	260		
Columbus mine	23		
Coming Wonder	211	Emerald mine	
Compromise tunnel	320		
Congress mine	79		
Copper Gulch mine	256		
Corkscrew Pass mine	29		
Custer mine	50		
Deadwood Gulch mine	334		
Dewey mine	200		
Dewitt mine	4		
Diamond mine (Ophir quadrangle)	253		
Diamond mine (Silverton quadrangle)	278		
Dives mine	352		
Eagle Chief mine	14		
Early Bird crosscut	8	Paris mine	
Elk tunnel	147		
Emma mine	244	Oregon and Galena mine	MAS
Empire tunnel	276	Little Dora, Hercules mine	
Ensle tunnel	208		
Esmeralda mine, lower level	202		
Esmeralda mine, upper level	203		
Eveline mine	91		
Evening Star mine	58		
Ezra R mine	298		
Fairview mine	340		
Ferricrete mine	137		
Forest Queen mine	195		
Freda mine	170		
Fredericka group	127		
Frisco tunnel	19		
Galena Mountain group	313		
Galena Queen mine	82		
Galty Boy mine	90	Galtie Boy, Hercules mine	MAS and MRDS
Gary Owen mine	248	Gary Owens mine	MAS
George Washington mine	40		

Table 2. Mine sites listed alphabetically.—Continued

Name	AMLI_MINE_ID	Synonyms	Reference
Gladstone mine	272		
Gold Finch group	140		
Gold King mine, #1 level	111		
Gold King mine, #7 level	103		
Gold King mine, Paul level	109		
Gold King mine, Sampson level	104		
Gold King mine, upper Sampson level	105		
Gold Lake mine	311	McMillan mine	
Gold Nugget mine	199		
Gold Prince mine	49	Sunnyside Extension, Mastedon mine	MRDS
Golden Fleece mine	60		
Golden Gate mine	204		
Grand Mogul	35		
Grand Mogul Stope Complex	33		
Grey Eagle mine	295		
Great Eastern	128	Sioux City	MRDS
Green Mountain mine, lower level	315		
Green Mountain mine, middle level	317		
Green Mountain mine, upper level	321	Philadelphia mine	
Hamlet mine	193		
Happy Jack mine	291		
Hemetite mine	235		
Henrietta mine, #3 level	84		
Henrietta mine, #7 level	85	Mineral King	
Henrietta mine, #8 level	505		
Henrietta mine, #9 level	506		
Hercules mine	83		
Hermes group	11		
Hidden Treasure mine	230		
Highland Mary, #7 level	359		
Hoosier Boy mine	146		
Idaho mine	283		
Ideal placer	279		
Imogene mine	136		
Independence mine (Handies Peak quadrangle)	48		
Independence mine (Silverton quadrangle)	171		
Indian Chief mine	45		
Innis tunnel	360	Highland Mary, #8 level	
Iowa mine	345		
Irene mine	178		
Iron Mask mine	329		
Jenny Parker mine	274	Jennie Parker mine	MAS
Jess mine	302	Peerless mine	
Joe and Johns mine	87		
Joseph Neff mine	226		
JSP mine	81		
Junction mine	76		
Kansas City mine, #1 level	145		
Kendall Lode	281		
King mine	152		

Table 2. Mine sites listed alphabetically.—Continued

Name	AMLI_MINE_ID	Synonyms	Reference
King Solomon mine	306		
King tunnel	341		
Kinney tunnel	255		
Kittimack mine	201	Kittimac mine	MRDS
Klondyke mine	130		
Koehler tunnel	75		
Lackawanna mine	288		
Lake mine	43		
Lake Parson mine	121		
Lamont mine	187		
Lark mine	86		
Last Chance mine	289		
Last Chance tunnel	300		
Lawrence tunnel	314	Osceola mine	
Lead Carbonate mine	106		
Legal Tender mine (Howardsville quadrangle)	189		
Legal Tender mine (Silverton quadrangle)	220		
Liberty Bond Creek mine	175		
Little Casino mine	212		
Little Chief mine	5		
Little Dora mine	273		
Little Fanney mine	322		
Little Giant mine	303		
Little Ida mine	15		
Little Maud mine	252	Little Maude mine	MAS
Little Nation mine	228	Royal Charter mine	MRDS
Little Ray mine	365		
London mine	7		
Longfellow mine	77		
Lower Browns Gulch mine	139		
Lower Bullion King mine	70		
Lower Great Eastern	129		
Lower Porphyry Gulch mine	72		
Lower Ross Basin mine	36		
Lucky Jack mine	13		
Lucy mine	254	Last Hope mine	MRDS
Mabel group	363	Maybell	Munson (1889)
Magnet mine	174		
Mammoth tunnel	148		
Marcella mine	280	Marcello mine	MRDS
Mastodon mine (Handies Peak quadrangle)	47		
Mastodon mine (Howardsville quadrangle)	326		
May Day mine	181	Mayday	
Mayflower mine	304	S-D mine, main level	
Melville mine	346		
Midway tunnel	159		
Mighty Monarch mine	285		
Mine with unknown name (Silverton quadrangle)	511		
Mineral Basin mine	71		
Minnehaha mine	107		

Table 2. Mine sites listed alphabetically.—Continued

Name	AMLI_MINE_ID	Synonyms	Reference
Minnesota Gulch mine	144		
Mocking Bird mine	108		
Mogul mine	31		
Mogul North mine	32		
Mogul South mine	30		
Molas group	362	Ione mine, Molas mine	MRDS
Molly group	210		
Molly Gulch mine	173		
Monarch	180		
Montana mine	364		
Moonbeam mine	160		
Mountain Queen mine	41		
Mountain Queen tunnel	42		
Mountaineer mine	356	Lookout mine, Old Highland Mary mine, #1 level	
Natalie/Occidental mine	153	Silver Ledge mine	
Nevada mine, lower level	293		
Nevada mine, upper level	292		
New York mine	296		
North Star (Solomon) mine, #4 level (S-D 1700 level)	350	King Soloman mine	
North Star (Solomon) mine, #5 level	351	King Soloman mine	
North Star (Sultan), #4 level	259	Sultan mine	
North Star (Sultan), #6 level	261	Sultan mine	
North Star (Sultan), #7 level	263	Sultan mine	
Occident tunnel	197		
Occidental mine	154		
Old Abe mine	324		
Old Hundred mine, #2 level	241		
Old Hundred mine, #5 level	243	Old Hundred mine, 2600 level	
Old Hundred mine, #7 level (new)	245		
Old Hundred mine, #7 level (old)	246		
Old Hundred mine, Mill-level tunnel (3200 level)	239		
Omaha mine	179		
Oyama tunnel	323		
Paradise mine	168	Governor mine, Paradise portal	
Pittsburg tunnel, Champion mine	339		
Potomac mine	312		
Prairie mine	10		
Pride of Bonita mine	101		
Pride of the West mine (#1 level)	319		
Progressive mine	232		
Protection mine	167		
Putnam Basin mine	333		
Queen Anne mine	34		
Queen of Maggie mine	327		
Ransom mine	504		
Ransom mine, upper level	161		
Red and Bonita mine	99		
Red Cloud mine	1		
Ricker tunnel	270		
Ridgeway mine	251		

Table 2. Mine sites listed alphabetically.—Continued

Name	AMLI_MINE_ID	Synonyms	Reference
Riverside mine	12		
Rolling Mountain mine	330		
Royal Tiger mine	348		
Ruby mine	196		
Ruby Trust	169		
Salomon group	102		
San Juan Queen mine	61		
Sandiago tunnel	62		
Scotia mine	59		
Scranton City mine	290		
Senator mine	163		
Sewell mine	2		
Shenandoah tunnel	354		
Shenandoah-Dives mine, 900 level	355		
Silver Bell mine	126		
Silver Chord mine	44		
Silver Cloud mine	132		
Silver Coin mine	22		
Silver Crown mine	133		
Silver King mine	134		
Silver Lake mine, #1 level	343		
Silver Ledge mine	73		
Silver Queen mine	53		
Silver Wing mine	125		
Silverheel mine	257		
Sioux City	503		
Smuggler mine	236		
Sound Democrat mine	54		
South Fork mine #16	156		
South Fork mine #17	157		
Spotted Pup tunnel	353	S-D mine, 1100 level, Dives-Shenandoah mine	
St. Paul mine	78		
Sultan tunnel	266		
Sunbank group, lower level	57		
Sunbank group, upper level	56		
Sunnyside “Mill-level tunnel”	162		
Sunnyside Extension	46		
Sunnyside mine	116		
Terrible mine	349		
Terry tunnel of Sunnyside mine, F level	120		
Thunder tunnel	501		
Titusville mine	342		
Toltec mine, lower level	67		
Toltec mine, middle level	65		
Toltec mine, upper level	64		
Tom Moore #1, 2	123		
Tom Moore tunnel	122		
Trilby tunnel	357		
Turk tunnel	338	King mine	
U.S. Basin mine	143		

Table 2. Mine sites listed alphabetically.—Continued

Name	AMLI_MINE_ID	Synonyms	Reference
Uncle Sam mine	188		
Uncompahgre Chief mine	6		
Union tunnel	229	Silver Star mine	
Unity tunnel level of Silver Lake mine	294		
Upper Aspen mine	500		
Upper Browns Gulch	142		
Upper Bullion King	69		
Upper Joe and Johns mine	89		
Upper Mill Creek mine	131		
Upper Queen Anne mine	38		
Valley Forge mine	223		
Vermillion mine	17		
Vermillion tunnel	18		
Veta Madre tunnel	247	Neigold mine	
Victoria mine	268		
Waco mine	206		
Webster mine	88		
Yukon tunnel	186	Gold Hub, Ariadne	MRDS
Zuni mine	177		

Table 3. Mills, large mill-tailings deposits, and smelter sites[1].

[Numbers refer to locations in figure 5; some mills located at the same sites were not originally numbered; we have added numbers in brackets for clarity]

Name	AMLI_MINE_ID
Mills	
Bagley Mill (Frisco)	20
Big Giant Mill	307
Boston & Silverton Mill	185
Columbus Mill	24
Contention Mill (Arpad/North Star [#2])	225
Gold King Mill	94
Gold Prince Mill	27
Green Mountain Mill	240
Hamlet Mill	191
Hanson Mill (Sunnyside Extension Mill)	51
Hercules Mill (Empire)	277
Highland Mary Mill	502
Ice Lake Mill	205
Intersection Mill	328
Iowa Mill	297
Kittimack Mill	194
Lackawanna Mill	287
Lead Carbonate Mill	95
Little Giant Mill	299
Little Nation Mill	231
Mastodon Mill	52
Mayflower Mill (Shenandoah Dives Mill)	221

Table 3. Mills, large mill-tailings deposits, and smelter sites[1].—Continued

Name	AMLI_MINE_ID
Mills—Continued	
Mears-Wilfley Mill	222
Mogul Mill	93
Natalie/Occidental Mill	151
North Star (Sultan) Mill	264
North Star Mill #1	309
Old Hundred Mill	238
Pride of the West Mill [#1]	318
Pride of the West Mill [#2]	227
Pride of the West Mill [#3]	316
Pride of the West Mill [#4] (Dixilyn, P&G, Howardsville, Silver Wing)	233
Red and Bonita Mill	97
Silver Lake Mill #1	347
Silver Lake Mill #2	219
Silver Ledge Mill	138
Silver Wing Mill	124
Sound Democrat Mill	55
Sunnyside Eureka Mill	164
Sunnyside Mill #1	158
Sunnyside Mill #2	165
Sunnyside-Thompson Mill	113
Treasure Mountain Mill	63
Vertex Mill	242
Victoria Mill	267
Ward and Shepard Mill	224
William Crooke Mill	215
Yukon Mill	184
Mill-tailings deposits	
Highland Mary Mill tailings	361
Kittimack tailings	192
Lackawanna tailings (removed)	286
Mayflower Mill tailings repository # 1	507
Mayflower Mill tailings repository # 2	508
Mayflower Mill tailings repository # 3	509
Mayflower Mill tailings repository # 4	510
North Star Mill tailings	310
Old Hundred Mill tailings	237
Pride of the West Mill tailings	234
Smelters	
Animas Forks Smelter	26
Brown, Epley & Co. Smelter	28
Eclipse Smelter	66
Greene Smelter	214
Kendrick-Gelder Smelter (Ross)	213
Martha Rose Smelter	275
Rough & Ready Smelter	282
Winspear Smelter	166

[1]Additional data on mills and smelters are in Jones (this volume).

