History of the Pope-Shenon Mine, Lemhi County, Idaho

Victoria E. Mitchell

Staff Report 97-15
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 The information in this report is from a number of published and unpublished sources in the Idaho Geological Survey's mineral property files.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 Pope-Shenon Mine, Lemhi County, Idaho

Victoria E. Mitchell[1]

The Pope-Shenon Mine is in the Eureka mining district in Lemhi County near the north end of the Lemhi Range about 8 miles southwest of Salmon (Figures 1 and 2). This area is in the Idaho copper-cobalt belt. The deposit is in mineralized shear zones in fractured and altered, dark green, impure quartzites and quartzitic argillites of the Yellowjacket Formation (Figure 3), and the ore is in part stratabound. The rocks generally strike about N. 30° E. and dip between 10° E. and 35° E., although the attitudes vary somewhat (Ross, 1925). The mine had both primary and oxidized ore. The dominant minerals in the primary ore were chalcopyrite, pyrite, delafossite (a rare copper-iron oxide mineral), sphalerite, magnetite, quartz, mica, and chlorite. Much of this ore showed signs of incipient oxidation and contained malachite, azurite, cuprite, and a little native copper (Anderson, 1943).

Copper was discovered in parts of the Eureka district as early as the 1850s, but most mining was done after 1911 (Anderson, 1943). In the early 1890s, Lige Stroud and James Fenning located claims for a gold prospect in the area. Two years later, Thomas Pope, Red McDonald, Thomas Andrews, and Richard Clark located two copper claims; sometime later, Philip Shenon acquired a two-thirds interest in the property (Ross, 1925). (Table 1 lists companies and individuals operating at the mine.)

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

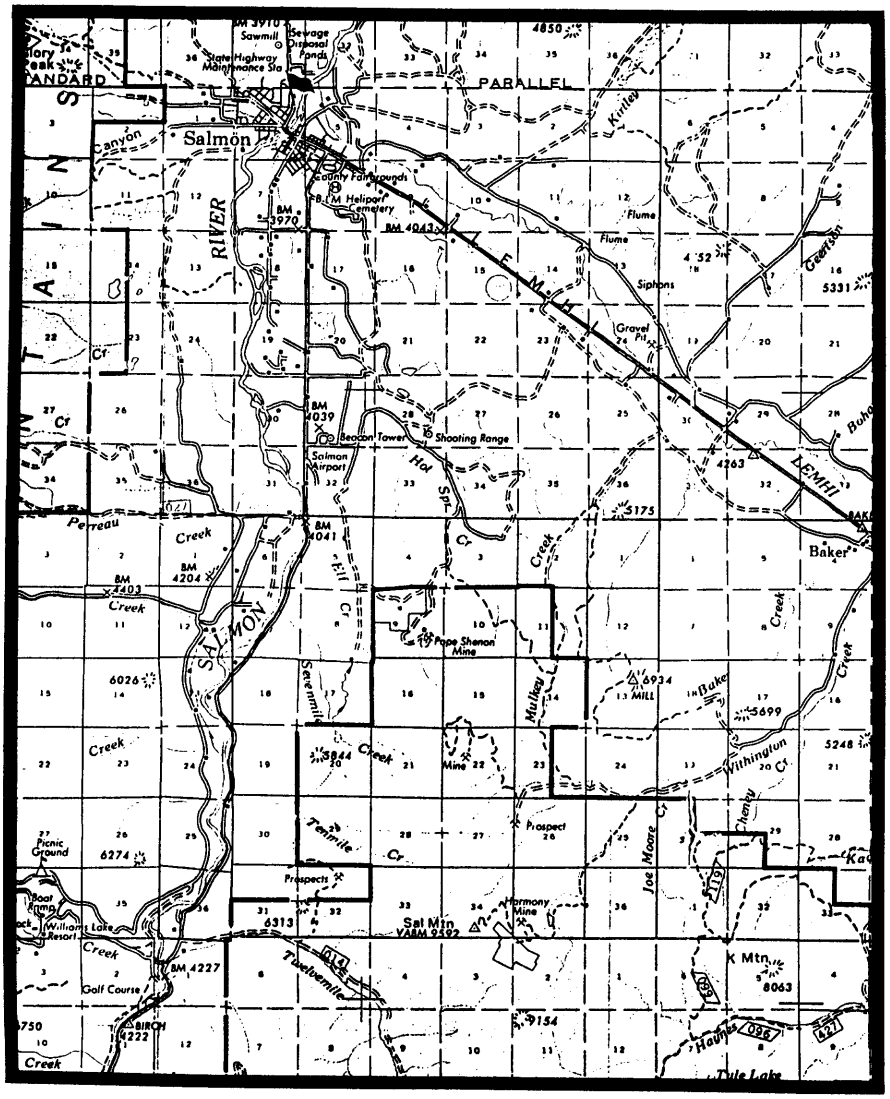


Figure 1. Location of the Pope-Shenon Mine and vicinity, Lemhi County, Idaho (U.S, Forest Service Salmon National Forest map, scale ⅜ inch = 1 mile).

