History of the Sunbeam Mine, Custer County, Idaho

Victoria E. Mitchell

Staff Report 97-18
April 1997

Idaho Geological Survey
Morrill Hall, Third Floor
University of Idaho
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INTRODUCTORY NOTE

This report was prepared under a cooperative agreement with the U.S. Forest Service, Region IV, as part of a project to identify and describe inactive and abandoned mines in the state of Idaho. Work on this project included preparing detailed histories of mines in Region IV that had significant recorded production. The information in this report is from a number of published and unpublished sources in the Idaho Geological Survey's mineral property files. Where not otherwise noted, most of the mine production data is drawn from the U.S. Geological Survey's (USGS) annual volumes on *Mineral Resources of the United States* (1882-1923) and the equivalent volumes produced by the U.S. Bureau of Mines (USBM) (*Mineral Resources of the United States,* 1924-1931, and *Minerals Yearbook*, 1932 to present). Information on underground workings and mine equipment is generally from the annual reports of the Idaho Inspector of Mines (IMIR) published from 1899 to 1979. After 1974, the Mine Inspector's office was known as the Mine Safety Bureau, a section of the Idaho Department of Labor and Industrial Services. Detailed accounts of mine operations are, for the most part, drawn from the annual reports prepared by the companies for the State Inspector of Mines; these reports were required by law and the information contained in them formed the basis of the Mine Inspector's annual reports. Reports of recent developments are taken from the Idaho Geological Survey's (IGS) annual reports on the developments in mining and minerals in Idaho (from 1984 to present) or from similar reports produced by the Survey's predecessor, the Idaho Bureau of Mines and Geology (IBMG) from 1975 to 1984. Other published sources are referenced in the text. A complete bibliography is included at the end of the report. Where direct quotations are taken from source materials, the original spelling and grammar are preserved even in cases where they do not conform to currently accepted usage.

History of the Sunbeam Mine, Custer County, Idaho

Victoria E. Mitchell[1]

The Sunbeam Mine is in the Yankee Fork mining district in Custer County (Figure 1). It is located on Bismark Mountain on the south side of Jordan Creek, four miles above the creek's confluence with the Yankee Fork and 7 miles west of Custer (Figure 2). The original mill and the portal of the lowest adit are at about 7,200 feet. Other mine workings extended uphill to an elevation of about 8,000 feet. The Sunbeam is an epithermal gold deposit, with the ore occurring in stockworks and zones of mineralized tuff of the Challis Volcanics (Figure 3). Location of the ore bodies is controlled by extensive fracturing of the host rock (McIntyre and Johnson, 1985; Johnson and McIntyre, 1983, 1986). Most of the minerals in the ore zones were very fine grained, commonly too small to be identified in polished section. The Sunbeam was one of the few mines in the district where the gold content of the ore was nearly equal to the silver content (Anderson, 1949).

The Sunbeam, originally known as the Golden Sunbeam, was discovered in the late 1880s. The first claims were staked in 1879, but little work was done until around 1903, when the developers erected a mill on the property. According to Umpleby (1913), the mine was worked for several years prior to 1906, but the major work started that year after a large orebody was discovered.

In 1903, the Golden Sunbeam Mining Company built a 30 tons-per-day (tpd) milling plant, which operated with satisfactory results. (See Table 1 for companies operating at the Sunbeam). The deposit was described as a stockwork of mineralized

[1]Idaho Geological Survey, Main Office at Moscow, University of Idaho, Moscow.