Table 4. Physical parameters that may contribute to the environmental effect of historical mines.

[Volume of mine waste estimated in cubic yards, yd^3; size, distance originally in feet, converted to meters, m, or square meters, m^2; Ref.=footnote; blank, no data]

AMLI_MINE_ID	NAME	Ref.	No. shafts	No. adits	No. of flowing adits	Adit drainage flows over mine waste dump	Kill zone	Volume of mine waste yd^3	Size of disturbed area m^2	Distance to stream m
100	Adams mine	2	0	1	0	no	yes	800	1,000	320
271	Ajax tunnel	5				yes	no			
217	Amy tunnel	4	0	1	1	yes	no	20,000		
183	Anglo Saxon mine	2	0	1	1	yes	no	2,200	870	50
249	Antiperiodic mine	4	0	2	0	no	no		2,900	in stream
301	Argentine tunnel	4	0	1	1					
218	Aspen mine	4	0	5?	1				2,700	
190	Auburn tunnel	4	0	1	1	yes	no	3,100	1,100	340
332	Bandora mine	1		9	4	yes	yes	5,500	5,700	97
119	Bavarian mine	4	0	1	1	yes	no	2,100	300	180
9	Ben Butler mine	3	2	0	0	no	yes	400–600	1,400	410
118	Ben Franklin mine	4	1	1	0	no	yes	500	1,500	in stream
117	Ben Franklin prospect	4	0	1	1	yes	no	250	290	140
150	Big Colorado mine	2	0	1	1	no	no	27,000	2,100	45
155	Black Hawk mine	2	0	2	2	yes	no	12,000	610	67
305	Black Prince tunnel	4	0	1	1	yes	no		770	42
216	Blair Mountain tunnel	4	0	1	1					
172	Bonner mine	1		5	2	yes	yes	24,500	3,300	in stream
3	Boston mine	3	1	1	0	yes	yes	900	2,700	180
358	Bradley tunnel	4	0	1	1	yes	yes		3,900	in stream
39	Brenneman mine	2	2	0	0	no	yes	1,800		
141	Brooklyn mine	1		1	1	yes	yes		15,000	50 260
325	Buffalo Boy mine	4	0	1	1	yes	yes	7,000	2,400	in stream
207	Burbank mine	5				yes	yes		2,200	in stream
16	Burrows mine	3	1	2	2	yes	yes	3,400	850	
198	Caledonia mine	4	0	3	0	no	no		2,300	480
80	Carbon Lake mine	1	3	0		no	yes	4,000		
335	Champion mine, #3 level	4	0	1	1					
336	Champion mine	4	0	1	1				1,500	270
114	Clipper mine	4	1	1	0	no	yes	1,100	370	190
37	Columbia mine	2	5	1	0	yes	yes	6,500		
24	Columbus Mill	3								
23	Columbus mine	3	0	1	1	yes	yes	24,000	2,500	39
320	Compromise tunnel	5	0	1	0	no	no		3,900	28
79	Congress mine	5	1			no	yes		1,400	19
29	Corkscrew Pass mine	2	0	1	0	no	no	1,300	100	
14	Eagle Chief mine	3	0	1	0	no	yes	1,500	280	100
8	Early Bird crosscut	3	0	2	1	yes		2,900	1,700	160
66	Eclipse Smelter	5	0	0	0	no		300		
147	Elk tunnel	2	0	1	1	yes	no	1,100	650	50
244	Emma mine	4	0	1	1					
276	Empire tunnel	5				yes	no			
202	Esmeralda mine, lower level	4	0	1	1					
203	Esmeralda mine, upper level	4	0	1	0					
91	Eveline mine	2	0	1	1	yes	no		250	215
298	Ezra R mine	4	0	1	1	yes				
137	Ferricrete mine	1	0	1	1					
19	Frisco tunnel	3	0	1	1	no	yes	20,500		
82	Galena Queen mine	2	1	0	0	no	yes	7,200	4,400	in stream
90	Galty Boy mine	2	0	1	0	no	no	1,000	680	566
248	Gary Owen mine	4	0	1	0	no	no			

Table 4. Physical parameters that may contribute to the environmental effect of historical mines.—Continued

AMLI_MINE_ID	NAME	Ref.	No. shafts	No. adits	No. of flowing adits	Adit drainage flows over mine waste dump	Kill zone	Volume of mine waste yd^3	Size of disturbed area m^2	Distance to stream m
272	Gladstone mine	5				no	yes		3,500	340
103	Gold King mine, #7 level	5				no	no		small	in stream
60	Golden Fleece mine	3	0	1	1	yes	yes	6,500	4,100	
35	Grand Mogul	2	0	1	1	yes	yes	9,000	2,200	45
33	Grand Mogul Stope Complex	2	0	1	0	no	yes	8,000	1,400	26
240	Green Mountain Mill (Buffalo Boy tailings)	4				no	no	400	1,500	71
315	Green Mountain mine, lower level	4	0	2	1	yes	no		3,300	115
193	Hamlet mine	4	0	6	1	yes	no	10,700	2,000	
84	Henrietta mine, #3 level	2	0	1	0	yes	yes	<2,000	3,500	500
85	Henrietta mine, #7 level	2	0	1	1	yes	yes	30,000	4,800	in stream
505	Henrietta mine, #8 level	2	0	1	1	no	yes		5,600	in stream
506	Henrietta mine, #9 level	2	0	1	0			700		
83	Hercules mine	2	1	0	0	no	yes	4,680	3,500	in stream
11	Hermes Group	5	0	2	0	no	yes	1,300		
230	Hidden Treasure mine	4	0	1	1	yes	no			
359	Highland Mary mine, #7 level	5				no	no		1,900	18
361	Highland Mary Mill tailings	4				no	no	35,000	5,800	in stream
283	Idaho mine	4	0	1	1	no	no		1,400	
136	Imogene mine	1		1	1	yes	yes		520	in stream
171	Independence mine (Silverton quadrangle)	5				yes	no		470	in stream
45	Indian Chief mine	3	0	2	1	yes	yes	400	860	
360	Innis tunnel	4	0	1	1	yes	no			
297	Iowa Mill	4				no	no	500		
345	Iowa mine, A-level	4	0	4	2	yes	no	27,000	18,000	70
329	Iron Mask mine	4	1	1	0				720	in stream
274	Jenny Parker mine	5				no	no		1,500	365
302	Jess mine	4	0	1	1					
87	Joe and Johns mine	2	0	1	1	no	yes		1,040	110
226	Joseph Neff mine	4	0	1	1					
81	JSP mine	2	0	1	0	no	yes	300		
145	Kansas City mine, # 1 level	2	0	5	2	yes	yes	8,500	2,000	180
306	King Solomon mine	4	0	1	1	no	no		950	130
201	Kittimack mine	4	0	many	1	yes	no	7,850	1,200	210
192	Kittimack tailings	4				no	no	23,000	35,000	67
75	Koehler tunnel	1	3	1		no, piped	yes	15,000 to repository		
86	Lark mine	2	0	1	1	no	no	3,500	2,660	216
289	Last Chance mine	4	0	1	1	yes	no		500	
106	Lead Carbonate mine	2	0	many	0	no	yes	3,500	2,500	in stream
189	Legal Tender mine (Howardsville quadrangle)	4	0	2	2	yes	no	1,700		
212	Little Casino mine	4	0	1	1	yes	no		430	>1,000
5	Little Chief mine	3	0	1	1	yes	yes	700		
15	Little Ida mine	3	0	6	4	yes	yes	1,100		
252	Little Maud mine	4	0	1	1					
228	Little Nation mine	4	0	3	1					

Table 4. Physical parameters that may contribute to the environmental effect of historical mines.—Continued

AMLI_MINE_ID	NAME	Ref.	No. shafts	No. adits	No. of flowing adits	Adit drainage flows over mine waste dump	Kill zone	Volume of mine waste yd^3	Size of disturbed area m^2	Distance to stream m
7	London mine	3	1	4	3	yes	yes	3,300	2,700	in stream
77	Longfellow mine	1	1	2		yes	yes	5,500		
70	Lower Bullion King	5				no	yes		3,500	in stream
129	Lower Great Eastern	5		3		no	no	5,000		
36	Lower Ross Basin mine	2	0	1	0	no	yes	900		
13	Lucky Jack mine	3	2	2	1	yes	yes	2,800	2,800	in stream
148	Mammoth tunnel	2	0	1	1	no	no	<100	590	100
280	Marcella mine	5		1	1					
221	Mayflower Mill (S-D Mill)	5				no	yes	750		
159	Midway mine	5	0	1	1	yes	no		5,900	40
285	Mighty Monarch mine	4	0	1	1					
31	Mogul mine	2	1	1	1	yes	yes	25,000	4,700	63
32	Mogul North mine	2	0	1	0	no	no	400	310	19
30	Mogul South mine	2	0	1	1	no	no	800	380	86
180	Monarch	2	0	1	1	yes	no		1,200	in stream
160	Moonbeam mine	4	0	1	1	yes	no	1,000	small	
41	Mountain Queen mine	3	1	0	0	no	yes	1,900	2,200	576
42	Mountain Queen tunnel	3	0	1	1	yes	yes	3,200	215	
153	Natalie/Occidental mine	2	0	1	1	yes	yes	6,800	1,500	in stream
310	North Star Mill tailings	5				no	no			
259	North Star mine, #4 level (Sultan)	1		4	0		no			
261	North Star mine, #6 level (Sultan)	1		1	0	no	no	3,500	7,100	237
263	North Star mine, #7 level (Sultan)	1		1	1	no	yes	40,000	15,000	in stream
154	Occidental mine	2	0	1	0	no	no	1,000	920	in stream
237	Old Hundred Mill tailings	5				no	no	400	2,000	in stream
239	Old Hundred mine, Mill-level tunnel	4		many	1			400		
323	Oyama tunnel	4	0	1	1	no	no			
168	Paradise mine	1		4	4	yes	yes	700		
182	Porcupine Gulch adit (sublevel, Anglo Saxon mine)	2	0	1	1	no	no	1,600		
10	Prairie mine	3	0	1	1			600		
227	Pride of the West Mill [#2]	4				no	no	1,200		
233	Pride of the West Mill [#4] (Dixilyn, P&G, Howardsville, Silver Wing)	4						large, permitted		
319	Pride of the West mine	4	0	1	1					
232	Progressive mine	4	0	1	1	yes	no		3,000	
167	Protection mine	3	0	1	0	no	no	20,000	2,200	210
34	Queen Anne mine	2	0	1	1	yes	no	5,000	380	86
327	Queen of Maggie mine	4	0	1	1					
504	Ransom mine	4		1	1					
99	Red and Bonita mine	2	0	2	1	no	yes	6,000	1,100	200
1	Red Cloud mine	3	4	1	0	no	yes	3,000	630	310
270	Ricker tunnel	5				no	yes		1,100	330
251	Ridgeway mine	5	0	1	1					
12	Riverside mine	3	0	1	1	yes	yes	<100		
348	Royal Tiger mine	4	0	3	1	yes	yes	18,000	7,300	in stream
169	Ruby Trust	1		1	1	yes	yes	5,000–6,000		
62	Sandiago tunnel	3	0	1	1	no	no	9,000	2,100	

Table 4. Physical parameters that may contribute to the environmental effect of historical mines.—Continued

AMLI_MINE_ID	NAME	Ref.	No. shafts	No. adits	No. of flowing adits	Adit drainage flows over mine waste dump	Kill zone	Volume of mine waste yd^3	Size of disturbed area m^2	Distance to stream m
163	Senator mine	3	0	1	1	yes	no	4,000	440	190
355	Shenandoah-Dives mine, 900 level	4	0	1	1			0		
126	Silver Bell mine	3	0	1	0	no	yes	1,900	250	80
133	Silver Crown mine	5				no	no			
347	Silver Lake Mill #1	4				no	no	50,000	11,000	
343	Silver Lake mine, #1 level	4	0	1	0					
53	Silver Queen mine	3	1	2	2	yes	yes	15,000		375
125	Silver Wing mine	3	0	1	1	no	yes	10,000	4,900	
503	Sioux City	3	0	4	0	no		5,000	1,600	122
236	Smuggler mine	4	0	1	1					
54	Sound Democrat mine	3	0	2	1	yes	yes	14,000	590	220
156	South Fork mine #16	5	0	1	1	yes	yes	2,000		
157	South Fork mine #17	5	0	1	1	yes	yes	400		
353	Spotted Pup tunnel	5				no	no		400	>1,000
164	Sunnyside Eureka Mill	4						12,000	3,500	in stream
165	Sunnyside Mill #2	5				no	yes			
116	Sunnyside mine	4	1	0	0	no	no	60,000	10,000	333
67	Toltec mine, lower level	3	0	1	1	yes	no	3,800	530	19
123	Tom Moore mine	3	0	1	1	yes	no	4,000	750	in stream
21	unnamed adit	3	1	2	0	no	yes	1,200		
229	Union tunnel	4	0	1	1					
294	Unity tunnel, Silver Lake mine	4	0	2	0	yes	no	35,000	900	in stream
142	Upper Browns Gulch	1		1	1	yes	yes			
69	Upper Bullion King	5				no	no		330	1
89	Upper Joe and Johns mine	2	0	1	0	no	yes		<100	470
38	Upper Queen Anne mine	2	0	1	0			900	500	560
223	Valley Forge mine	4	0	1	1					
17	Vermillion mine	3	0	1	1	yes	yes	5,100	1,100	in stream
18	Vermillion tunnel	3	0	1	1	yes	no	10,800	2,700	
186	Yukon tunnel	2	0	1	1	yes	yes	18,000	6,200	in stream

[1]Ref.: Unpub. Mineral Creek feasibility investigation report, (CDMG, 1997); Unpub. abandoned mine land inventory report, San Juan Forest, Columbine district, CGS, 1997.