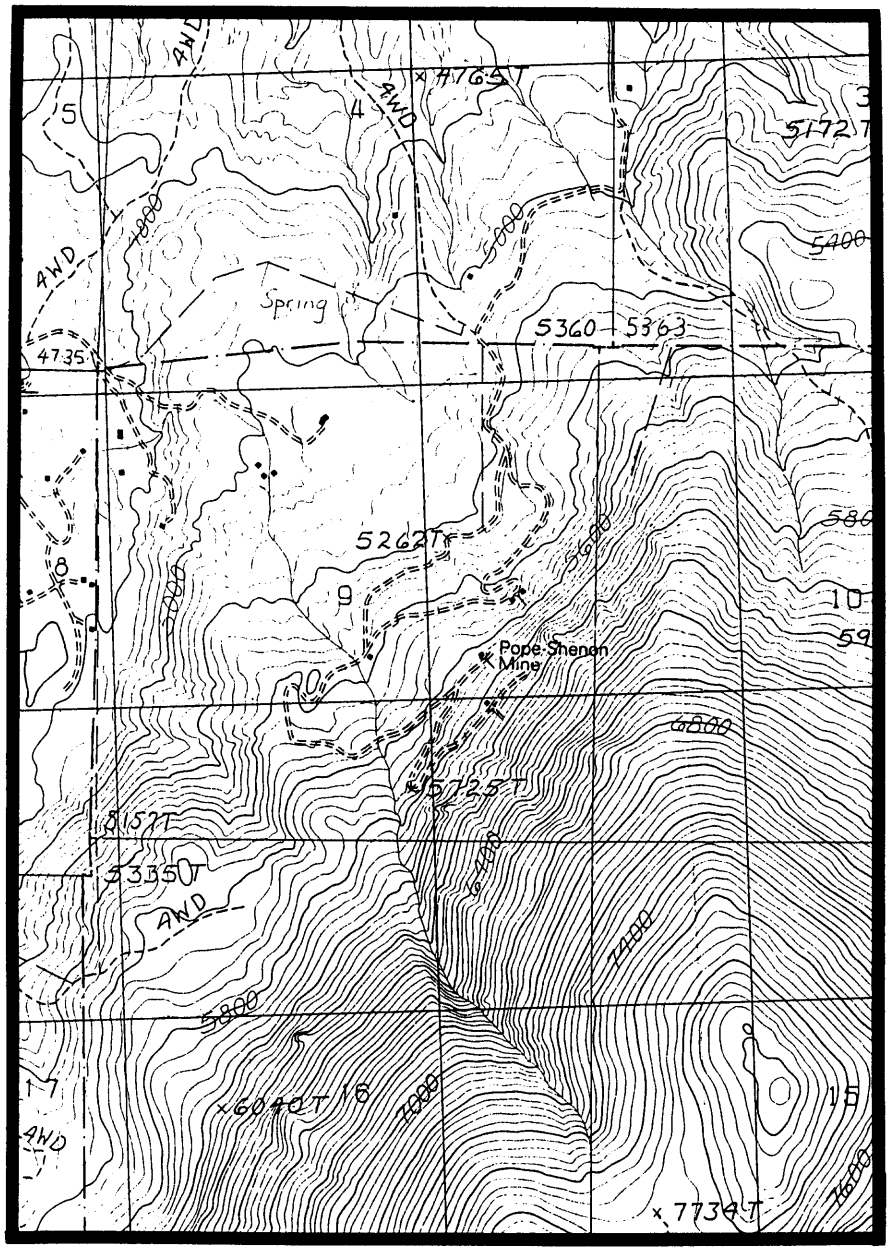


Figure 2. Topographic map of the Pope-Shenon Mine and vicinity (U.S. Geological Survey Sal Mountain 7.5-minute topographic map).

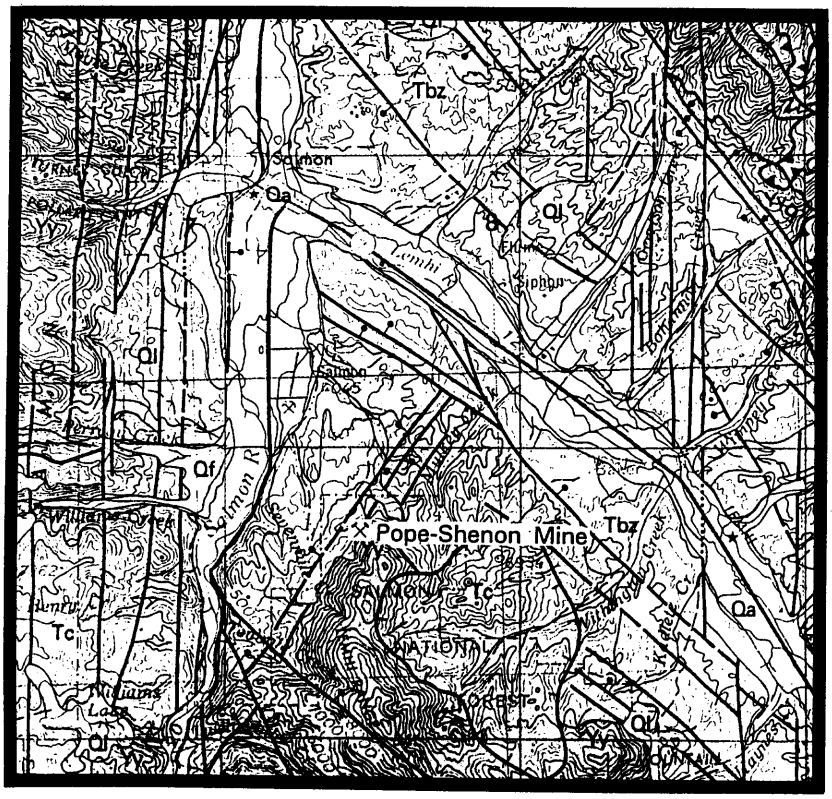


Figure 3. Geologic map of the Pope-Shenon Mine and vicinity, Lemhi County, Idaho. Yy = Middle Proterozoic Yellowjacket Formation; Yl = Middle Proterozoic Lemhi Group; Yg = Middle Proterozoic porphyritic granite; Tq = Tertiary monzogranite, granodiorite, quartz monzodiorite, and related intrusive granitic rocks; Tc = Eocene Challis Volcanics; Tbz = Pliocene to Eocene Bozeman Group and related valley fill rocks; Ql = Quaternary landslide deposits; Qa = Quaternary alluvium. Heavy lines are faults: ball-and-bar symbols mark downdropped blocks on normal faults; sawteeth are on upper plates of thrust faults (Ruppel and others, 1993).