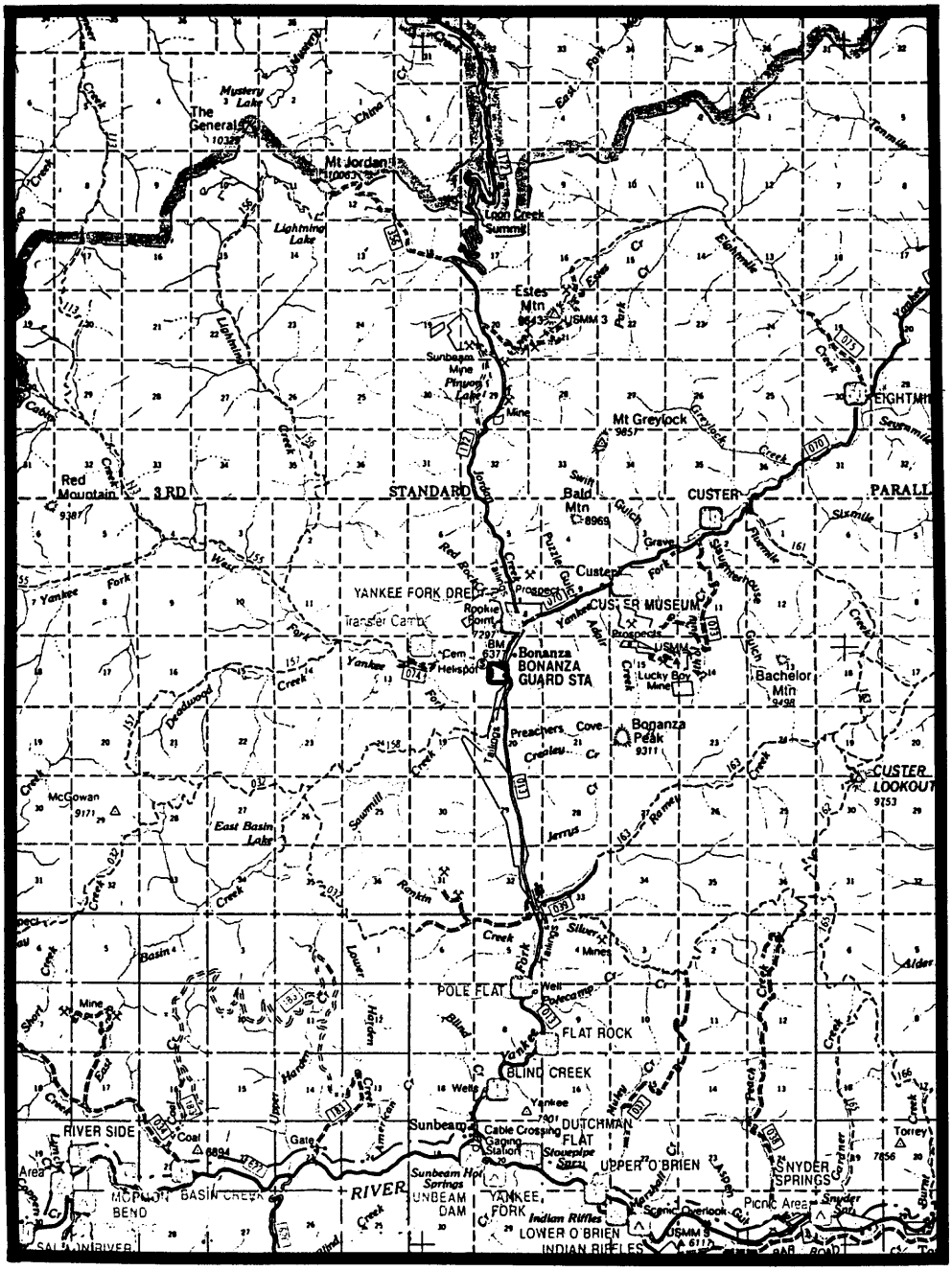

Figure 1. Location map of the Sunbeam Mine and vicinity, Custer County, Idaho (U.S. Forest Service Challis National Forest map, scale ⅜ inch = 1 mile).

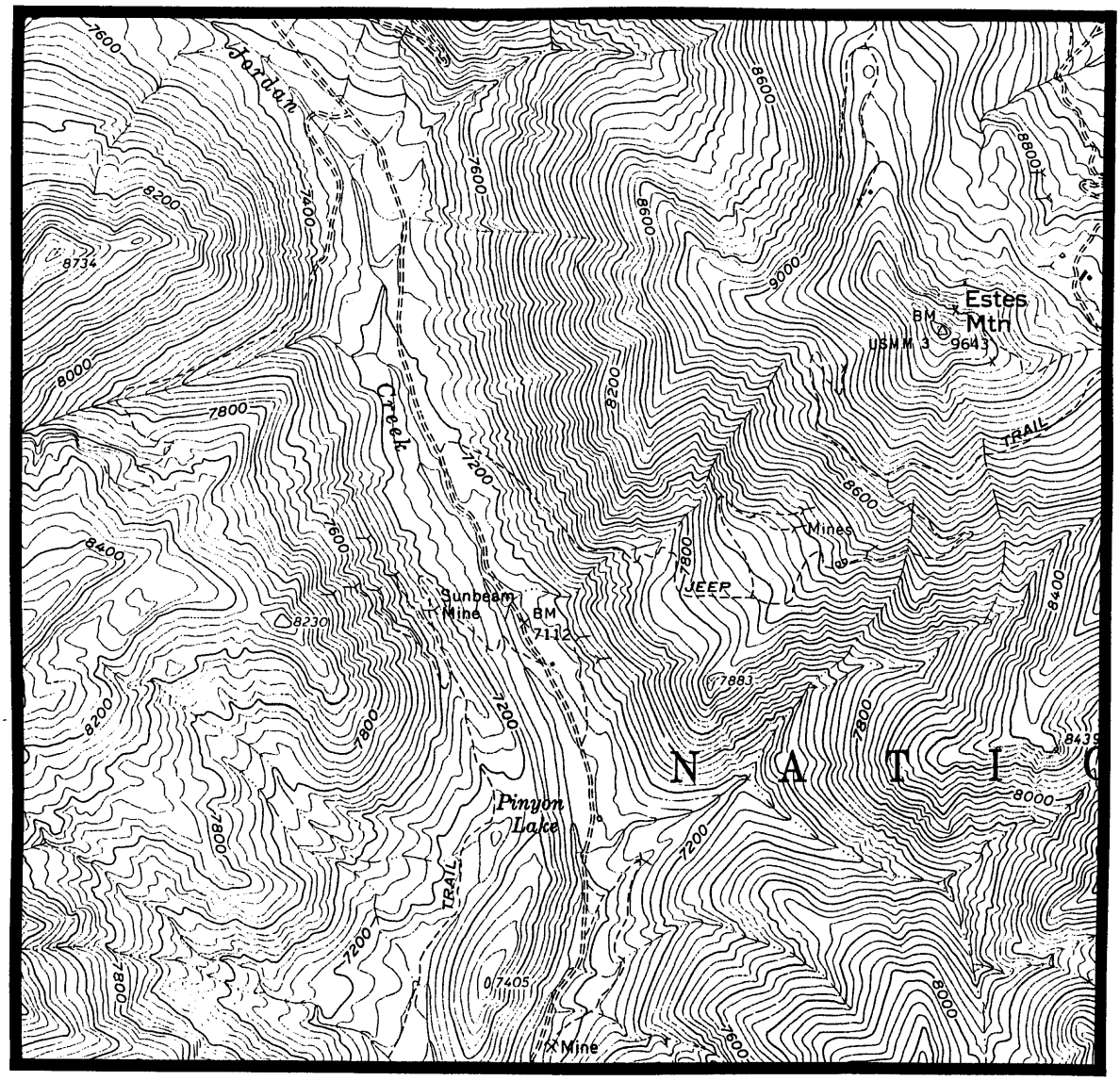

Figure 2. Topographic map of the Sunbeam Mine area (U.S. Geological Survey Custer 7.5-minute topographic map). Pinyon Lake is now the tailings pond for Hecla's Grouse Creek Mine.