[2]Ref.: Unpub. Cement Creek reclamation feasibility report, CDMG, 1998.

[3]Ref.: Unpub. Upper Animas River reclamation feasibility report, CDMG, 1999.

[4]Ref.: Unpub. Lower Animas River reclamation feasibility report, CDMG, 2000.

[5]Ref.: Unpub. report to Colorado Water Quality Control Commission, ARSG, 2001.

Table 5. Adit chemistry determined at low flow for selected sites sampled by State of Colorado.

[Adit flow in cubic feet/second, ft^3/s; all samples were filtered at 0.45 micrometers, concentrations expressed in milligrams per liter, mg/L; or in micrograms per liter, µg/L; n.d., not detected; all methods and data are in the database (Sole and others, this volume). "Reference" column refers to the footnote number]

AMLI_MINE_ID	Name	Date	Sample designation	Reference	Discharge ft^3/s	pH	Specific conductance µS/cm	Sulfate mg/L	Na mg/L	K mg/L	Mg mg/L	Ca mg/L	Al µg/L	Fe µg/L	Mn µg/L	Cu µg/L	Ni µg/L	Zn µg/L	Cd µg/L	Pb µg/L
5	Little Chief mine	9/1/97	DM3	3	0.005	3.5	330	150	0.30	n.d.	2.7	20	7,700	4,300	7,500	180	13	4,800	26	4.5
7	London mine, w	9/1/97	DM5	3	0.0003	6.4	67	12	0.69	n.d.	0.6	13	n.d.	8.0	1.0	4.0	n.d.	26	n.d.	n.d.
7	London mine, n	9/1/97	DM6	3	0.0003	6.3	640	78	1.2	n.d.	1.3	18	440	1,900	1,200	120	n.d.	6,000	26	120
7	London mine, main	9/1/97	DM7	3	0.002	6.3	460	160	5.6	n.d.	4.3	63	n.d.	740	1,700	13	n.d.	9,800	64	n.d.
8	Early Bird Crosscut (Paris)	9/1/97	DM4	3	0.0003	3.6	380	170	0.32	2.3	6.8	33	6,100	2,900	6,700	260	23	2,300	19	78
10	Prairie mine	9/1/97	DM8	3	0.001	6.9	270	57	2.8	n.d.	3.0	43	n.d.	6.0	87	n.d.	n.d.	950	4.5	n.d.
12	Riverside mine	9/1/97	DM9	3	0.0003	7.1	80	12	0.55	n.d.	1.7	14	n.d.	41	110	n.d.	n.d.	79	n.d.	13
13	Lucky Jack mine	9/1/97	DM2	3	0.101	5.1	81	32	0.84	n.d.	1.3	10	260	190	120	19	n.d.	920	3.8	230
15	Little Ida mine, s	9/1/97	DM14	3	0.004	7.2	99	27	0.78	n.d.	1.0	17	97	15	140	26	n.d.	780	3.9	36
16	Burrows mine, w	9/1/97	DM15	3	0.002	5.7	120	44	0.48	n.d.	1.3	13	500	7.0	860	67	n.d.	5,700	24	540
16	Burrows mine, e	9/1/97	DM16	3	0.003	5.4	170	57	1.0	n.d.	1.6	25	40	n.d.	350	12	n.d.	6,900	20	n.d.
17	Vermillion mine	9/1/97	DM17	3	0.016	3.1	1,000	250	0.32	n.d.	1.8	23	3,100	21,000	7,300	1,300	n.d.	52,000	210	1,600
18	Vermillion tunnel	9/1/97	DM18	3	0.24	6.3	570	160	4.0	n.d.	5.4	91	n.d.	18	1,200	n.d.	n.d.	1,000	3.3	1.1
19	Frisco tunnel	9/1/97	DM19	3	0.15	6.4	650	260	4.8	2.1	7.6	120	140	210	7,600	n.d.	n.d.	3,700	11	n.d.
23	Columbus mine	9/1/97	DM20	3	0.003	3.3	1,600	1,400	0.93	n.d.	9.5	30	19,000	77,000	14,000	7,700	75	250,000	1,000	350
31	Mogul mine	10/1/96	SO5	2	0.02	2.9	1,100	450	3.3	1.0	4.2	84	5,000	48,000	9,700	6,500	21	29,000	160	180
34	Queen Anne mine	10/1/96	SO1	2	0.05	6.4	300	97	1.0	n.d.	2.8	41	100	120	1,200	84	n.d.	2,200	9.1	1.6
35	Grand Mogul mine	10/1/96	SO3	2	0.02	3.4	510	190	1.0	n.d.	7.9	21	10,000	730	7,100	2,600	12	17,000	88	38
41	Mountain Queen mine	9/1/97	DM10	3	0.005	3.7	310	120	0.46	n.d.	1.7	15	4,000	9,100	4,100	2,300	n.d.	6,500	62	140
45	Indian Chief mine	9/1/97	DM28	3	0.004	6.8	180	46	0.87	n.d.	1.8	35	n.d.	12	600	n.d.	n.d.	220	1.0	23
53	Silver Queen mine	9/1/97	DM25	3	0.0007	3.2	680	540	0.47	n.d.	4.0	55	1,400	15,000	72,000	2,300	21	8,400	28	360
54	Sound Democrat mine	9/1/97	DM26	3	0.008	3.7	480	260	0.24	n.d.	6.6	59	1,500	260	46,000	280	17	9,400	22	150
60	Golden Fleece mine	9/1/97	DM27	3	0.008	3.8	220	84	0.22	n.d.	1.8	18	1,800	1,300	7,000	41	n.d.	1,300	7.8	69
67	Toltec mine, lower level	9/1/97	DM29	3	0.0015	8.1	340	84	5.1	n.d.	8.7	61	n.d.	n.d.	33	4.0	n.d.	27	n.d.	n.d.
87	Joe and Johns mine	10/1/96	SO6	2	<0.002	2.7	1,400	330	0.28	n.d.	1.9	1.9	13,000	62,000	290	510	33	11,000	53	550
91	Eveline mine	10/1/96	SO24	2	<0.002	3.4	470	170	2.3	n.d.	10.0	4.9	11,000	15,000	850	56	16	850	10	1.4
118	Ben Franklin mine	9/1/98	DM32	4	0.022	6.1	720	260	1.2	n.d.	15.0	81	140	64	88	n.d.	n.d.	260	0.8	1.9
119	Bavarian mine	9/1/98	DM33	4	0.001	3.3	500	88	0.38	n.d.	1.0	16	130	2,900	4,100	500	n.d.	2,300	5.4	430
123	Tom Moore mine	9/1/97	DM22	3	0.072	7.3	350	89	2.4	n.d.	2.2	75	n.d.	14	540	n.d.	n.d.	840	2.0	n.d.
125	Silver Wing mine	9/1/97	DM21	3	0.037	6.5	380	270	3.8	n.d.	4.9	120	410	1,800	3,400	1,400	n.d.	3,900	15	n.d.
133	Silver Crown mine	7/20/95	258/4194–1.307	1	0.11	7.1	413	139	3.8	0.3	3.2	75	7.0	50	60	0.7	2.6	42	0.3	<0.2
136	Imogene mine	7/19/95	259/4193–1.304	1	0.25	5.9	247	162	3.6	0.3	2.8	41	250	10,000	820	n.d.	2.1	100	n.d.	1.4
141	Brooklyn mine	7/18/95	261/4193–1.306	1	0.045	3.2	1,006	526	1.2	0.5	15.0	84	2,300	38,000	>5,000	810	19	7,300	38	62
143	U.S. Basin mine	8/24/95	262/4195–1.300	1	0.042	5.1	512	212	2.0	0.7	11.0	63	280	1,500	2,900	3.2	5.6	160	0.7	8.8
145	Kansas City # 1 mine	10/1/96	SO20	2	<0.002	3.0	1,400	600	1.0	n.d.	13.0	120	10,000	57,000	32,000	2,100	30	8,300	25	100
147	Elk tunnel	10/1/96	SO19	2	0.38	7.0	1,500	740	7.9	n.d.	6.4	330	n.d.	3,500	1,700	n.d.	n.d.	190	n.d.	n.d.
148	Mammoth tunnel	10/1/96	SO18	2	0.07	4.9	1,500	580	5.1	2.4	18.0	210	1,700	53,000	4,400	12	20	1,000	1.3	n.d.
150	Big Colorado mine	10/1/96	SO17	2	0.04	4.6	820	450	3.9	2.8	13.0	110	6,800	75,000	2,200	15	37	1,100	4.8	n.d.
153	Natalie/Occidental mine	10/1/96	SO13	2	0.89	6.3	1,000	540	3.7	n.d.	9.0	220	770	13,000	2,300	n.d.	n.d.	710	2.1	n.d.
155	Black Hawk mine	10/1/96	SO12	2	0.2	7.3	1,200	610	3.3	1.1	11.0	260	n.d.	50	2,500	n.d.	10	580	1.8	n.d.

Table 5. Adit chemistry determined at low flow for selected sites sampled by State of Colorado.—Continued