Table 1. Companies and individuals operating at the Pope-Shenon Mine.

Company Name	Officer	Date Incorporated	Charter Forfeited	Year(s) at Mine
T. Pope, R. Clark, R. McDonald, and T. Andrews	---	---	---	"early 1890s" -?
Philip Shenon (⅔ interest)	---	---	---	1
Langsdorf and Company	1	1	1	1908
Pope-Shenon Mining Co.	R.H. Winder, Pres.	December 3, 1917	November 30, 1927	1917-1927
A. Boulais (lessee)	---	---	---	1922
Snow Brothers (lessees)	George A. and William M. Snow	---	---	1922-1924
Idaho Porphyry Copper Mining Co. (lessees)	E.J. Kearns, President/Manager	filed in Idaho: November 30, 1925	1926	1925-1926
Winder-Stillman Copper Co.	R.H. Winder, President	March 2, 1928	1930	1927-1930
Winder-Stillman Consolidated	J.W. Jones	1929 (?)	1935 (?)	1929-?
Fred Brough	---	---	---	1937-1938
Joe Jones	---	---	---	1939
Salmon Development Co.	1	1	1	1942
various lessees	---	---	---	1955-1958
Centrida Mines, Inc.	C. Whelan, Secretary	May 25, 1953	not active: 1963	1953-?
Desert Peak Mines, Ltd.	1	1	1	1969
Salmon Copper Mines, Inc.	J. Howard Sims	Dec. 9, 1968; reinstated Sept. 4, 1974	1	1969-1971
Mines Exploration	1	1	1	1972
Grandview Metals	1	1	1	1973-1978
RCO Resources	1	1	1	1989

[1]Information not available in IGS's files.

In 1908, Langsdorf and Company shipped 21 tons of hand-sorted ore from the property to the smelter at Anaconda, Montana (Anderson, 1943, 1956). Around 1917, the mine was taken over by a group of people from Salt Lake City (Ross, 1925). In that year, the mine made a shipment of oxidized, hand-sorted ore.

A carload of copper carbonate ore was shipped in 1918 by the Pope-Shenon Mining Co., and the company began making plans made for a volatizing plant to treat the ore. Development at the mine consisted of several adits driven on the vein.

The Pope Shenon shipped several hundred tons of sulfide copper ore in 1919, but the company spent most of its efforts constructing a 50 ton-per-day (tpd) mill. According to the 1919 IMIR (p. 97-100):

> Development progress during the year at several new Lemhi County copper properties decidedly enhance my former predictions of the ultimate importance of these interesting ore courses as an added source of Idaho copper production. The most interesting feature of this progress is the installation at the Pope-Shenon Mine, eight miles south of Salmon City, the terminus of the Gilmore & Pittsburgh Railway, of a new metallurgical innovation for the treatment of sulphide ore by volatilization by which the contents of the ore is reduced to metal on the ground without direct smelting of the ore. This process is known as the Bradford process and has been developed on a practical scale with an experimental plant of several tons daily capacity at the co-operative research station of the U. S. Bureau of Mines at the University of Utah.
>
> The plant now being installed, a progress cut of which is illustrated on an adjoining page [Figure 4], is designed for a daily capacity of 50 tons of ore and in December was 90 per cent completed [Figure 5]. By this process the ore is crushed to a six-mesh size, mixed with cheap chlorides such as common salt at the rate of one pound of the salt to one pound of metal contents of the ore and roasted at a temperature of 700 or 800 degrees. The metallic fumes developed from this roast are precipitated as chlorides by a Cottrell electrical separator. Crude oil distillate is used in the furnace and the collected metallic chlorides, melted down to metal in a small furnace on the ground and a recovery of 85 to 90 per cent of the ore values has been made in numerous experimental tests. If this substantial practical test is a success it will probably prove the opening wedge to the utilization of base ore resources carrying excellent precious values in the several other districts of Idaho where the values will better stand the freight cost of the chloridizing mixtures than they would the crude ore.
>
> The Pope-Shenon Mine has been quite extensively developed with a series of adit tunnels driven on the vein. The lowest tunnel is 850 feet long and the inside 500 feet of its length is in continuous ore varying from 5 to 20 feet wide and said to average three to six per cent copper in the form of copper carbonates, oxides, chalcocite and at the deepest point penetrated, which has a face depth almost equal to the length of the tunnel, primary chalcopyrite mineral is commencing to show strong. The vein is a pronounced sheared fissure nearly vertical with no defined walls, but more of a zonal type of fissuring that cuts the structure of the enclosed silicious Pre-Cambrian schist formation at a sharp angle and the economic limit of the values fading gradually from the pronounced central fissure.
>
> In the progress of this deeper development during the year 12 carloads of ore were shipped aggregating a total of 360 tons that contained an average gross value of 12 per cent copper. The ore is decidedly a clean copper ore and should be especially adapted, if any ore is, for treatment by the new process being installed in which respect the plant has an excellent chance of success in its initial workout on a substantial practical scale. In excavating for the foundation of this new mill another zone of copper carbonate