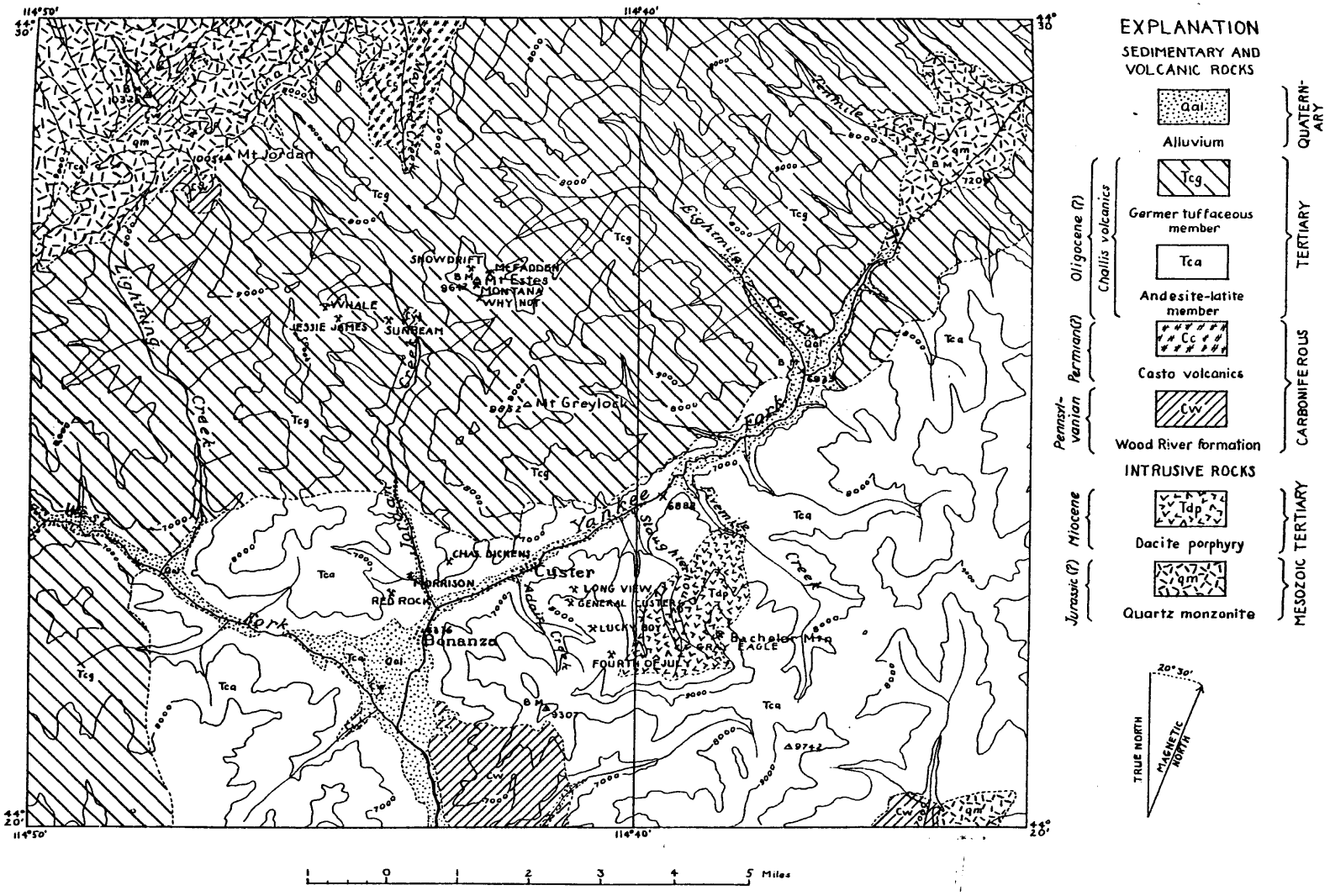

Figure 3. Topographic and geologic map of the Sunbeam Mine and vicinity (Figure 2 from Anderson, 1949).

Table 1. Companies operating at the Sunbeam Mine.

Company Name	Officer	Date Incorporated	Charter Forfeited	Year(s) at Mine
Golden Sunbeam Mining Co.	C.E. Gable, President	[1]	absorbed by Sunbeam Consol.	?[1]-1909
Sunbeam Consolidated Gold Mines Co.	C.E. Gable, President	June 1, 1909	[1]	1909-?[1]
Sunbeam Holding Co.	G. von Brecht, President; John R. Love	Dec. 7, 1915	Nov. 30, 1923	1915-1923
Custer Slide Mining & Development Co. (lessee)	R.L. Holland; G. von Brecht	July 19, 1915	1920	1918-1919
Idaho Power & Mines Co.	John R. Love, President	July 13, 1931	[1]	[1]
Sunbeam Mining Corp.	[1]	[1]	[1]	?[1]-1983
Vernon Taylor, Jr.	---	---	---	1967-?[1]
Azcon Corporation	[1]	[1]	[1]	1974-1977
Geodome Petroleum Corp.	[1]	[1]	[1]	1979-1983
Geodome Resources, Ltd.	[1]	[1]	[1]	1983-1990
CoCa Mines, Inc.	Hugh J. Metheson, President	[1]	Acquired by Hecla	1990(?)-1991
Grouse Creek Mining Co.	[1]	[1]	[1]	1990-1991
Hecla Mining Co.	Arthur Brown, President	Sept. 26, 1898	active	1991-[2]

[1]Information not available in IGS's files.
[2]Owner of record in 1995.

rhyolite with occasional stringers of high-grade material. The plant was equipped with two Elspass roller mills, each with a capacity of 25 tpd; the mill was also equipped with amalgamation plates. The Sunbeam made "a number of important shipments of gold bullion" during 1904 (IMIR, p. 55).

In 1905, development work was done on the Bismark and Daisy claims. Several mill runs were made, but the grade of the ore was very low (Luebbert, 1978).