AMLI_MINE_ID	Name	Date	Sample designation	Reference	Discharge ft³/s	pH	Specific conductance µS/cm	Sulfate mg/L	Na mg/L	K mg/L	Mg mg/L	Ca mg/L	Al µg/L	Fe µg/L	Mn µg/L	Cu µg/L	Ni µg/L	Zn µg/L	Cd µg/L	Pb µg/L
159	Midway tunnel	9/1/98	DM74	4	0.018	7.6	1,200	750	8.4	n.d.	6.6	260	56	n.d.	12	n.d.	n.d.	35	n.d.	n.d.
160	Moonbeam mine	9/1/98	DM35	4	0.067	7.6	550	160	2.0	n.d.	3.7	90	n.d.	71	400	n.d.	n.d.	360	0.7	1.7
163	Senator mine	9/1/97	DM24	3	0.163	6.6	1,200	940	6.6	3.1	25.0	230	1,700	26,000	16,000	8.0	17	1,900	3.9	6.8
183	Anglo Saxon mine	10/1/96	SO16	2	0.09	6.6	1,700	810	9.2	3.5	20.0	320	340	31,000	9,200	14	22	2,900	3.0	n.d.
186	Yukon mine (Gold Hub)	10/1/96	SO14	2	1.21	7.1	950	500	5.7	n.d.	6.5	220	n.d.	1,100	1,000	n.d.	n.d.	99	n.d.	n.d.
190	Auburn mine	9/1/98	DM36	4	0.243	7.7	950	320	3.5	n.d.	5.0	150	n.d.	160	270	n.d.	n.d.	150	n.d.	2.0
193	Hamlet mine	9/1/98	DM39	4	0.331	7.6	860	300	5.3	n.d.	8.2	150	n.d.	210	550	n.d.	n.d.	100	n.d.	n.d.
203	Esmeralda mine	9/1/98	DM40	4	0.035	8.0	780	50	3.3	n.d.	3.2	41	n.d.	n.d.	14	n.d.	n.d.	8.0	n.d.	n.d.
208	Ensle tunnel	8/24/95	255/4189–1.303	1	<0.002	2.9	470	145	0.30	0.3	2.3	15	3,100	18,000	380	46	4.2	1,500	7.9	12
212	Little Casino mine (Coming Wonder)	9/1/98	DM73	4	0.004	7.6	400	110	5.7	n.d.	11.0	64	n.d.	5.0	47	n.d.	n.d.	460	0.8	n.d.
216	Blair Mtn. tunnel	9/1/98	DM65	4	0.06	7.0	850	440	5.0	n.d.	2.9	180	n.d.	620	360	8.0	n.d.	n.d.	n.d.	n.d.
218	Aspen mine	9/1/98	DM64	4	0.421	7.1	750	330	3.4	n.d.	2.5	150	n.d.	n.d.	2.0	5.0	n.d.	590	3.6	n.d.
223	Valley Forge mine	9/1/98	DM57	4	0.111	7.4	340	58	2.9	n.d.	3.9	51	n.d.	n.d.	n.d.	n.d.	n.d.	7.0	n.d.	n.d.
226	Joseph Neff mine	9/1/98	DM75	4	0.013	5.5	500	250	6.1	n.d.	8.6	86	1,400	380	400	n.d.	n.d.	79	n.d.	n.d.
228	Little Nation mine	9/1/98	DM56	4	0.137	7.0	580	240	3.7	n.d.	6.1	95	72	5,500	1,300	n.d.	n.d.	510	1.0	1.4
230	Hidden Treasure mine	9/1/98	DM44	4	0.008	6.8	300	140	4.5	n.d.	8.0	48	n.d.	3,200	1,400	n.d.	n.d.	400	1.1	n.d.
236	Smuggler mine	9/1/98	DM46	4	0.023	7.7	310	92	4.3	n.d.	5.4	57	n.d.	1,800	630	n.d.	n.d.	15	n.d.	n.d.
239	Old Hundred mine	9/1/98	DM45	4	1.146	8.2	500	220	3.9	n.d.	3.4	110	n.d.	n.d.	n.d.	n.d.	n.d.	83	0.7	0.7
244	Emma mine	9/1/98	DM47	4	0.036	7.5	600	260	4.4	n.d.	6.9	130	n.d.	7.0	10	n.d.	n.d.	29	n.d.	n.d.
285	Mighty Monarch mine	9/1/98	DM67	4	0.064	7.4	350	120	3.5	n.d.	4.5	63	n.d.	47	850	n.d.	n.d.	500	1.6	n.d.
289	Last Chance mine	9/1/98	DM66	4	0.277	7.4	290	96	3.0	n.d.	2.6	49	n.d.	250	410	n.d.	n.d.	18	n.d.	n.d.
298	Ezra R mine	9/1/98	DM58	4	0.011	7.7	220	100	2.4	n.d.	0.8	60	n.d.	n.d.	11	n.d.	n.d.	64	n.d.	n.d.
301	Argentine tunnel	9/1/98	DM78	4	0.041	8.2	370	120	2.8	n.d.	2.0	66	n.d.	n.d.	2.0	n.d.	n.d.	34	n.d.	n.d.
302	Jess mine	9/1/98	DM77	4	0.006	7.9	380	130	2.5	n.d.	2.7	71	n.d.	59	200	n.d.	n.d.	47	n.d.	n.d.
305	Black Prince mine	9/1/98	DM60	4	0.061	7.9	62	6.6	0.31	n.d.	0.4	16	n.d.	n.d.	n.d.	n.d.	n.d.	14	n.d.	n.d.
306	King Solomon mine	9/1/98	DM59	4	0.001	7.7	98	26	1.0	n.d.	1.2	26	n.d.	14	5.0	24	n.d.	180	1.0	3.8
315	Green Mtn. mine	9/1/98	DM52	4	0.008	8.3	240	48	2.1	n.d.	2.4	47	n.d.	5.0	4.0	7.8	n.d.	940	5.7	13
319	Pride of the West mine	9/1/98	DM51	4	0.227	8.6	350	48	1.7	n.d.	5.2	75	n.d.	n.d.	230	13	n.d.	1,200	6.3	2.8
323	Oyama tunnel	9/1/98	DM49	4	0.072	7.7	390	220	12.0	2.2	12.0	98	n.d.	210	870	n.d.	n.d.	21	n.d.	n.d.
327	Queen of Maggie mine	9/1/98	DM71	4	0.007	4.6	230	58	2.9	4.1	11.0	34	n.d.	1,200	20	n.d.	n.d.	59	0.7	n.d.
332	Bandora mine	7/19/95	235/4185–1.3000	1	0.071	6.2	32	290	2.1	0.3	7.1	90	25	11,000	>5,000	140	23	16,000	88	<0.2
345	Iowa mine	9/1/98	DM62	4	0.001	7.3	41	13	0.18	n.d.	0.5	6.7	n.d.	n.d.	13	22	n.d.	880	6.1	18
345	South Iowa mine adit	9/1/98	DM79	4	0.002	5.2	110	200	0.29	n.d.	1.0	12	390	57	130	400	n.d.	7,500	29	970
348	Royal Tiger mine	9/1/98	DM63	4	0.007	4.9	350	190	1.0	n.d.	8.2	41	5,700	340	6,500	1,400	16	9,800	38	2,200
360	Innis tunnel	9/1/98	DM53	4	0.053	7.8	300	83	3.3	n.d.	3.3	60	n.d.	n.d.	2.0	n.d.	n.d.	64	n.d.	n.d.
504	Lower Ransom mine	9/1/98	DM69	4	0.061	7.6	1,300	1,000	4.9	n.d.	7.5	220	n.d.	14	78	n.d.	n.d.	330	n.d.	n.d.

[1]Reference: Unpub. abandoned mine land inventory report, San Juan Forest, Columbine district, CGS, 1997.

[2]Reference: Unpub. Cement Creek reclamation feasibility report, CDMG, 1998.

[3]Reference: Unpub. Upper Animas River reclamation feasibility report, CDMG, 1999.

[4]Reference: Unpub. Lower Animas River reclamation feasibility report, CDMG, 2000.

Table 6. Adit chemistry determined at low flow for selected sites sampled by U.S. Geological Survey.

[Adit flow in cubic feet/second, ft^3/s; all samples were filtered at 0.45 micrometers; concentrations expressed in milligrams per liter, mg/L; or in micrograms per liter, µg/L; < detection limit, not detected; --, not determined; all methods and data are in the database (Sole and others, this volume)]

AMLI_MINE_ID	Name	Date	Sample designation	Discharge ft^3/s	pH	Specific conductance µS/cm	Sulfate mg/L	Na mg/L	K mg/L	Mg mg/L	Ca mg/L	Al µg/L	Fe µg/L	Mn µg/L	Cu µg/L	Ni µg/L	Zn µg/L	Cd µg/L	Pb µg/L
Detection limit —							*2*	*0.5*	*0.03*	*0.01*	*0.02*	*2*	*50*	*0.2*	*0.5*	*0.5*	*0.5*	*0.02*	*0.05*
7	London mine	9/4/98	MS22	0.011	6.8	405	167	5.2	1.25	3.91	59	20	15	1,400	6.0	10	6,450	44	15
8	Early Bird Crosscut	8/13/97	NAW150	0.0045	3.2	350	--	0.53	--	5.30	13	4,400	1,400	3,800	260	18	1,400	24	69
		9/14/98	NAW727	0.0022	3.2	330	--	< 0.5	--	6.90	29	6,300	2,300	6,800	350	19	2,200	23	83
9	Ben Butler mine	8/14/97	NAW156	0.0045	3.0	600	--	< 0.5	--	0.64	4.5	1,500	3,200	210	1,100	4.2	13,000	110	2,500
		9/14/98	NAW726	0.0067	3.0	530	--	< 0.5	--	0.56	4.8	1,700	4,300	320	1,400	3.5	18,000	110	1,800
		9/2/99	NAW822	0.0067	2.9	230	--	< 0.5	--	0.65	5.4	2,500	5,800	310	1,100	5.0	20,000	110	2,400
13	Lucky Jack mine	10/3/98	MS23	0.01	3.5	284	80	1.0	0.68	1.75	14	1,220	2,050	615	63	10	4,280	21	253
15	Little Ida mine	9/7/97	NAW380	0.011	7.3	90	--	0.64	--	0.69	3.9	160	110	130	30	1.7	740	4.0	49
17	Vermillion mine	9/27/99	MS55	0.005	2.6	783	269	0.38	0.62	1.82	26	3,280	21,500	7,340	1,410	10	49,800	202	1,380
19	Frisco tunnel	8/24/98	MS3	0.062	6.2	845	300	4.6	2.74	6.93	113	116	226	6,860	2.0	10	3,000	4.9	15
		9/11/98	NAW704	0.067	5.4	580	--	4.8	--	7.70	120	69	1,300	7,900	1.5	3.2	3,100	5.7	0.6
		9/2/99	NAW828	0.18	5.5	260	--	4.7	--	7.10	120	71	300	7,300	3.0	10	3,400	10	25
31	Mogul mine	8/31/99	NAW802	--	2.8	780	--	4.5	--	13.0	160	46,000	130,000	31,000	12,000	59	100,000	1,600	240
32	Mogul North mine	9/10/97	MS26	0.015	4.7	180	85	0.72	--	2.49	25	373	15	36	10	10	1,050	2.3	15
34	Queen Anne mine	9/6/97	MS50	0.05	7.0	367	344	1.5	--	3.94	61	116	77	1,680	98	10	2,430	11	15
35	Grand Mogul mine	8/15/97	NAW176	0.067	3.3	400	--	0.79	--	3.00	8.9	1,900	5,200	1,900	1,000	5.8	5,500	42	35
		9/10/97	MS16	0.003	3.4	488	190	1.0	--	6.05	17	9,170	1,470	7,110	3,240	24	15,800	89	44
		8/15/98	NAW530	0.045	2.9	630	--	<0.5	--	13.0	23	13,000	43,000	13,000	7,300	24	34,000	170	42
		8/31/99	NAW801	0.056	3.0	380	--	0.64	--	5.20	15	5,500	25,000	4,300	2,000	14	14,000	73	25
42	Mountain Queen mine	8/22/02	CGS-350	0.004	3.6	243	82		0.49	1.60	12	2,500	3,700	3,900	930	2.5	3,800	37	190
58	Evening Star mine	9/5/99	NAW860	0.011	4.6	92	--	1.2	--	4.30	16	12,000	21,000	7,200	3.0	15	4,400	14	300
62	Sandiago tunnel (Treasure Mountain mine)	9/8/98	MS54	0.433	7.0	590	203	2.0	1.44	5.76	77	20	15	717	2.0	10	27	1.0	15
		9/5/99	NAW854B	0.22	7.1	170	--	2.1	--	7.30	78	5.0	<50	490	0.7	5.0	5.0	0.04	25
70	Lower Bullion King mine	8/19/98	NAW592	0.011	4.6	140	--	< 0.5	--	1.00	30	450	--	1,100	28	2.5	1,600	10	12
		8/25/99	MS9	0.045	4.8	175	88	0.69	0.47	0.60	24	447	60	911	32	10	1,610	8.6	15
		9/7/99	NAW876	0.045	6.4	76	--	1.0	--	0.66	34	100	4,100	1,200	6.0	5.0	1,300	5.2	25
75	Koehler tunnel	9/25/95	MS81	0.02	2.5	3,520	2,720	19.4	0.70	26	111	71,400	686,000	23,700	98,600	300	228,000	780	235
		9/25/95	MS82	0.15	2.5	3,310	2,700	14.3	0.40	39	144	70,300	494,000	20,300	61,100	290	157,000	550	300
		8/18/98	NAW580	--	2.4	2,200	--	26.0	--	22	120	51,000	460,000	19,000	40,000		120,000	450	280
82	Galena Queen	9/9/97	MS59	--	2.6	1,060	368	0.67	--	1.36	7.2	7,180	60,100	603	3,920	57	44,700	183	417
83	Hercules mine	9/9/97	MS60	--	2.3	1,780	691	0.35	--	0.81	3.0	5,870	118,000	205	3,000	68	52,400	279	966
85	Henrietta mine, #7 level	8/17/97	NAW215	0.011	2.5	1,600	--	0.68	--	5.10	16	11,000	130,000	530	380	67	6,500	41	18
		6/30/99	H7A	--	2.6	530	--	0.23	--	1.09	3.5	1,914	27,696	78	50	10	296	1.0	15
		9/29/99	H7A	--	2.5	2,450	1,100	0.83	1.40	7.50	49	23,000	270,000	910	590	110	8,200	35	25
86	Lark mine	8/17/97	NAW204	0.011	3.2	380	--	0.62	--	1.00	4.6	1,300	760	120	420	5	3,300	21	320
		8/17/97	NAW212	--	4.2	50	--	0.54	--	2.90	14	820	1,500	210	100	6	490	3.0	28
		7/22/98	MS21	0.001	2.8	678	133	0.59	0.72	1.21	5.5	1,850	11,300	208	1,640	10	9,780	44	357
		8/31/99	NAW807	--	3.0	390	--	0.56	--	2.10	2.6	5,000	67,000	200	990	28	6,900	30	25
		9/29/99	L3A	--	4.1	228	53	2.6	2.20	0.90	16	350	24,000	220	160	11	2,200	9.2	25
		9/29/99	L3P	--	4.0	157	83	3.0	0.89	1.70	16	1,100	120	190	230	5	3,100	12	97