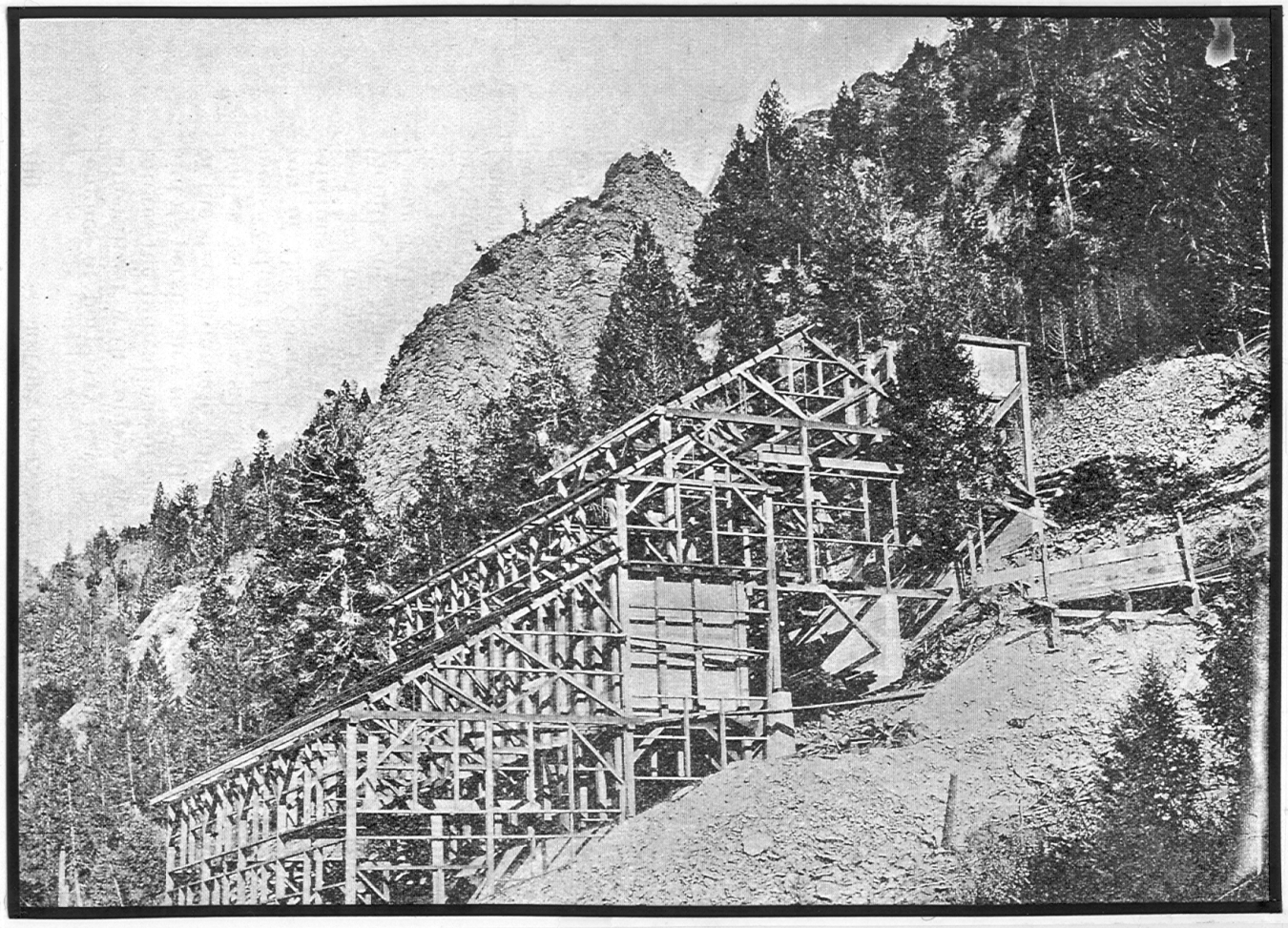


Figure 4. Half-finished mill building at the Pope-Shenon Mine. When finished, this structure housed the Bradford process mill (page 99 from Bell, R.N., 1920, Twenty-first Annual Report of the Mining Industry of Idaho for the Year 1919).

Figure 5. Pope-Shenon mill (date unknown) (Idaho Historical Society photograph).

stained rock was encountered fully 100 feet in width that it is believed may carry commercial values on further development.

Two pronounced porphyry dikes traverse the steep mountain slope a few hundred feet north and south of the main zone of fissuring now developed that converge as they go east and in the lower tunnel some interesting tongues of porphyry have been disclosed that are richly mineralized with copper values and affording decidedly interesting indications of the genetic source of the mineral and its persistency to great depth. The general formations of the steep mountain uplift in which these interesting ore bodies occur, is a silicious Pre-Cambrian sediment of immense extent that I believe is related to the Prichard horizon of the Coeur d'Alene series. It varies from thin silicious schist to blocky black and flaggy quartzite rock and has many phases of very close resemblance in the vicinity of Muaary [sic] and the Nine Mile bonanzas of the Coeur d'Alene district.

Work on the mill continued in 1920, and some experimental runs were made. The IMIR stated (p. 10), "The process is still in progress of elaboration with promising prospects of ultimate success." The milling equipment had a capacity of 200 tpd, but the rotary kiln and the Cottrell precipitator could only handle 50 tpd (Bradford, 1921; Figures 6 and 7). Work continued on the mill in 1921, but operations were apparently not as successful as the original experiments and the volatilization process was abandoned (Ross, 1925).