An irregularly shaped mass of ore called the "Big Stope" was discovered in 1906. In the Daisy No. 4 tunnel, the stoped-out area originally occupied by this orebody was about 130 feet long and 75 feet wide. It extended upward for 85 feet and downward for 115 feet. The 1906 IMIR gave the following description of the Sunbeam (p. 46-47):

> This property is situated on Jordan Creek near the Montana mine and has been operated in a desultory manner for three years. It is located on a mountain mass of altered and brecciated rhyolite near one of the main eruptive centers of the district that has subsequently been fissured and permeated with gold-bearing solutions to the extent that the whole mountain side, covering an area of fully two hundred acres, carries low values in gold and silver with defined stringers and fissures of more solidified rock containing richer values.
>
> Operation of the Sunbeam prior to last spring was not very successful owing to the low values of the ore available. The property was equipped with a small Elspass mill and several runs have been made, but the ore was too low grade to pay much profit. In searching for better values, however, Mr. C. E. Gable, the manager, extended one of his tunnels into a new ore course about a year ago that contained very high grade rock and has since developed a very large shoot which, according to recent reports, has proven a width of thirty feet and a length of over two hundred feet carrying a pay streak ten feet wide which gives milling values in free gold of from fifty to one hundred dollars per ton. Several test runs have been made in the small mill on the property during the past year, demonstrating this tenor in a practical way, and resulting in the production of several thousand ounces of precious bullion, while the great body of mineral accompanying it is of much higher grade than anything formerly worked by the company. The ore is characteristic of the district. It consists of a soft porphyritic rock with fine lines and casings of blue quartz and occasional small vugs and spots of blue silver sulphide mineral. Handsome specimen ore is found in the mass richly sprinkled with light colored native gold that runs up into thousands of dollars in value per ton.

"Several thousand tons" of gold-silver ore was mined during 1906 (USGS, p. 256). Adjoining the Sunbeam, the North Sunbeam Gold Mining Company drove a long cross-cut tunnel toward the Sunbeam workings. It was hoped this tunnel would locate an extension of the "Big Stope" orebody. Development on the North Sunbeam eventually totaled about 2,000 feet (Anderson, 1949). None of the workings were open at the time of Anderson's visit.

In 1907, the main adit was 190 feet long, and the workings on the property totaled about a mile in length. The claims covered about 100 acres. Thirty men worked throughout the year on the property. Miners were paid $3.50 to $4.00 per

day, and blacksmiths and millmen, $4.00 per day. The 1907 IMIR (p. 74-75) contained the following description of the mine:

> The property is equipped with a small Elspass mill, but late last fall a Chillian mill of the Manadnock [sic] pattern of 100 tons daily capacity, was added. The property carries an immense deposit of gold bearing andesite tuff that is said to carry values ranging from $2 to $5 through a width of 500 feet. This great zone of mineral, striking into the steep slopes of Bismarck Mountain, is ideally situated for economic development and operation and it is believed that the whole mass can be handled at a profit and mined very cheaply by the "glory hole" or open-cut steam shovel method. The present operation is conducted on some richer pay courses and the property was mined underground by the overhead stoping method with square sets for a width of 30 to 60 feet along its best pay course, which is said to average $10 to $12 per ton in free gold through that great width, and yields a saving of 80 per cent of its values as free gold on the plates. The deposit is a soft, grayish yellow volcanic mud rock that contains no base minerals perceptible to the eye, excepting an occasional pebble or crystal of iron pyrite. In places, vertical fracture lines, carrying a thin blue selvage, apparently due to movement, are associated with exceptionally high values, and it is no trouble to select samples that will pan coarse native gold at the rate of 25 cents to 50 cents a pound. The gold is light colored, due to a natural alloy of silver, and is worth about $9 or $10 per ounce. Some kidneys of pure brittle silver have been found in the upper workings of the mine and there is no telling what development may result in on a property of this kind, as bonanza assays are found along its strike for several hundred feet in length; with further development at depth, it may lead to some sensationally rich ore.

The milling plant was equipped with "a 6-foot Monadnock mill of a daily capacity of 100 tons and with canvas tables for catching the pyrite containing gold and silver" (USGS, p. 296). During the year, the mine sent gold and silver bullion to the mint and made one shipment of concentrate to Salt Lake City. The bullion contained about an ounce of silver for each ounce of gold.

The Sunbeam was the chief producer in the district in 1908. The ore shoot had increased in width and was 60 feet wide on the 400-foot level. The ore being mined averaged $10 to $12 per ton, and a large reserve of low-grade material was present on the property. The mine more than doubled its gold output during 1908 and regularly shipped bullion. Nearly three-fourths of the gold was recovered by amalgamation, and only a small amount of concentrate was shipped. The tailings were saved for future cyanide treatment. The capacity of the power plant was 75 horsepower.

During 1909, the Sunbeam was again the largest producer in the district. The company started building a dam on the Salmon River at its confluence with the Yankee Fork to generate electricity. This project was to have made at least 1,000 horsepower available to the Sunbeam and to other mines in the area. The 1909 IMIR (p. 47) described the milling process at the Sunbeam as follows:

> The mill at the present time consists of two 6-foot Manadnock [sic] mills, the gold being saved upon amalgamation plates and the tailings passed over canvas tables. An

> 82 per cent saving is made upon the plates, and, with the saving made upon the tables, brings the total saving up to about 85 per cent. The concentrates run about $350 per ton, the ratio of concentration being 1,000 to 1. The mill at the present time is being driven by steam power, but as soon as the power plant, which is being constructed by this company on the Salmon River at the mouth of the Yankee Fork, is completed the mill will be operated by electricity. This power plant will have available 1,500 horse power and will supply several other properties in this district, in addition to the company's needs.

The mine was developed by three tunnels to a depth of 450 feet. A "glory hole" was being worked at the surface; the ore from it was dropped to the No. 1 tunnel and then taken through the No. 3 tunnel to the mill. Results of an extensive sampling program were said to show average values sufficient to "justify milling the bulk of the entire rhyolite deposit if a large mill were available" (1909 IMIR, p.47). A railroad up the Salmon River from Salmon, discussed but never built, was expected to contribute to the profitability of the mines in the district.