Table 6. Adit chemistry determined at low flow for selected sites sampled by U.S. Geological Survey.—Continued

AMLI_MINE_ID	Name	Date	Sample designation	Discharge ft³/s	pH	Specific conductance µS/cm	Sulfate mg/L	Na mg/L	K mg/L	Mg mg/L	Ca mg/L	Al µg/L	Fe µg/L	Mn µg/L	Cu µg/L	Ni µg/L	Zn µg/L	Cd µg/L	Pb µg/L
Detection limit —							*2*	*0.5*	*0.03*	*0.01*	*0.02*	*2*	*50*	*0.2*	*0.5*	*0.5*	*0.5*	*0.02*	*0.05*
87	Joe and Johns mine	8/17/97	NAW217	0.045	2.7	740	--	<0.5	--	1.20	2.2	6,400	29,000	180	400	20	7,100	54	1,200
		9/8/97	MS19	0.006	2.8	1,090	367	0.29	--	1.87	2.0	12,600	60,300	244	638	22	12,000	58	931
		6/30/99	JJA	--	--	--	--	0.36	--	0.30	1.6	317	244	28	22	10	216	1.0	15
		7/29/99	MS19	0.001	3.8	131	40	0.56	0.58	0.71	4.6	835	793	112	116	10	1,190	3.2	46
		9/29/99	JJP	--	2.7	1,010	290	0.39	1.60	1.60	2.7	13,000	62,000	190	640	28	11,000	54	1,400
91	Eveline mine	11/6/96	MS13	0.01	3.3	472	178	2.4	--	10.2	4.6	10,600	15,500	843	55	10	858	5.2	15
		8/16/97	NAW201	0.022	3.1	370	--	2.2	--	8.20	4.8	6,500	8,800	600	91	14	640	10	3.8
		8/19/97	MS13	0.01	3.1	468	175	2.5	--	10.2	4.7	11,100	17,900	859	100	10	892	4.3	15
100	Adams mine	10/1/99	MS38	0.01	4.2	498	169	3.8	0.76	4.85	60	3,180	11,500	2,670	81	10	3,880	51	60
125	Silver Wing mine	9/5/97	NAW355	0.22	6.2	620	--	3.2	--	3.40	36	210	740	1,400	410	8.0	2,000	14	0.2
		9/30/98	MS53	0.06	6.5	679	307	2.7	1.26	3.89	96	20	4,750	3,130	14	10	2,460	11	15
132	Potomac mine	9/13/98	NAW721	0.011	5.2	120	--	<0.5	--	0.87	28	140	340	230	27	<0.5	1,900	15	170
133	Silver Crown mine	8/18/98	NAW577	0.022	5.5	360	--	8.2	--	5.50	100	--	1,600	100	5.0	8.9	160	<0.02	<0.05
		8/25/99	MS51	0.164	7.6	481	156	6.0	0.38	3.76	80	20	15	69	2.0	10	34	1.0	15
135	Chattanooga Curve mine	8/18/98	NAW579	0.022	4.9	280	--	8.5	--	9.60	78	460	2,500	1,400	5.0	9.1	390	<0.02	<0.05
		8/27/99	MS42	0.095	5.8	456	218	6.3	0.51	6.83	64	656	1,870	1,200	2.0	10	171	1.0	15
136	Imogene mine	9/11/97	NAW427	0.067	5.8	280	--	4.4	--	2.40	14	300	3,200	360	0.7	2.2	110	0.07	0.2
		8/14/98	NAW511	0.067	5.4	260	--	6.1	--	4.10	54	410	5,900	1,000	7.3	3.6	130	<0.02	6.1
		9/1/99	NAW814	0.11	5.1	120	--	5.6	--	3.40	48	440	6,000	920	3.0	5.0	130	1.0	25
		9/15/99	MS17	0.174	5.9	334	123	5.4	0.43	3.23	46	445	5,230	884	2.0	10	118	1.0	15
137	Ferricrete mine	8/14/98	NAW512	0.045	5.1	380	--	6.4	--	7.90	74	840	11,000	2,600	2.2	10	370	0.6	0.5
		9/15/99	MS14	0.52	6.0	480	193	5.7	0.60	6.72	66	962	11,300	2,540	2.0	10	380	2.7	15
140	Gold Finch group	8/26/99	MS28	0.035	6.7	1,080	480	12.3	1.34	9.26	197	221	3,610	1,730	2.0	10	106	1.0	15
141	Brooklyn mine	8/13/98	NAW508	0.045	4.8	610	--	4.2	--	24	120	810	3,000	8,100	99	25	5,300	14	11
		8/18/98	NAW589	0.045	2.9	880	--	2.8	--	22	130	4,200	16,000	9,400	380	27	6,500	27	64
		7/18/99	MS8	0.08	3.7	802	311	1.8	0.77	16.0	84	2,250	17,300	6,750	338	10	5,560	18	15
		9/1/99	NAW817	0.045	2.9	280	--	1.7	--	16.0	62	3,700	33,000	5,800	280	22	5,900	23	52
		9/1/99	NAW819	0.045	3.0	350	--	1.9	--	17.0	72	5,500	28,000	6,400	430	31	6,500	30	50
142	Upper Browns Gulch mine	9/18/99	MS37	0.003	2.9	859	240	1.3	0.37	7.80	52	4,220	27,600	4,490	490	10	2,810	28	168
143	U.S. Basin mine	8/18/98	NAW586	--	2.8	670	--	1.4	--	6.60	40	4,100	15,000	1,500	370	11	1,100	7.7	180
145	Kansas City mine #1	8/22/98	NAW630	0.011	2.9	810	--	2.2	--	18.0	150	10,000	28,000	32,000	1,600	45	7,100	28	110
147	Elk tunnel	8/21/97	NAW311	0.22	6.4	1,100	--	6.7	--	5.00	190	47	4,100	1,400	1.3	19	160	<0.02	33
		10/10/97	MS11	--	7.1	1,280	815	7.8	--	6.00	342	20	3,060	1,750	2.0	10	225	1.0	15
		8/17/98	NAW575	0.22	4.9	1,200	--	9.3	--	7.50	370	15	11,000	2,000	2.9	26	210	0.2	5.0
		10/14/98	MS11	0.338	6.8	1,450	867	7.9	0.92	6.07	322	123	3,540	1,720	2.0	10	187	1.0	15
		9/8/99	NAW882	0.22	6.8	520	--	7.2	--	5.70	270	11	3,100	1,600	2.0	5	170	0.1	25
148	Mammoth tunnel	8/17/97	NAW227	0.089	4.8	990	--	4.1	--	13.0	120	1,000	26,000	3,200	5.2	25	730	1.8	0.6
		10/10/97	MS24	--	--	--	636	4.3	--	15.8	201	1,470	21,700	5,020	39	10	1,260	1.0	15
		8/7/98	MS24	0.005	5.1	1,520	700	5.4	2.65	18.4	215	2,010	52,400	4,810	13	10	1,090	12	15
		8/16/98	NAW554	0.089	4.5	980	--	5.9	--	20	230	2,000	51,000	4,900	27	32	1,000	2.0	<0.05
149	Avalanche mine	8/21/97	NAW309	0.022	3.8	480	--	2.1	--	7.40	31	5,300	22,000	530	75	17	170	1.1	1.3
		9/5/97	MS2	0.009	3.9	614	308	2.8	--	9.82	58	9,360	48,500	812	69	30	219	1.0	15
		8/17/98	NAW555	0.022	3.7	440	--	2.8	--	9.40	64	6,900	35,000	870	54	18	200	0.8	<0.05
		8/19/98	MS2	0.015	3.9	565	286	2.7	1.59	8.42	54	7,130	36,700	748	44	10	195	5.3	15

Table 6. Adit chemistry determined at low flow for selected sites sampled by U.S. Geological Survey.—Continued

AMLI_MINE_ID	Name	Date	Sample designation	Discharge ft³/s	pH	Specific conductance µS/cm	Sulfate mg/L	Na mg/L	K mg/L	Mg mg/L	Ca mg/L	Al µg/L	Fe µg/L	Mn µg/L	Cu µg/L	Ni µg/L	Zn µg/L	Cd µg/L	Pb µg/L
Detection limit —							*2*	*0.5*	*0.03*	*0.01*	*0.02*	*2*	*50*	*0.2*	*0.5*	*0.5*	*0.5*	*0.02*	*0.05*
150	Big Colorado mine	8/16/98	NAW552	0.22	3.6	960	--	4.8	--	14.0	130	6,800	42,000	2,400	31	45	1,100	4.6	19
		8/20/98	MS5	--	4.7	1,090	500	3.9	3.27	12.2	109	6,610	64,500	2,170	18	10	1,020	11	15
153	Natalie/Occidental (Silver Ledge) mine	10/18/96	MS52	0.75	5.7	1,090	518	3.9	--	8.99	211	879	12,300	2,430	11	10	701	6.3	15
		11/4/97	MS52	--	6.8	1,000	527	3.2	--	8.73	200	1,040	12,700	2,710	2.0	10	805	10	15
		8/5/98	MS52	--	6.3	910	490	3.9	0.88	8.76	187	1,430	13,700	2,470	17	10	895	6.2	15
		8/16/98	NAW551	0.89	5.3	670	--	4.2	--	9.90	220	1,300	16,000	2,700	23	23	820	2.2	1.3
		8/31/99	NAW808	0.89	5.1	330	--	3.7	--	8.70	150	1,300	14,000	2,400	19	15	940	3.4	25
155	Black Hawk mine	10/1/97	MS6	0.6	6.9	1,020	600	4.2	--	12.9	259	123	1,220	4,300	2.0	10	1,130	2.4	15
156	South Fork mine	8/28/98	MS29	0.3	6.5	652	253	2.1	0.67	5.42	117	20	4,490	1,980	2.0	10	304	1.0	15
168	Paradise mine	9/28/95	MS77	0.6	5.7	1,962	1,200	7.8	0.80	33	400	8,600	67,000	5,100	13	25	530	0.5	0.5
		8/14/98	NAW520	0.22	4.5	1,300	--	8.9	--	49	430	22,000	77,000	6,600	1.4	52	660	0.3	0.5
		8/14/98	NAW521	0.22	4.6	1,200	--	9.8	--	47	440	19,000	75,000	6,400	3.0	51	640	0.7	1.5
		8/27/98	MS34	0.009	5.0	2,140	1,300	8.0	0.90	42	359	21,200	73,000	5,920	2.0	10	620	1.0	15
		9/6/99	NAW870	0.45	5.1	610	--	8.2	--	38	350	27,000	69,000	5,100	3.0	29	570	0.4	25
169	Ruby Trust mine	9/18/95	MS76	1.03	6.4	560	200	3.6	0.50	3.90	110	0.5	470	530	3.0	3.0	39	0.5	0.5
		8/14/98	NAW524	0.45	6.4	360	--	4.8	--	4.40	120	38	2,400	550	3.3	10	66	0.2	2.7
		9/1/99	NAW816	0.89	5.5	180	--	3.6	--	3.40	90	5.0	440	470	1.0	5.0	55	0.1	25
171	Independence mine (Silverton quadrangle)	9/26/95	MS80	0.04	3.2	667		6.8	0.50	5.80	65	4,410	12,600	1,250	0.5	0.5	243	14	0.5
		6/10/98	MS18	0.04	3.2	634	263	6.1	0.64	4.83	64	4,140	11,400	1,090	51	10	225	1.0	15
172	Bonner mine upper adit	8/14/98	NAW516	0.022	3.1	530	--	6.7	--	7.70	90	7,000	15,000	3,800	86	14	3,000	14	17
		8/14/98	NAW517	0.022	2.9	730	--	8.3	--	8.80	120	6,800	11,000	3,800	83	16	2,700	14	13
172	Bonner mine, lower adit	9/26/95	MS79	0.06	3.1	1,225		7.7		7.30	107	8,300	10,500	4,100	0.5	0.5	4,090	20	0.5
		9/1/99	NAW815	0.045	2.8	380	--	7.0	--	7.40	81	8,300	11,000	4,400	120	11	4,900	25	25
173	Molly Gulch mine	8/24/99	MS43	0.004	3.1	560	177	4.7	0.84	8.77	34	5,560	4,770	1,140	629	10	224	1.0	15
174	Magnet mine	8/23/99	MS48	0.014	7.5	980	501	11.3	0.97	7.33	186	147	88	829	11	10	106	1.0	15
181	May Day mine	5/15/97	MS61	0.03	2.6	1,810	1,060	--	--	--	--	--	--	--	--	--	--	--	--
183	Anglo Saxon mine	10/10/97	MS1	--	--	--	827	9.6	--	20	339	970	550	9,490	2.0	10	3,060	17	15
		8/7/98	MS1	0.05	6.5	1,870	867	8.8	2.61	18.8	286	484	28,800	9,320	2.0	10	3,050	10	15
		8/17/98	NAW574	0.11	5.7	1,100	--	13.0	--	27	360	530	33,000	11,000	28	49	3,400	4.0	<0.05
186	Yukon tunnel (Gold Hub)	9/11/97	NAW415	0.089	5.9	1,100	--	5.2	--	4.50	70	65	1,500	510	6.4	9.1	130	1.2	1.0
		8/17/98	NAW573	0.089	5.6	900	--	8.6	--	9.00	260	150	5,000	970	15	20	270	1.2	<0.05
189	Legal Tender mine (Howardsville quadrangle)	9/8/97	NAW396	0.045	7.0	480	--	3.0	--	2.50	29	10	700	130	1.5	3.9	220	0.9	0.6
		9/3/99	NAW845	0.045	5.4	180	--	3.8	--	3.50	88	11	420	310	1.0	5.0	390	2.0	25
195	Forest Queen mine (preremediation)	11/6/96	MS15	0.036	4.7	856	433	8.8	--	13.9	137	2,150	25,300	2,460	2.0	10	641	8.3	44
		8/18/97	NAW231	0.045	5.1	830	--	6.6	--	9.60	80	1,000	13,000	1,600	n.d.	15	440	8.9	7.5
		9/11/97	MS15	0.036	4.6	770	475	8.9	--	13.1	133	1,960	24,400	2,330	2.0	10	605	8.0	15
		8/11/98	MS15	0.083	6.7	1,390	787	8.7	1.44	11.0	272	305	10,900	2,240	2.0	10	349	1.0	15
195	Forest Queen mine (postremediation)	9/16/99	MS15	--	5.9	1,510	577	9.6	1.10	11.2	334	601	10,400	2,590	2.0	10	393	39	15
		9/20/00	MS15	0.0007	6.1	733	345	8.4	1.55	10.8	124	70	8,240	2,200	0.8	1.5	79	9.0	11