Between April 1 and June 1, 1922, the mine was leased to A. Boulais, who worked the property with an average of four men. George A. and William M. Snow leased the property on the first of August. They converted the mill into a gravity concentrator equipped with jigs, tables, and a small oil-flotation unit (Ross, 1925). The ore came from a stope above the No. 5 level, which was connected at that time to the mill by a tramway (Anderson, 1943). The mine had a large tonnage of ore blocked out. The lessees maintained continuous production and shipped several hundred tons of copper concentrate. The mine had five tunnels, one shaft, and two raises, for a total development of about 1,800 feet. (Table 2 shows development work and employment at the mine.) The lengths of the tunnels were: No. 1, 125 ft.; No. 2, 125 ft.; No. 3, 387 ft.; No. 4, 100 ft. long; and No. 5, 840 ft. The inclined shaft was 35 feet long. Mine equipment included a 12x10[1] Ingersoll-Rand electrically driven compressor and a 50-horsepower gasoline engine.

The Pope-Shenon was among the top four copper producers in the state in 1923, and Snow Brothers maintained continuous production all year. Between September 25, 1922, and August 14, 1923, 940 tons of concentrate averaging 22 percent copper were shipped to a Salt Lake City smelter (Ross, 1925). (Table 3 shows mine output and economic data for the mine.) According to the USGS report for 1923 (p. 393):

The Pope Shenon mine was operated by lessees, and several thousand tons of copper ore was treated in the 50-ton concentration plant. The concentrate is hauled 10 miles northwest to Salmon, on the Gilmore & Pittsburgh Railroad. The mine is said to

[1]The diameter of the piston in the compressor and the length of its stroke, in inches.

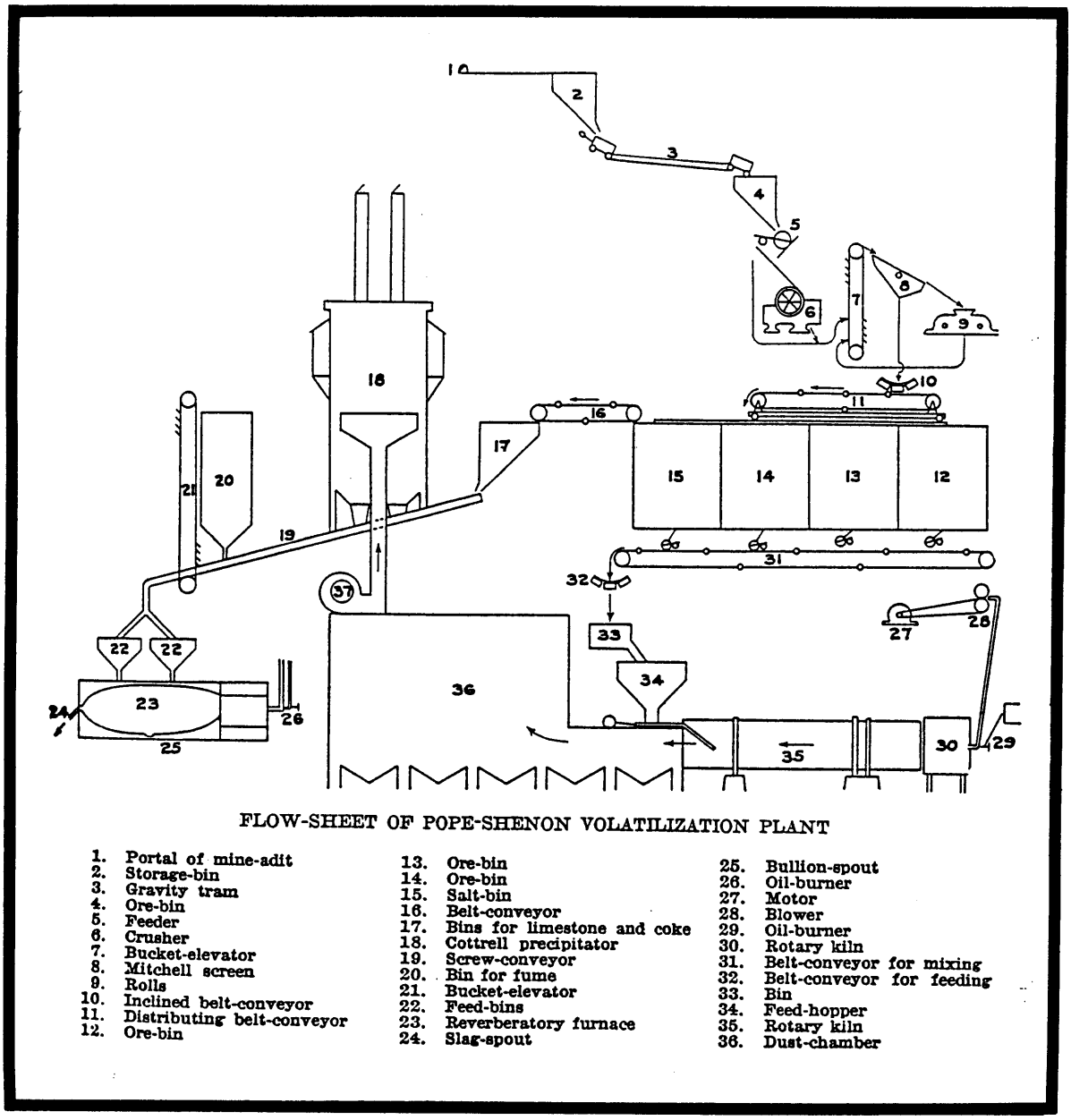


Figure 6. Flow sheet for the Pope-Shenon volatilization plant (page 265 from Bradford, 1921).