The company spent the first part of 1910 completing its dam on the Salmon River and constructing the first 500-ton unit of a 2,000-horsepower hydraulic electric plant. A new mill building was completed and two 75-tpd Monadnock mills were added, which gave the plant a total capacity of 300-350 tpd, with room to install two more mills.

The Sunbeam Mine and the new power plant were idle in 1911, although the mill operated during May and June. The mine was closed in June and the company was placed in receivership. According to Lockard (1970), the mine was closed because of a trespass suit filed against the company by the North Sunbeam Mining Co. Debts incurred to finance the new power plant and mill were also a major factor in the closure (Luebbert, 1978). Lessees processed old tailings at the Sunbeam mill during September and October 1912. Similar operations were carried out in 1913 and 1914. The tailings were treated by cyanidation. Also during 1914, an aerial tram was built to connect the Montana Mine, on the opposite side of Jordan Creek, with the Sunbeam mill. The 1918 and 1919 company reports to the Idaho Mines Inspector stated that the mill was leased to the Custer Slide Mining and Development Co.

The 1920 annual report said no work had been done on the company's property for two years "because of legal entanglements and for other reasons." By 1922, the old mine workings were inaccessible. In 1933, Idaho Power & Mines Co. (the owner of the Sunbeam and Montana mines) had both properties up for sale.

Old tailings from the Sunbeam dumps were treated by cyanidation during 1933 and by flotation in 1934. Minor production was recorded for the Sunbeam in 1936.

In 1946, plans were made to reopen the mine (Anderson, 1949). During 1947, a new jig-flotation plant was installed and work began on reopening the main tunnels. The mine produced until 1950 (McHugh and others, 1991).

When Anderson visited the Sunbeam in 1947, development on the Golden Sunbeam consisted of five tunnels, two intermediate levels between the two lowest tunnels, and several glory holes (Figure 4). The Daisy No. 3 tunnel was 800 feet

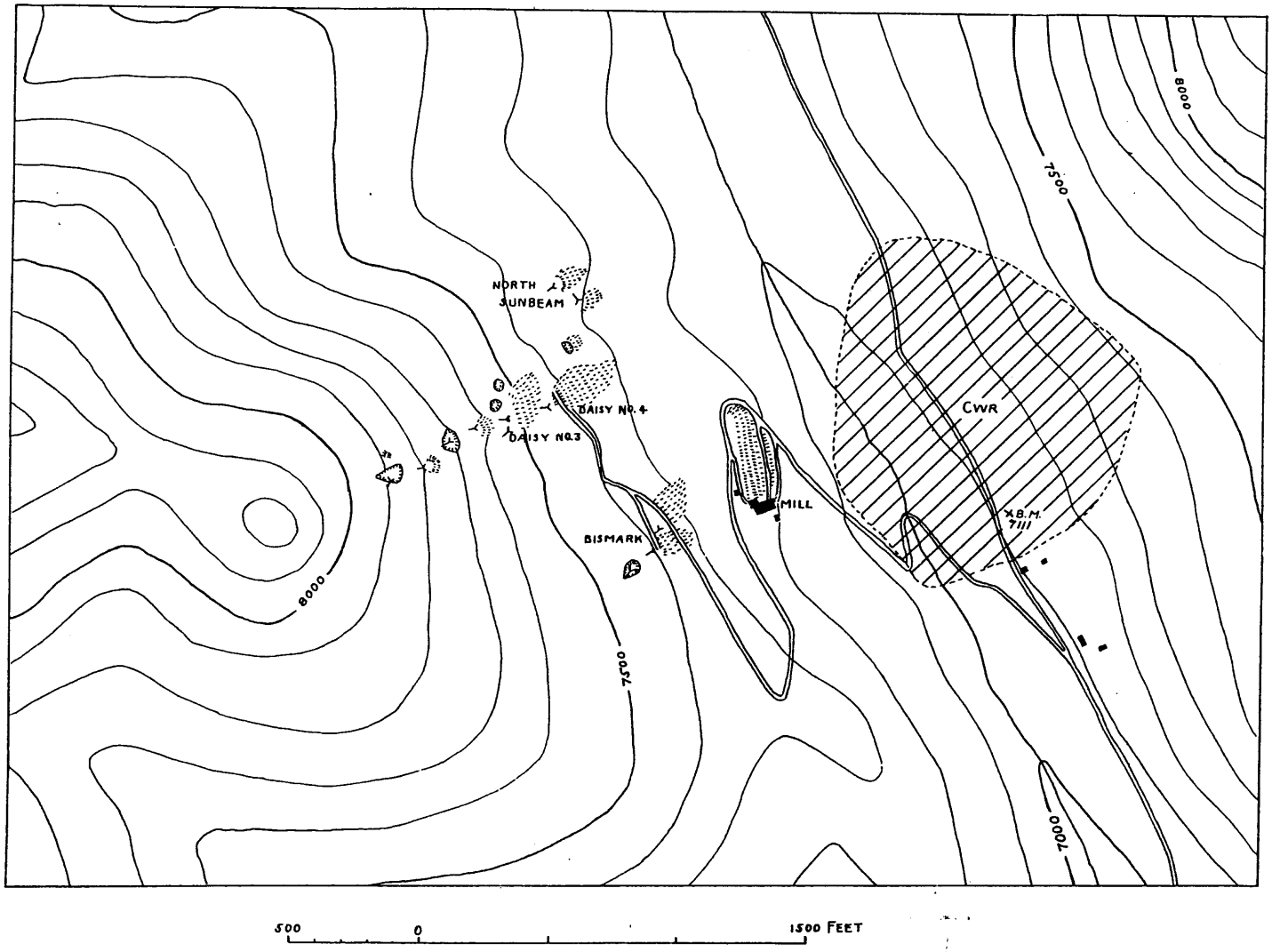

Figure 4. Geologic and topographic map of the workings at or near the Sunbeam Mine, c. 1947. Ruled area is outcrop of Pennsylvanian-Permian Grand Prize Formation (Figure 13 from Anderson, A. L., 1949, Idaho Bureau of Mines and Geology Pamphlet 83).

long, and the Daisy No. 4 tunnel was 1,000 feet long (Figure 5). The 1,200-foot No. 5 tunnel, which opened at the same elevation as the mill, was being reopened, but all the other workings were caved. The No. 2 tunnel had several hundred feet of branching tunnels. The top glory hole was about 75 feet long, 50 feet wide, and 50 feet deep at its deepest point. It was connected to the tunnels below by raises. The workings on the adjacent Bismark claims consisted of two caved tunnels and a small glory hole. Anderson estimated the total workings at around 6,000 feet.