Table 6. Adit chemistry determined at low flow for selected sites sampled by U.S. Geological Survey.—Continued

AMLI_MINE_ID	Name	Date	Sample designation	Discharge ft³/s	pH	Specific conductance µS/cm	Sulfate mg/L	Na mg/L	K mg/L	Mg mg/L	Ca mg/L	Al µg/L	Fe µg/L	Mn µg/L	Cu µg/L	Ni µg/L	Zn µg/L	Cd µg/L	Pb µg/L
Detection limit —							*2*	*0.5*	*0.03*	*0.01*	*0.02*	*2*	*50*	*0.2*	*0.5*	*0.5*	*0.5*	*0.02*	*0.05*
201	Kittimack mine	8/18/97	NAW235	0.067	6.3	270	--	4.1	--	4.90	33	17	360	200	110	3.7	1,000	7.0	5
		8/5/98	MS20	--	7.8	392	115	5.9	0.95	6.15	59	42	15	256	160	10	1,440	4.6	15
		9/13/98	NAW717	0.045	5.5	320	--	7.3	--	8.50	71	67	570	390	250	<0.5	1,500	7.3	21
		9/3/99	NAW835	0.045	5.6	120	--	4.0	--	5.30	58	15	<50	220	130	5.0	1,200	6.4	25
203	Esmeralda mine, lower adit	10/3/98	MS12	0.05	7.0	252	56	3.2	0.69	3.19	41	20	15	7.0	2.0	10	10	1.0	15
207	Burbank mine	8/20/98	NAW603	0.11	5.7	530	--	5.0	--	18.0	150	--	6,200	1,400	3.2	10	52	1.8	<0.05
		8/24/98	MS10	0.087	6.3	898	327	4.3	0.72	16.7	135	20	2,810	1,310	2.0	10	47	1.0	15
		9/9/99	NAW890	0.45	7.4	250	--	4.4	--	15.0	98	5.0	2,600	1,100	1.0	5.0	38	0.2	25
239	Old Hundred mine, lower adit	8/19/97	NAW271	0.11	7.1	450	--	3.5	--	3.00	58	8.4	500	1.4	3.2	6.1	130	1.3	1.9
		10/17/97	MS49	--	7.5	520	205	3.8	--	3.44	109	229	15	1.5	2.0	10	127	1.0	15
260	Columbine mine	8/19/98	MS57	0.011	3.0	715	240	3.9	3.43	5.32	28	10,700	4,560	445	12	10	137	1.0	15
		9/24/98	MS57	0.01	2.9	694	207	4.1	2.77	4.97	20	10,800	4,060	339	21	10	102	1.0	15
263	North Star mine	12/17/97	MS63	0.632	6.8	716	363	4.8	0.92	17.1	132	101	1,820	2,560	2.0	10	619	1.0	15
		7/23/98	MS63	1.18	7.2	726	327	4.1	0.87	16.3	117	20	1,590	2,520	11	10	667	1.0	15
		10/13/98	MS63	0.935	6.8	756	340	4.9	0.77	17.0	131	197	1,600	2,600	2.0	10	621	1.0	15
266	Sultan tunnel	8/21/97	NAW298	0.056	6.9	600	--	4.0	--	7.70	56	30	540	580	8.1	7.1	52	0.3	0.6
		8/19/98	NAW601	0.056	5.5	390	--	5.3	--	11.0	120	57	3,000	580	4.0	7.7	49	0.3	<0.05
		9/14/98	NAW733	--	3.0	760	--	3.8	--	7.70	35	17,000	29,000	580	10	31	200	0.4	4.1
285	Mighty Monarch mine	9/24/98	MS25	0.041	6.8	359	122	3.9	0.39	4.58	63	20	33	881	2.0	10	484	1.0	15
287	Lackawanna mill tailings	8/21/98	NATW622	--	5.9	1,800	--	<0.5	--	11.0	580	59	21,000	31,000	42	69	63,000	150	190
289	Last Chance mine	9/6/97	NAW364	0.13	7.2	230	--	2.5	--	1.90	16	10	390	160	< 0.5	2.2	15	0.1	0.2
		9/15/98	NAW735	0.11	5.2	180	--	3.1	--	2.60	48	18	400	410	1.1	<0.5	25	0.04	0.2
306	King Soloman mine	9/8/99	NAW883	0.022	7.3	40	--	1.3	--	1.40	24	52	64	20	32	5	140	1	25
332	Bandora mine	9/9/97	NAW399	0.045	6.6	540	--	2.9	--	5.80	32	4.7	4,800	3,200	35	19	8,300	65	1.9
		8/23/98	NAW648	0.056	5.6	410	--	3.8	--	8.50	100	24	9,300	6,800	63	23	12,000	51	1.6
		10/13/98	MS4	0.09	6.1	556	260	2.8	0.29	6.46	84	55	6,770	5,780	39	20	10,500	43	15
		9/9/99	NAW887	0.22	6.4	250	--	2.5	--	7.20	79	19	11,000	7,200	120	21	16,000	80	25
360	Highland Mary mine, #8 level	9/16/98	NAW741	0.022	5.8	240	--	3.7	--	3.40	62	7.6	300	2.6	3.5	<0.5	60	0.4	0.9
505	Henrietta mine, #8 level	8/17/97	NAW213	0.011	2.6	1,100	--	0.52	--	1.90	2.9	2,800	21,000	190	830	18	4,400	31	43
		8/17/98	NAW570	0.013	2.3	2,200	--	1.5	--	11.0	9.1	22,000	29,000	1,100	5,900	110	27,000	130	18
511	unnamed adit, Porcupine Gulch	9/29/97	MS62	0.01	3.7	395	138	1.1	--	4.90	19	4,700	12,200	882	522	10	2,160	13	47
		9/24/98	MS62	0.002	3.8	234	99	1.4	0.68	4.98	23	2,120	874	377	242	10	1,360	6	15

Table 7. Time-series data from adit flow from seven mine sites.

[Discharge in ft^3/s (cfs); total concentrations are from unfiltered sample; dissolved (diss.) concentrations are from 0.45 µm filtered sample; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; µg/L, micrograms per liter; --, not determined; n.d., not detected; < detection limit, not detected; detection limits are for instrumental methods used in the analyses. Data for 1996–99 are from Mast and others (2000). Statistical data rounded to three significant figures]