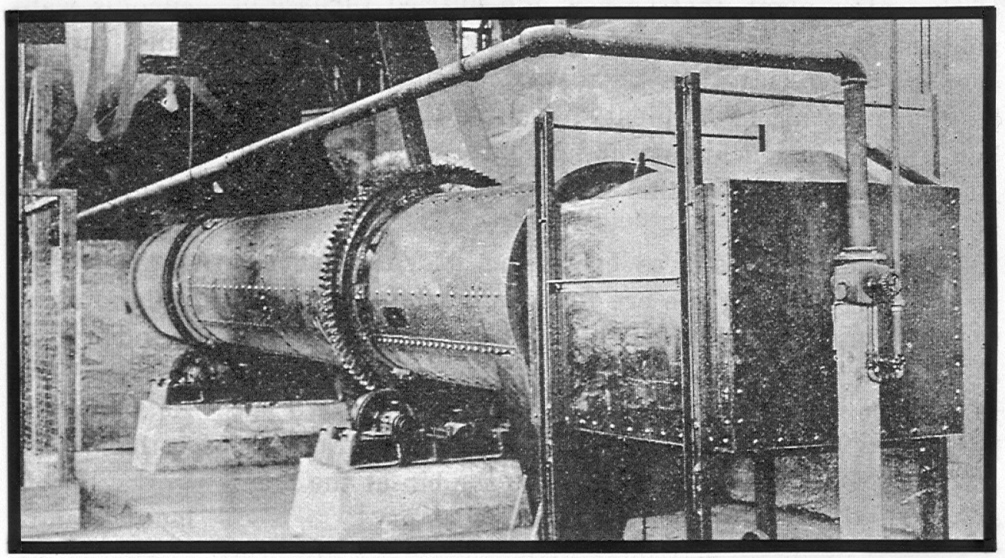


Figure 7. Rotary kiln furnace for volatizing copper ore (page 263 from Bradford, 1921).

Table 2. Development work, number of men employed, and operating companies at the Pope-Shenon Mine, by year.

Year	No. of Men employed	Tunnels (feet)	Cross-cutting (feet)	Raising (feet)	Operator
1922	20	40	---	---	Pope-Shenon Mining Co. (lessees)
1924	20	[1]	---	---	Pope-Shenon Mining Co. (lessees)
1925	---	850	---	---	Pope-Shenon Mining Co. (lessees)
1926	---	100	---	---	Pope-Shenon Mining Co. (lessees)
1928	33	125[2]	50	175	Winder-Stillman Co.

[1]Development work consisted of stoping an area 60 feet long and 80 feet high between the No. 4 and the No. 5 levels.
[2]Development work also included "140 feet" of stoping.

> have in reserve about 20,000 tons of ore containing 6 per cent of copper. Operations have been fairly successful since the milling process was changed from volatilization to concentration. The lowest tunnel is 800 feet long, and most of the work of 1923 consisted in driving raises from this level. To open more sulphide ore at depth considerable sinking or the driving of a longer tunnel will be required.

Ross (1925) visited the district in August and September 1923. At that time, the mine had six tunnels (numbered consecutively from top to bottom), but the lowest one was only 40 feet long in barren rock (Figure 8). Workings totaled about 1,475 feet of drifts, with a large stope from the No. 5 tunnel, smaller stopes from the No. 2 and No. 3 tunnels, three raises, and a few small prospect pits. The ore shoot was exposed for 200 feet on the No. 5 level and had been mined vertically upward for 125 feet and with an average width of somewhat less than 10 feet. The average ore grade ran about 6 percent copper, 0.01 ounce (or less) of gold per ton, and less than 1 ounce of silver per ton (Ross, 1925).

Snow Brothers operated the mine in the early part of 1924 and shipped copper concentrate to the International Smelting and Refining Co. in Utah. In June, the company was unable to obtain a satisfactory renewal of its lease, so all its operations were transferred to the Tormey mine. Pope-Shenon Mining then began extending the No. 6 tunnel to the ore zone.

The mine was idle for most of 1925. In November, the Idaho Porphyry Copper Mining Co. acquired the mine under lease and option. The new company started driving the lower tunnel to open the vein at greater depth. Lessees operated the mine for most of 1926 and did a small amount of work.

Table 3. Mine output and economic data for the Pope-Shenon Mine for selected years, 1923-1928.

Year	Tons of ore	Concentrate produced (tons)	Copper recovered (pounds)	Gross returns
1923	4,300[1]	695	311,409	$4,386.78
1924	5,848.75[2]	1,169.75	538,085	$42,479.23
1925	---	67	---	---
1928	1,500[1]	74	[3]	$4,184.16

[1]Ore averaged 4 percent copper.
[2]Ore averaged 6 percent copper.
[3]Recovery rate was given as 40 to 50 percent.