Vernon Taylor, Jr., of Denver, Colorado, optioned the Sunbeam claims in 1967. Taylor began an exploration program to determine whether the mine could be worked profitably (Lockard, 1970).

The Sunbeam was evaluated in 1968 and 1969 under the USBM's Heavy Metals Program. The mine area was extensively sampled and drilled. The data were analyzed to delineate the potential gold resource and to determine the best site for an open-pit mine. Results indicated an inferred resource of over 82 million tons of mineralized rock averaging $1.07 per ton. Mining the deposit was not considered economically feasible under the current market conditions and with the available technology.

Azcon Corporation had five men doing exploration work at the mine from 1974 to 1977. Core from three of Azcon's drill holes was by the U.S. Geological Survey (Johnson, 1987).

In 1979, Geodome Petroleum Corp. acquired the Sunbeam group for exploration and development. In 1980, Sunbeam Mining Corp. (a subsidiary of Geodome Petroleum Co.) constructed three heap-leach pads to test the feasibility of a heap-leach cyanide operation on the low-grade gold ores in the area; each pad tested a different configuration. One pad tested the mine-run ore; the second pad used ore crushed to ½ inch; and the third pad tested ore crushed to ½ inch that had been run through a trommel to separate the coarse gold. The pilot testing used 10,000 tons of ore. The company also put up a building to house gold recovery equipment. The plant used a Merrill-Crowe zinc-cyanide extraction process. A trommel helped separate clay from the ore, and coarse gold was recovered with a sluice box and washing plant.

Sunbeam Mining Company did little new work on the project during 1982 while it awaited results of an environmental analysis by the U.S. Forest Service. A cyanide spill in the spring caused concern, although the cyanide was neutralized and no damage resulted. The spill prompted the Idaho Conservation League to request that the leach pad be moved to a safer site.

In 1983, Geodome Resources (formerly Geodome Petroleum) assumed control of the Sunbeam property. Between 1968 and 1983, various companies and government agencies had expended a total of almost $3.5 million on the property. Included in this work was about 72,000 feet of drilling that was done to evaluate the deposit. Reserves were estimated at 8.3 million tons, with a grade of 0.051 ounce per ton (oz/ton) of gold.