Mine	Sample date	Discharge ft^3/s	Field pH	Dissolved oxygen mg/L	Specific conductance µS/cm	Sulfate total mg/L	Na diss. mg/L	K diss. mg/L	Mg diss. mg/L	Ca diss. mg/L	Sr diss. µg/L	Ba diss. µg/L	Al diss. µg/L	Al total µg/L	Silica diss. µg/L	Silica total µg/L	Fe diss. µg/L	Fe total µg/L	Mn diss. µg/L	Cu diss. µg/L	Cu total µg/L	Zn diss. µg/L	Cd diss. µg/L	Pb diss. µg/L
Detection limit--						*1*	*0.1*	*0.01*	*0.01*	*0.15*	*3*	*2*	*40*	*40*	*0.2*	*0.2*	*30*	*30*	*10*	*4*	*4*	*20*	*2.0*	*30*
Avalanche mine	9/5/97	0.009	3.92	3.9	614	308	2.75	--	9.82	57.5	717	6.0	9,360	--	63.2	--	48,500	--	812	69	--	219	< 2.0	< 30
(AML_MINE_ID # 149)	3/26/98	0.015	3.69	7.4	563	237	2.74	1.32	7.16	55.3	466	7.0	4,150	5,000	49.5	53.9	27,900	31,200	716	45	46	166	< 2.0	< 30
	4/22/98	0.016	3.40	6.5	449	205	2.69	1.32	6.93	54.7	448	7.0	3,920	4,650	47.4	51.6	26,000	31,000	699	40	44	179	< 2.0	< 30
	5/6/98	0.022	3.99	8.1	542	237	2.55	1.34	7.59	52.6	463	10	5,230	6,310	48.0	55.9	31,000	34,000	720	42	51	177	4.1	< 30
	5/21/98	0.028	3.92	8.0	654	293	3.24	1.43	11.5	60.0	752	6.0	10,500	9,250	64.9	56.8	62,100	53,600	864	63	55	241	6.6	< 30
	6/10/98	0.024	3.85	6.7	628	330	2.32	1.56	9.93	50.5	723	5.0	9,650	10,300	57.1	65.6	54,200	53,700	712	57	70	193	4.7	< 30
	7/1/98	0.008	3.80	6.0	627	300	2.06	1.60	8.31	46.1	597	3.0	7,690	8,580	49.7	58.2	41,000	44,200	670	49	58	190	3.1	< 30
	7/23/98	0.011	3.99	8.8	601	290	2.02	1.63	8.01	47.7	539	4.0	6,820	7,230	49.9	55.8	36,200	37,100	696	43	48	172	< 2.0	< 30
	7/30/98	0.014	3.85	7.9	598	267	2.09	1.61	8.52	52.3	569	< 2	7,040	7,160	50.5	49.6	37,900	36,100	741	41	42	180	8.0	< 30
	8/19/98	0.015	3.91	8.1	565	286	2.66	1.59	8.42	54.4	554	5.0	7,130	7,530	53.1	52.4	36,700	38,400	748	44	44	195	5.3	< 30
	9/24/98	0.010	3.93	5.8	546	270	2.82	1.38	8.40	57.4	542	4.0	6,250	6,600	54.3	52.6	34,000	34,100	755	42	40	189	2.2	< 30
	10/14/98	0.003	3.92	4.6	534	260	2.42	1.28	7.64	53.6	488	4.0	5,170	5,790	49.7	51.3	31,000	31,300	721	40	42	171	5.3	< 30
	11/5/98	0.017	4.04	--	535	252	2.43	1.30	7.64	54.1	481	4.0	5,020	--	49.5	--	30,300	--	722	39	--	162	2.8	< 30
	12/18/98	0.031	4.02	--	551	259	2.05	1.47	8.27	55.2	527	< 2	5,920	--	49.3	--	34,700	--	753	38	--	177	< 2.0	< 30
Minimum		0.003	3.40	3.9	449	205	2.02	1.28	6.93	46.1	448	3.0	3,920	4,650	47.4	49.6	26,000	31,000	670	38	40	162	2.2	< 30
Median		0.015	3.92	7.0	564	269	2.49	1.43	8.29	54.3	541	5.0	6,535	7,160	49.8	53.9	35,450	36,100	722	43	46	180	4.7	< 30
Mean (n = 14)					572	271	2.49	1.45	8.44	53.7	562	5.4	6,704	7,127	52.6	54.9	37,964	38,609	738	47	49	187	4.7	< 30
Standard Deviation				1.5	53	33	0.36	0.13	1.23	3.74	101	1.9	2,036	1,739	5.5	4.4	10,369	8,367	50	10	9	21	1.9	--
Maximum		0.031	4.04	8.8	654	330	3.24	1.63	11.5	60.0	752	10	10,500	10,300	64.9	65.6	62,100	53,700	864	69	70	241	8.0	< 30
Bandora mine	5/28/98	0.10	6.04	2.8	624	260	3.45	0.33	7.82	95	587	18	86	179	13.7	14.6	8,260	17,300	8,230	55	231	15,700	55.1	< 30
(AML_MINE_ID # 332)	7/22/98	0.11	6.25	2.4	588	238	3.00	0.34	7.02	87	533	12	< 40	1,110	12.8	17.4	7,290	18,000	6,680	79	302	13,100	54.6	< 30
	10/13/98	0.09	6.06	0.9	556	260	2.79	0.29	6.46	84	554	14	55	119	11.9	12.7	6,770	14,200	5,780	39	169	10,500	42.9	< 30
	12/17/98	0.03	5.95	--	545	219	2.96	0.32	6.53	89	597	15	< 40	--	12.6	--	6,670	--	5,720	30	--	10,100	39.9	< 30
	5/27/99	0.09	5.36	0.6	628	192	2.84	0.30	7.15	87	529	28	320	--	12.1	--	8,130	--	7,610	72	--	15,400	60.7	153
	7/17/99	0.13	6.04	0.8	591	240	2.90	0.34	7.21	84	528	15	94	--	13.1	--	7,750	--	7,030	121	--	14,400	65.4	< 30
	8/25/99	0.14	5.72	0.9	618	325	3.07	--	7.72	91	538	14	232	--	13.2	--	8,480	--	8,120	143	--	17,400	77.8	< 30
Minimum		0.03	5.36	0.6	545	192	2.79	0.29	6.46	84	528	12	55	119	11.9	12.7	6,670	14,200	5,720	30	169	10,100	39.9	< 30
Median		0.10	6.04	0.9	591	240	2.96	0.33	7.15	87	538	15	94	179	12.8	14.6	7,750	17,300	7,030	72	231	14,400	55.1	< 30
Mean (n = 7)				1.4	593	248	3.00	0.32	7.13	88	552	17	157	469	12.8	14.9	7,621	16,500	7,024	77	234	13,800	56.6	< 30
Standard Deviation				0.9	33	42	0.22	0.02	0.52	4.1	29	5.3	114	556	0.6	2.4	726	2,022	1,030	42	67	2,725	13.0	--
Maximum		0.14	6.25	2.8	628	325	3.45	0.34	7.82	95	597	28	320	1,110	13.7	17.4	8,480	18,000	8,230	143	302	17,400	77.8	153
Bonner mine	12/17/97	0.07	3.16	9.2	795	346	6.18	0.66	6.16	89	381	10	7,450	7,520	49.1	48.8	3,900	3,950	2,590	106	91	1,830	12.3	< 30
(AML_MINE_ID # 172)	3/25/98	0.06	2.74	9.5	938	356	7.11	0.64	6.39	92	420	12	7,490	6,680	50.2	49.1	4,130	3,740	2,490	94	88	1,490	3.4	< 30
	5/22/98	0.04	3.00	3.1	1,220	510	10.3	0.67	8.98	155	539	7	6,620	6,000	47.2	47.7	17,700	16,500	3,650	59	62	1,840	10.9	< 30
	7/22/98	0.05	3.28	10.5	895	350	5.94	0.51	5.97	88	393	14	6,460	5,730	48.5	50.1	3,990	4,580	2,560	100	102	2,140	13.6	< 30
	10/13/98	0.03	3.09	10.3	874	360	6.01	0.51	6.32	91	395	12	7,390	7,170	48.9	49.7	4,100	4,110	2,940	97	96	2,330	13.0	< 30
	7/16/99	0.07	3.23	8.0	807	291	5.74	0.46	5.22	77	348	16	6,120	--	44.9	--	3,540	--	2,440	96	--	2,610	7.0	< 30
	8/25/99	0.05	3.35	8.5	770	325	5.82	--	5.72	76	349	22	7,270	--	46.3	--	3,630	--	3,430	121	--	3,730	33.5	< 30
Minimum		0.03	2.74	3.1	770	291	5.74	0.46	5.22	76	348	7	6,120	5,730	44.9	47.7	3,540	3,740	2,440	59	62	1,490	3.4	< 30

Table 7. Time-series data from adit flow from seven mine sites.—Continued

Mine	Sample date	Discharge ft³/s	Field pH	Dissolved oxygen mg/L	Specific conductance µS/cm	Sulfate total mg/L	Na diss. mg/L	K diss. mg/L	Mg diss. mg/L	Ca diss. mg/L	Sr diss. µg/L	Ba diss. µg/L	Al diss. µg/L	Al total µg/L	Silica diss. µg/L	Silica total µg/L	Fe diss. µg/L	Fe total µg/L	Mn diss. µg/L	Cu diss. µg/L	Cu total µg/L	Zn diss. µg/L	Cd diss. µg/L	Pb diss. µg/L
Detection limit--						*1*	*0.1*	*0.01*	*0.01*	*0.15*	*3*	*2*	*40*	*40*	*0.2*	*0.2*	*30*	*30*	*10*	*4*	*4*	*20*	*2.0*	*30*
Bonner mine (continued)																								
Median		0.05	3.16	9.2	874	350	6.01	0.57	6.16	89	393	12	7,270	6,680	48.5	49.1	3,990	4,110	2,590	97	91	2,140	12.3	< 30
Mean (*n* = 7)					900	363	6.73	0.58	6.39	95	404	13	6,971	6,620	47.9	49.1	5,856	6,576	2,871	96	88	2,281	13.4	< 30
Standard Deviation				2.5	153	69	1.64	0.09	1.21	27	65	4.8	559	757	1.8	0.9	5,228	5,556	488	19	15	736	9.6	--
Maximum		0.07	3.35	10.5	1,220	510	10.3	0.67	8.98	155	539	22	7,490	7,520	50.2	50.1	17,700	16,500	3,650	121	102	3,730	33.5	< 30
Elk tunnel	10/10/97	--	7.10	--	1,280	815	7.85	--	6.00	342	4,790	14	< 40	--	26.9	--	3,060	--	1,750	< 4	--	225	< 2.0	< 30
(AML_MINE_ID # 147)	12/29/97	0.40	6.14	--	1,460	790	8.39	1.15	6.09	305	4,880	10	< 40	n.d.	28.2	28.3	3,080	3,440	1,730	< 4	< 4	152	< 2.0	< 30
	2/12/98	0.30	6.20	0.6	1,480	796	7.81	1.13	6.03	300	4,790	12	< 40	n.d.	27.4	28.4	3,280	3,600	1,690	< 4	< 4	164	< 2.0	< 30
	3/24/98	0.57	6.79	0.0	1,510	800	9.25	1.03	6.25	270	5,160	11	125	n.d.	28.6	32.2	3,380	3,540	1,740	< 4	< 4	168	< 2.0	< 30
	4/21/98	0.43	6.54	0.2	1,480	817	8.71	0.98	6.06	277	4,930	11	66	n.d.	27.2	31.3	3,450	8,960	1,680	< 4	< 4	168	< 2.0	< 30
	5/5/98	0.55	7.04	0.1	1,510	820	8.08	0.96	6.41	300	5,140	10	49	249	28.4	35.3	3,630	15,400	1,800	< 4	< 4	174	< 2.0	< 30
	5/21/98	0.45	7.18	0.1	1,480	793	8.56	0.93	6.13	286	4,910	11	48	n.d.	28.1	29.1	3,580	3,890	1,760	< 4	< 4	215	< 2.0	< 30
	6/24/98	0.34	6.50	0.3	1,410	800	7.26	0.96	5.71	252	4,490	11	< 40	241	26.9	29.6	3,480	3,840	1,900	< 4	< 4	201	2.3	38
	7/23/98	0.34	6.93	1.2	1,460	780	7.31	1.12	5.92	307	4,590	< 2	< 40	239	27.1	31.6	3,560	5,280	1,710	< 4	< 4	164	< 2.0	< 30
	10/14/98	0.34	6.79	0.3	1,450	867	7.93	0.92	6.07	322	5,020	10	123	123	28.0	26.9	3,540	4,880	1,720	< 4	< 4	187	< 2.0	< 30
Minimum		0.30	6.14	0.0	1,280	780	7.26	0.92	5.71	252	4,490	10	48	123	26.9	26.9	3,060	3,440	1,680	--	--	152	2.3	< 30
Median		0.40	6.79	0.3	1,470	800	8.00	0.98	6.07	300	4,895	11	66	240	27.7	29.6	3,465	3,890	1,735	--	--	171	2.3	< 30
Mean (*n* = 10)					1,452	808	8.12	1.02	6.07	296	4,870	11	82	213	27.7	30.3	3,404	5,870	1,748	--	--	182	2.3	17
Standard Deviation				0.4	67	24	0.62	0.09	0.19	26	216	1.3	39	60	0.65	2.6	203	3,972	64	--	--	24	--	--
Maximum		0.57	7.18	1.2	1,510	867	9.25	1.15	6.41	342	5,160	14	125	249	28.6	35.3	3,630	15,400	1,900	--	--	225	2.3	38
Eveline mine	11/6/96	0.010	3.31	--	472	178	2.36	--	10.2	4.60	77	< 2	10,600	10,700	57.5	49.3	15,500	17,700	843	55	51	858	5.2	< 30
(AML_MINE_ID # 91)	12/11/96	0.030	3.29	1.9	490	162	2.48	--	10.6	5.03	81	< 2	11,000	11,000	58.8	49.8	15,600	17,700	881	54	48	885	6.4	< 30
	1/22/97	0.016	3.20	2.3	500	156	2.42	--	10.3	4.71	79	< 2	10,800	10,700	57.0	49.0	15,100	17,300	860	53	47	826	4.0	< 30
	2/13/97	0.014	2.81	3.0	493	153	2.28	--	9.97	4.48	74	< 2	10,300	10,300	55.5	46.7	14,700	16,900	829	43	47	837	4.9	< 30
	3/14/97	0.023	3.18	4.9	502	161	2.43	--	11.1	5.08	87	< 2	11,100	10,600	52.4	47.0	14,700	14,700	889	49	46	904	6.7	< 30
	4/25/97	0.012	3.00	--	510	171	2.21	--	10.4	4.67	81	< 2	11,000	10,700	49.1	47.2	13,700	15,200	836	41	47	851	2.5	< 30
	5/22/97	0.018	3.16	3.2	502	170	2.47	--	10.6	4.88	79	< 2	11,100	12,300	50.4	51.4	17,400	26,300	878	67	292	895	4.3	< 30
	6/5/97	0.026	3.15	2.4	494	183	2.25		10.8	4.72	76	< 2	11,800	11,400	49.9	50.2	24,600	26,000	911	283	268	1,240	8.9	< 30
	7/17/97	0.017	3.19	2.1	470	173	2.41	--	10.1	4.62	75	< 2	11,300	11,100	59.5	59.0	20,900	23,200	853	206	202	949	3.4	< 30
	8/19/97	0.010	3.11	2.6	468	175	2.50	--	10.2	4.70	78	< 2	11,100	10,200	60.5	55.9	17,900	18,800	859	100	88	892	4.3	< 30
	9/11/97	0.022	3.04	1.4	457	180	2.49	--	10.2	4.68	76	< 2	10,900	10,600	59.9	57.8	16,600	18,000	859	88	82	885	2.7	< 30
Minimum		0.010	2.81	1.4	457	153	2.21	--	10.0	4.48	74	--	10,300	10,200	49.1	46.7	13,700	14,700	829	41	46	826	2.5	< 30
Median		0.017	3.16	2.4	493	171	2.42	--	10.3	4.70	78	--	11,000	10,700	57.0	49.8	15,600	17,700	859	55	51	885	4.3	< 30
Mean (*n* = 11)		0.018		2.6	487	169	2.39	--	10.4	4.74	78	--	11,000	10,873	55.5	51.2	16,973	19,255	863	94	111	911	4.8	< 30
Standard Deviation		0.007		1.0	17	10.0	0.10	--	0.34	0.18	3.6	--	382	583	4.3	4.4	3,215	4,048	24	78	95	114	1.9	--
Maximum		0.030	3.31	4.9	510	183	2.50	--	11.1	5.08	87	--	11,800	12,300	60.5	59.0	24,600	26,300	911	283	292	1,240	8.9	< 30
Forest Queen	11/6/96	0.036	4.68	0.5	856	433	8.84	--	13.9	137	1,270	7	2,150	1,900	57.0	45.4	25,300	24,300	2,460	< 4	< 4	641	8.3	44
(AML_MINE_ID # 195)	12/11/96	0.039	4.69	0.4	865	446	8.54	--	13.5	132	1,220	7	2,070	1,840	55.5	44.2	24,500	23,600	2,390	< 4	< 4	599	5.4	40
	1/22/97	0.058	4.80	0.2	870	442	9.90	--	15.5	153	1,420	7	2,380	1,980	62.2	46.5	28,100	24,900	2,740	< 4	< 4	709	3.3	< 30
	2/12/97	0.036	4.44	0.4	883	450	8.49	--	13.5	133	1,220	7	2,050	2,370	54.5	44.8	24,300	24,000	2,390	< 4	4	604	8.4	< 30
	3/13/97	0.036	4.76	0.0	872	425	7.87	--	13.3	128	1,150	5	2,060	1,970	45.7	44.9	23,200	24,000	2,270	< 4	< 4	569	5.4	< 30
	4/24/97	0.022	4.57	--	895	461	9.48	--	14.7	144	1,320	6	2,060	--	50.4	--	25,500	--	2,500	< 4	--	634	2.9	< 30
	5/22/97	0.044	4.49	0.0	854	477	9.31	--	14.1	141	1,390	5	2,130	2,010	60.0	47.2	25,200	25,100	2,510	< 4	< 4	613	< 2.0	< 30