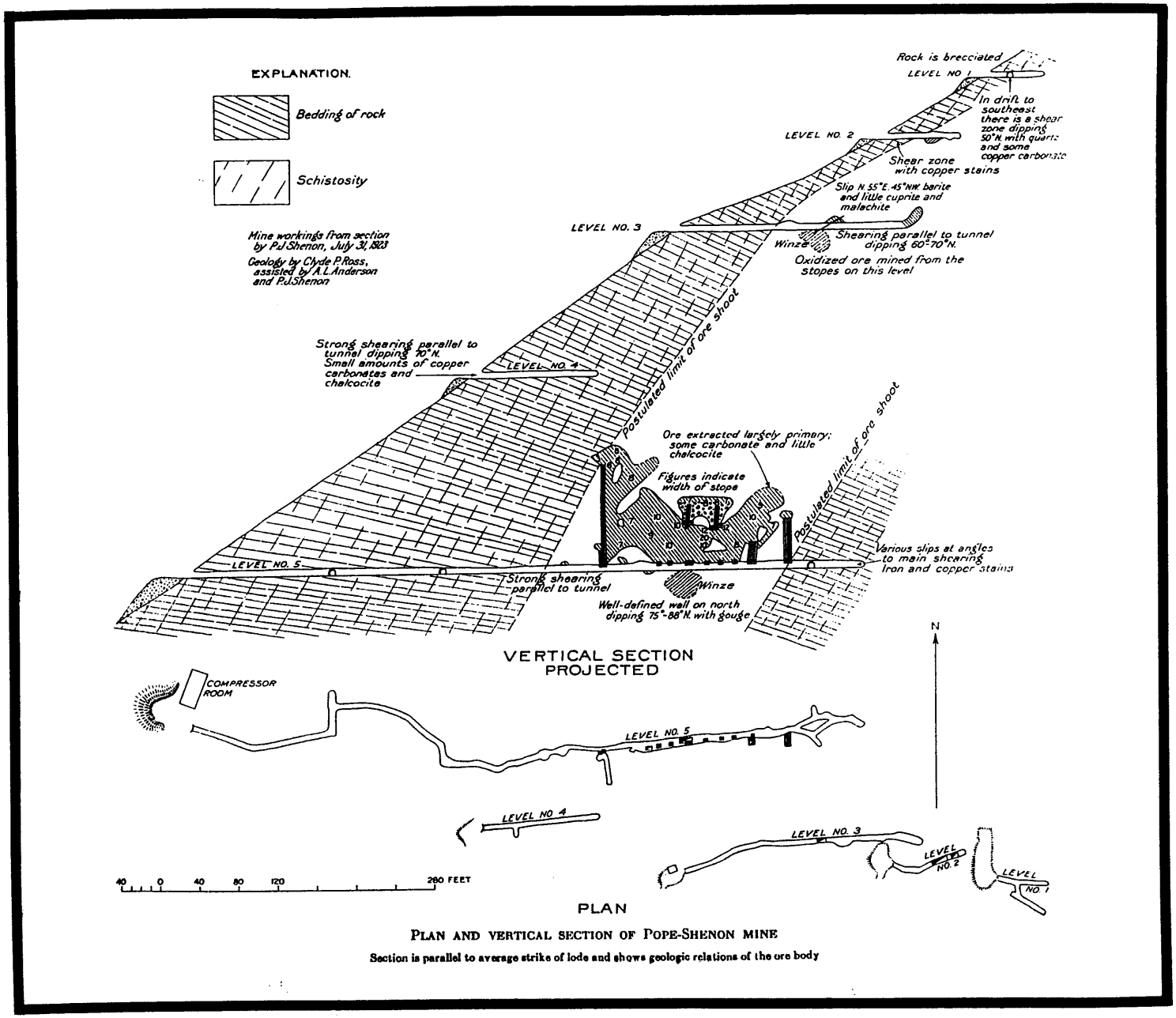
During the first part of 1927, lessees developed the mine through the No. 6 tunnel. After this work located a considerable amount of new ore, the lease was organized as the Winder-Stillman Copper Co. The new company financed the reconstruction of the mill. It was repaired and enlarged, and a flotation unit was added. By the end of the year, both the mine and mill were ready for continuous production. The mine had about 3,000 feet of underground workings.

The Pope-Shenon mine was the second largest copper producer in Idaho in 1928. The Winder-Stillman Copper Co. treated more than 3,000 tons of copper ore in its 60-tpd flotation plant, and the high-grade concentrate was shipped to International, Utah, for smelting. The company also did a large amount of development work during the year.

The mine was the largest producer in Lemhi County in 1929. Winder-Stillman Consolidated operated a 150-tpd flotation plant and shipped more than 1,000 tons of copper concentrate to a smelter near Tooele, Utah. Improvements were made to the mill during the year, and an additional ball mill was purchased. A new compressor was installed in the mine. About 1,000 feet of development was done, and a large amount of new ore was located.

In 1930, the mine's output was less than one-third that of the previous year, although the mine was still the largest producer in the county. The mine was active only during the early part of the year. (According to Anderson (1956), the mine was closed in 1929 but continued to make shipments in 1930.) The ore was treated by flotation, and the concentrate was shipped to Tooele, Utah.

A small amount of work was done by lessees in 1931 and possibly in 1934, but the mine remained essentially closed until 1937. In that year, Fred Brough



PLAN AND VERTICAL SECTION OF POPE-SHENON MINE

Section is parallel to average strike of lode and shows geologic relations of the ore body

Figure 8. Plan and vertical section of the Pope-Shenon Mine (Plate IV from Ross, 1925).

operated the mine with a crew of four. It was rumored that Brough was working on a deal to lease the mine on a royalty basis. However, according to Anderson (1943), Brough relocated the mine as the Grandview in 1937 and made shipments of hand-sorted ore during 1937 and 1938 before suspending operations. Joe Jones made a shipment of ore in April 1939 (Anderson, 1943). Also in 1939, the ball mill and other machinery were purchased and taken from the property to the Allie Mine at Gilmore.

In July 1941, the property was leased to L.J. Bills, who re-equipped the mill and began shipping concentrate (Anderson, 1943). The mine (reported as both the Pope-Shenon and the Grand View) was the principal copper producer in the district.

Salmon Development Company shipped concentrates from the mine in February, March, and May 1942, but the mine reverted to its owners (Fred Brough and Challis Hall) in July (Anderson, 1943). During the time it was operating, Salmon Development milled 560 tons of copper ore. When Anderson (1943) visited the property, there were more than 3,610 feet of drifts and crosscuts in the mine (Figures 9 and 10). The mine had six tunnels, and the No. 6 (which had been 40 feet long when described by Ross) had been extended to the lode. It was the main working level and had about 1,735 feet of drifts and crosscuts. Raises connected the No. 6 level to the Intermediate level, 70 feet above, and the No. 5 level, 160 feet above. In addition, a 40-foot winze was sunk from the No. 6 level. There were stopes between the No. 6 and Intermediate levels, the Intermediate and No. 5 levels, and the No. 5 and No. 4 levels.