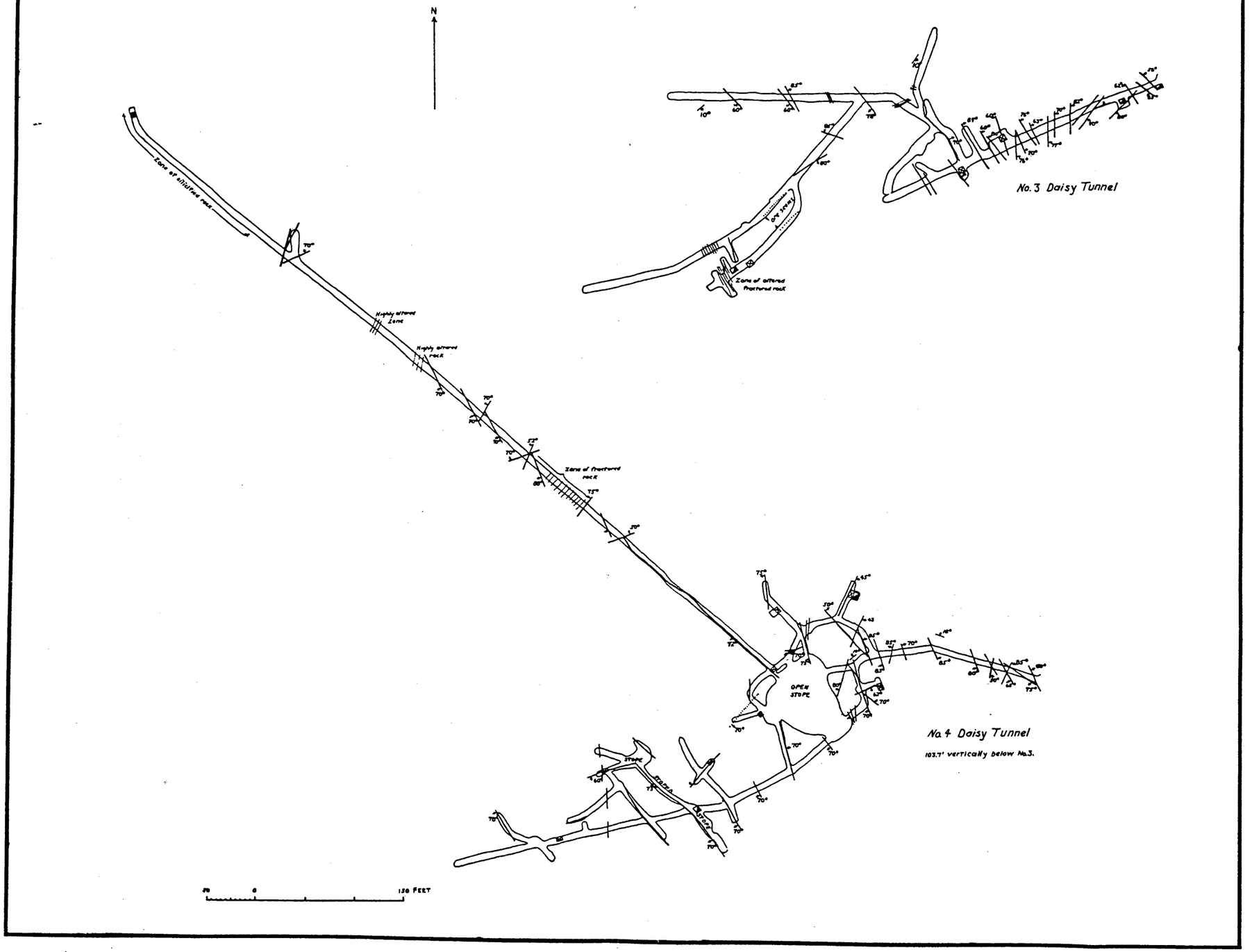

Figure 5. Geologic sketch map of the Daisy No. 3 and No. 4 levels of the Sunbeam Mine (c. 1947). Heavy black lines show faults (Figure 14 from Anderson, 1949).

Geodome did detailed exploration work and mine planning during 1984. The company made a stock offering at year's end to raise funds for the vat-leach operation. Mining at the open-pit mine was planned at 2,000 tpd, with a projected 10-year life span. Proven and probable reserves were 9.2 million tons, averaging 0.30 to 0.04 oz/ton of gold. Annual production was to be about 29,000 ounces of gold.

Production at the Sunbeam was deferred for a year in 1985 while the company filed operating plans and obtained the necessary permits. In 1986, the company built a bridge over Jordan Creek, completed a road to the mine site, and conducted some drilling, but production was again deferred until the final approval was received. In March 1988, the Environmental Protection Agency approved Sunbeam's pollution-discharge-system permit, the last remaining hurdle to starting the mine. The National Wildlife Federation appealed the decision, arguing that the EPA did not have authority under the Clean Water Act to grant the permit. The appeal again slowed development of the mine.

Design work for the project was nearly complete in 1988. The company raised $20 million during the year to finance the construction of the mine and mill. Three of six sediment ponds were excavated. Plans called for operating the mine for ten months each year to avoid problems with spring runoff. The company also conducted a drilling program on Grouse Creek, to the north of the Sunbeam, with encouraging results. Mineralization was found in fourteen of twenty holes. In November, CoCa Mines, Inc., acquired Geodome Resources for stock warrants and shares valued at $13 million.

An injunction by the National Wildlife Federation and other environmental groups again delayed starting the mine in 1989. These groups objected to the company using the Pinyon Basin wetland as part of the mining operation. The drilling program on Grouse Creek increased reserves there, and the company considered linking the two deposits together. The Sunbeam reserves were 3.3 million tons of 0.077 oz/ton gold, and the drilling on Grouse Creek added 4.4 million tons of 0.04 oz/ton gold and 1.94 oz/ton silver.

In 1990, Grouse Creek Mining (a subsidiary of CoCa Mines, Inc.) drilled 34 holes at the Grouse-South deposit. The company did geotechnical work on the waste dump and plant sites, and reclaimed the Sunbeam test heap-leach pad. The property contained 3.2 million tons of 0.082 oz/ton gold at the Sunbeam mine and 4.9 million tons of 0.044 oz/ton gold at Grouse Creek. Construction costs for the open pit mine and mill were estimated at $46 million. Annual production was projected at 75,000 ounces of gold and 350,000 ounces of silver during the first three years of operation. About 3,000 tpd would be mined from an open pit with a 4:1 strip ratio. CoCa planned on building a conventional countercurrent decant mill with zero discharge instead of the vat leach process originally proposed by Sunbeam Mining.

Hecla Mining Company took over operation of the Grouse Creek project in 1991 after Hecla merged with CoCa Mines. Work for the year consisted of

permitting, and exploration and development drilling. A Supplemental Draft Environmental Impact Statement was released in September. The revised mine plan called for enhancing wetlands on lower Jordan Creek to compensate for Pinyon Basin, resulting in no net loss of wetlands for the area. Construction was scheduled to begin in 1992, at an estimated cost of $40 million. Plans called for employing 150-200 people during construction and about 100 during normal operations, with an annual payroll of about $4 million. The proposed 3,000-tpd mill would use a carbon-in-pulp circuit to process the ore. About 3,600 tons of ore and 17,000 tons of waste rock would be moved daily. Annual production was projected at 70,000 ounces of gold and 1.5 million ounces of silver. Reserves at the end of 1990 were 3.3 million tons of 0.075 oz/ton gold in the Sunbeam deposit and 6.4 million tons of 0.049 oz/ton gold and 2 oz/ton silver at Grouse Creek. During 1991, the company did 44,000 feet of reverse circulation and 8,000 feet of core drilling.

Hecla continued its development work during 1992. The operating plans called for two pits, one on Sunbeam Mountain and the other on Grouse Creek. The mines were expected to yield 70,000-100,000 ounces of gold and 400,000 ounces of silver annually for 8 years. Exploration drilling during the year located high-grade mineralization outside the area of the planned pits. All necessary federal and state permits were obtained to begin mining.

Construction on the Grouse Creek Mine, with a projected cost of about $85 million, began in 1993. Industrial Contractors Corporation from Missoula was hired to build the surface plant. Reserves were 831,000 ounces of gold and 17.5 million ounces of silver. This was sufficient for 8 years of operation with production at a rate of 100,000 ounces of gold and 1.6 million ounces of silver a year. Production costs were estimated at $155 per ounce of gold, among the lowest in the world. Exploration continued on the rest of Hecla's 32,500-acre holdings in the area. The deposit is hosted by Challis Volcanics and syntectonic black shale. It is a classic zoned epithermal deposit, and the ore is in stockwork and breccias. Ore minerals include native gold, electrum, pyrargyrite, native silver, and a number of silver sulfosalts.