Table 7. Time-series data from adit flow from seven mine sites.—Continued

Mine	Sample date	Discharge ft³/s	Field pH	Dissolved oxygen mg/L	Specific conductance µS/cm	Sulfate total mg/L	Na diss. mg/L	K diss. mg/L	Mg diss. mg/L	Ca diss. mg/L	Sr diss. µg/L	Ba diss. µg/L	Al diss. µg/L	Al total µg/L	Silica diss. µg/L	Silica total µg/L	Fe diss. µg/L	Fe total µg/L	Mn diss. µg/L	Cu diss. µg/L	Cu total µg/L	Zn diss. µg/L	Cd diss. µg/L	Pb diss. µg/L
Detection limit--						*1*	*0.1*	*0.01*	*0.01*	*0.15*	*3*	*2*	*40*	*40*	*0.2*	*0.2*	*30*	*30*	*10*	*4*	*4*	*20*	*2.0*	*30*
Forest Queen (continued)																								
	6/5/97	0.052	3.72	0.0	920	472	8.36	--	13.6	141	1,430	5	1,890	1,840	56.7	45.3	24,000	24,300	2,420	< 4	< 4	598	4.3	< 30
	6/19/97	0.077	5.06	0.0	969	456	6.72	--	11.9	125	1,260	7	1,580	2,020	48.8	57.2	21,100	25,600	2,120	< 4	< 4	538	< 2.0	< 30
	7/18/97	0.070	4.92	0.4	934	449	8.89	--	13.3	141	1,450	6	1,920	1,870	57.9	55.2	24,300	24,300	2,350	< 4	< 4	588	3.8	< 30
	8/18/97	0.050	5.05	0.0	872	481	8.28	--	12.8	133	1,340	6	1,820	1,810	55.5	53.5	23,700	22,900	2,260	< 4	< 4	567	8.7	< 30
	9/11/97	0.036	4.64	0.0	770	475	8.86	--	13.1	133	1,320	5	1,960	1,650	58.3	49.8	24,400	22,300	2,330	< 4	< 4	605	8.0	< 30
	8/11/98	0.083	6.65	--	1,390	787	8.71	1.44	11.0	272	3,760	13	305	5,360	39.1	57.8	10,900	42,700	2,240	< 4	20	349	< 2.0	< 30
	7/29/99	0.005	5.83	3.7	1,220	746	9.53	3.09	12.2	250	2,970	19	1,450	--	42.6	--	2,380	--	2,410	< 4	--	828	112.0	< 30
	8/3/99	--	6.27	--	1,640	1,250	9.56	1.56	11.1	359	4,710	14	540	--	36.7	--	10,200	--	2,550	< 4	--	485	84.8	< 30
	8/13/99	--	6.20	3.8	1,590	1,190	11.9	1.75	12.8	409	5,360	12	705	--	44.1	--	12,100	--	2,830	< 4	--	477	86.0	< 30
	8/20/99	--	6.07	6.1	1,710	1,110	8.99	1.45	10.6	378	5,150	15	241	--	35.4	--	11,500	--	2,710	< 4	--	355	37.1	< 30
	8/25/99	--	5.65	7.5	1,770	1,010	9.56	--	10.9	393	5,500	19	244	--	36.0	--	11,400	--	2,860	< 4	--	386	32.2	< 30
	9/1/99	--	5.69	7.2	1,320	756	10.3	1.60	10.9	349	4,550	13	523	--	37.8	--	10,500	--	2,600	< 4	--	337	23.7	< 30
	9/9/99	--	5.80	9.0	1,380	746	9.99	1.45	11.7	294	3,620	10	1,120	--	41.8	--	8,610	--	2,450	14	--	545	70.7	< 30
	9/16/99	--	5.92	6.9	1,510	577	9.59	1.10	11.2	334	4,350	13	601	--	38.8	--	10,400	--	2,590	< 4	--	393	39.2	< 30
	3/30/00	0.003	5.07	8.5	622	--	7.70	1.61	11.9	93	714	17	974	--	--	--	13,400	--	2,310	14	--	559	5.4	< 30
	4/26/00	0.003	5.97	6.1	617	--	7.70	1.50	12.1	95	707	11	953	--	21.3	--	15,900	--	2,340	< 4	--	614	17.2	< 30
	6/2/00	--	5.72	3.1	685	--	7.80	1.50	12.8	106	872	9.9	1,770	--	48.6	--	19,700	--	2,270	< 4	--	679	19.5	< 30
	7/19/00	0.105	5.58	--	783	--	8.70	1.58	12.8	162	1,640	15	1,480	--	48.2	--	20,200	--	2,360	< 4	--	616	19.2	< 30
	9/20/00	0.001	6.09	4.7	733	--	8.40	1.55	10.8	124	1,130	21	70	--	44.4	--	8,240	--	2,200	< 4	--	79	9.0	< 30
Minimum		0.001	3.72	0.0	617	425	6.72	1.10	10.6	93	707	5.0	70	1,650	21.3	44.2	2,380	22,300	2,120	14	4	79	2.9	< 30
Median		0.037	5.33	1.8	889	477	8.85	1.55	12.8	141	1,405	9.9	1,530	1,935	48.2	46.9	19,950	24,300	2,400	14	12	579	9.0	< 30
Mean (n = 26)					1,059	649	8.92	1.63	12.5	202	2,339	10.6	1,348	2,218	47.1	49.3	17,655	25,667	2,441	14	12	537	26.7	< 30
Standard Deviation				3.3	357	274	1.03	0.46	1.3	106	1,646	5.0	739	1,004	9.9	5.2	7,306	5,439	191	0	11	150	31.5	--
Maximum		0.105	6.65	9.0	1,770	1,250	11.9	3.09	15.5	409	5,500	21	2,380	5,360	62.2	57.8	28,100	42,700	2,860	14	20	828	112.0	44
Mighty Monarch	3/5/98	0.044	6.43	8.1	376	124	3.58	0.53	4.34	60.7	548	23	< 40	114	13.4	14.8	102	686	786	< 4	10	458	6.0	< 30
(AML_MINE_ID # 285)	4/21/98	0.076	6.35	8.5	375	118	4.20	0.39	4.63	64.9	606	19	96	72	14.2	16.8	31	545	793	< 4	< 4	449	< 2.0	< 30
	5/6/98	0.049	7.17	8.7	373	115	3.89	0.40	4.51	62.7	581	17	90	103	13.8	16.1	64	393	803	< 4	< 4	466	< 2.0	< 30
	5/21/98	0.053	7.52	7.0	371	120	2.77	0.37	3.67	49.0	449	15	< 40	99	11.1	14.6	34	451	678	< 4	9	376	< 2.0	31
	6/8/98	0.078	6.70	8.7	376	120	3.79	0.41	4.45	60.6	566	22	< 40	141	13.5	15.4	58	471	985	< 4	6	519	3.0	< 30
	7/2/98	0.058	6.50	8.4	376	123	3.66	0.41	4.19	57.0	533	19	< 40	62	12.8	14.6	57	468	837	4	9	469	< 2.0	< 30
	7/22/98	0.081	6.60	8.6	377	120	3.45	0.43	4.53	61.2	568	18	< 40	88	13.7	15.6	44	429	869	< 4	7	447	< 2.0	< 30
	8/19/98	0.047	7.20	8.6	360	115	3.76	0.43	4.43	60.7	562	19	54	137	13.8	15.5	46	393	860	< 4	8	464	2.0	< 30
	9/24/98	0.041	6.80	6.4	359	122	3.93	0.39	4.58	63.1	584	18	< 40	77	14.2	14.7	33	364	881	< 4	5	484	< 2.0	< 30
	10/14/98	0.074	6.60	6.4	359	120	3.61	0.38	4.52	62.1	585	18	55	182	13.9	15.6	< 30	578	895	< 4	11	473	< 2.0	< 30
	11/2/98	0.044	6.18	7.1	358	123	3.35	0.38	4.39	59.2	553	16	< 40	--	13.3	--	< 30	--	906	< 4	--	483	2.2	< 30
	12/29/98	0.018	7.27	--	356	91	4.17	0.44	4.53	63.2	595	15	< 40	--	14.3	--	< 30	--	676	< 4	--	426	2.4	< 30
Minimum		0.018	6.18	6.4	356	91	2.77	0.37	3.67	49.0	449	15	54	62	11.1	14.6	31	364	676	4	5	376	2.0	< 30
Median		0.051	6.65	8.4	372	120	3.71	0.41	4.48	61.0	567	18	73	101	13.8	15.4	46	460	849	4	9	465	2.4	< 30
Mean (n = 12)					368	118	3.68	0.41	4.40	60.4	561	18	74	108	13.5	15.4	52	478	831	4	8	460	3.1	< 30
Standard Deviation				0.9	8.7	8.9	0.39	0.04	0.26	4.1	41	2.5	22	37	0.87	0.72	22	99	90	--	2	35	1.7	--
Maximum		0.081	7.52	8.7	377	124	4.20	0.53	4.63	64.9	606	23	96	182	14.3	16.8	102	686	985	4	11	519	6.0	31

SILVER BAY MINES, INC.

Entity Number: 565181-0142
Company Type: Corporation - Domestic - Profit
Address: 68 S MAIN FIFTH FLOOR Salt Lake City, UT 84115
State of Origin: UT
Registered Agent: ROBERT C LILJENQUIST S/D
Registered Agent Address:
68 S MAIN FIFTH FLOOR
SLC, UT 84115

View Management Team

Status: Expired

Status: Expired *as of 01/08/1982*
Status Description: Invol. Diss / No Renewal
Employment Verification: Not Registered with Verify Utah

History

View Filed Documents

Registration Date: 08/18/1948
Last Renewed: 02/11/1980

Additional Information

NAICS Code: 9999 **NAICS Title:** 9999-Nonclassifiable Establishment

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