Construction and development continued in 1994. In February, Hecla sold a 20 percent share of Grouse Creek to Great Lakes Minerals, Inc., for about $35 million. Great Lakes also had an option to buy another 10 percent of the mine. A deep high-grade gold zone (Grouse South) was discovered during an extensive winter drilling program early in the year. Five holes had values of up to 3.32 oz/ton over 25 feet, while one hole returned 15 feet grading 48.244 oz/ton gold and 39.48 oz/ton silver. The high-grade zones are under the main orebody and will be by mined through two declines at a rate of 400 tpd. (Figure 6 is an overview of the mine area.) Mining started in the Sunbeam pit at a rate of 6,000 tpd, and the first doré bullion was poured on December 20. By the time the mill started up on October 25, Hecla had invested $140 million in the project. The mill uses gravity separation, vat leach, and carbon-in-pulp circuits (Figure 7). In September, a 30,000-cubic-yard rockslide at the

Figure 6. Overview of the Grouse Creek Mine (1995). The Sunbeam pit is darker brown area in the center of the photograph. The mill is at the lower right corner of the tailings pond. The Grouse Creek pit will be located around the hill from the Sunbeam pit (right center of the photograph). The equipment on the wide part of the lowest bench (right center, below the Grouse Creek pit) marks the declines for the underground operation (Idaho Geological Survey photograph by Earl H. Bennett).

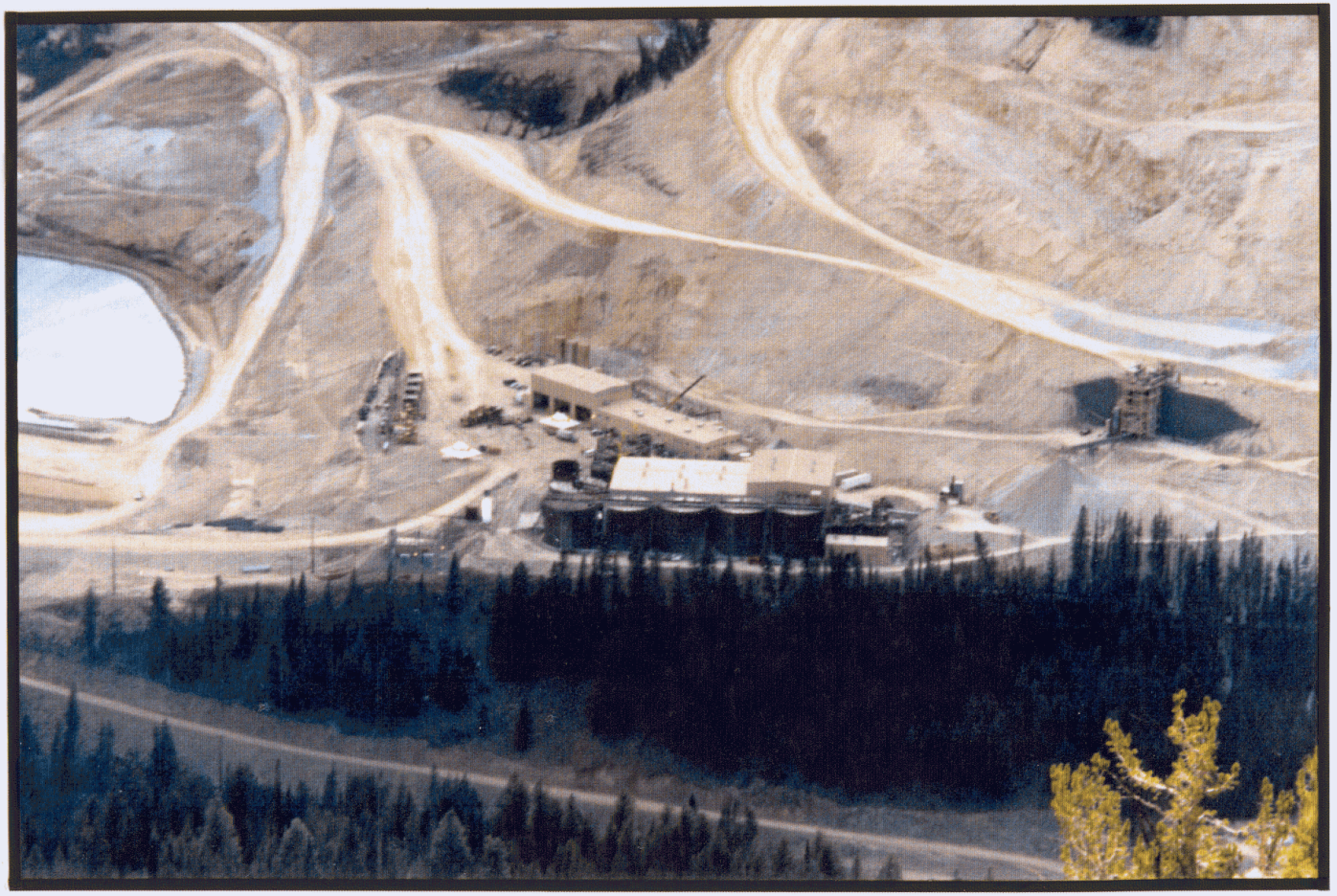

Figure 7. Hecla's Grouse Creek mill, garage, and office complex (1995). The primary crusher is on the right side of the photograph (Idaho Geological Survey by Earl H. Bennett).

mine partially blocked Jordan Creek. Hecla quickly constructed a 600-foot bypass channel to divert Jordan Creek around the toe of the slide.

The Grouse Creek Mine went into full production during 1995 and was dedicated on August 10 (Figure 8).

From 1904 to 1942, recorded production for the Sunbeam Mine from 43,582 tons of ore and 8,115 tons of reprocessed tailings was 18,162 ounces of gold, 23,899 ounces of silver, and 50 pounds of copper. Production records for the years after 1942 are not available.

Figure 8. Dedication ceremony for Hecla's Grouse Creek Mine on August 10, 1995. Art Brown, Hecla's president and CEO, is standing at the microphone. One of the mine's 90-ton Caterpillar trucks is behind the speakers' stand (Idaho Geological Survey photograph by Earl H. Bennett).

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