In 1944, lessees produced 199 tons of copper ore, which was shipped direct to a smelter. The mine was worked a short time in 1945, and 101 tons of copper ore was shipped to a smelter in Utah. The mine produced 322 tons of copper ore in 1947, 473 tons in 1948, and 194 tons in 1949.

In 1953, Centrida Mines acquired a lease to the property (Anderson, 1956). Centrida obtained a Defense Minerals Exploration Administration (DMEA) loan for $63,140 on December 28, 1953. Government participation was 50 percent, and the contract ran until 1955. Also in 1953, Rulon Young shipped 110 tons of copper ore, containing 25,000 pounds of copper, from the Grandview group. Young produced 310 tons of ore in 1954 and also worked the Grandview in 1955 and 1956. When Anderson (1956) visited the mine in 1954, he stated (p. 79) that "On completion of the present exploration program the drifts and crosscuts will total nearly 4,500 feet." At that time, work was being done on the 500 level, some stoping had been done on the 400 level, and a 160-foot crosscut had been driven on the 600 level to establish a diamond drilling station (Figure 11). Some, possibly all, of this work was being done with funds from the DMEA contract.

Lessees shipped tailings from the Pope-Shenon mill-tailings pond to a smelter in 1955. In 1956, a "considerable quantity" of old copper tailings was shipped from the mine by Mel Parks, Gunderson & Mays, and Hugh B. Hublinger. The mine again closed about 1958.

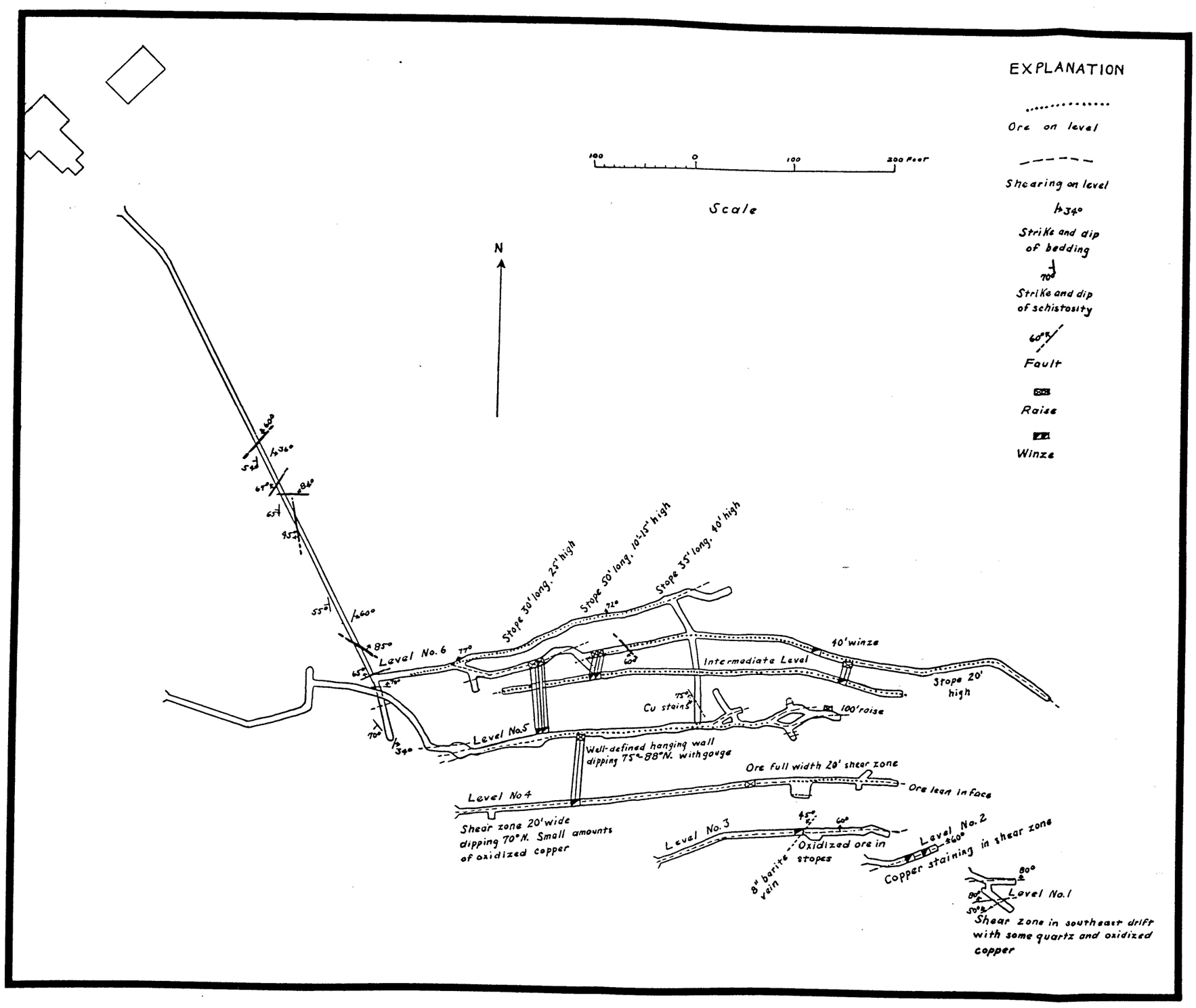


Figure 9. Plan of the workings of the Pope-Shenon Mine (Figure 1 from Anderson, 1943).

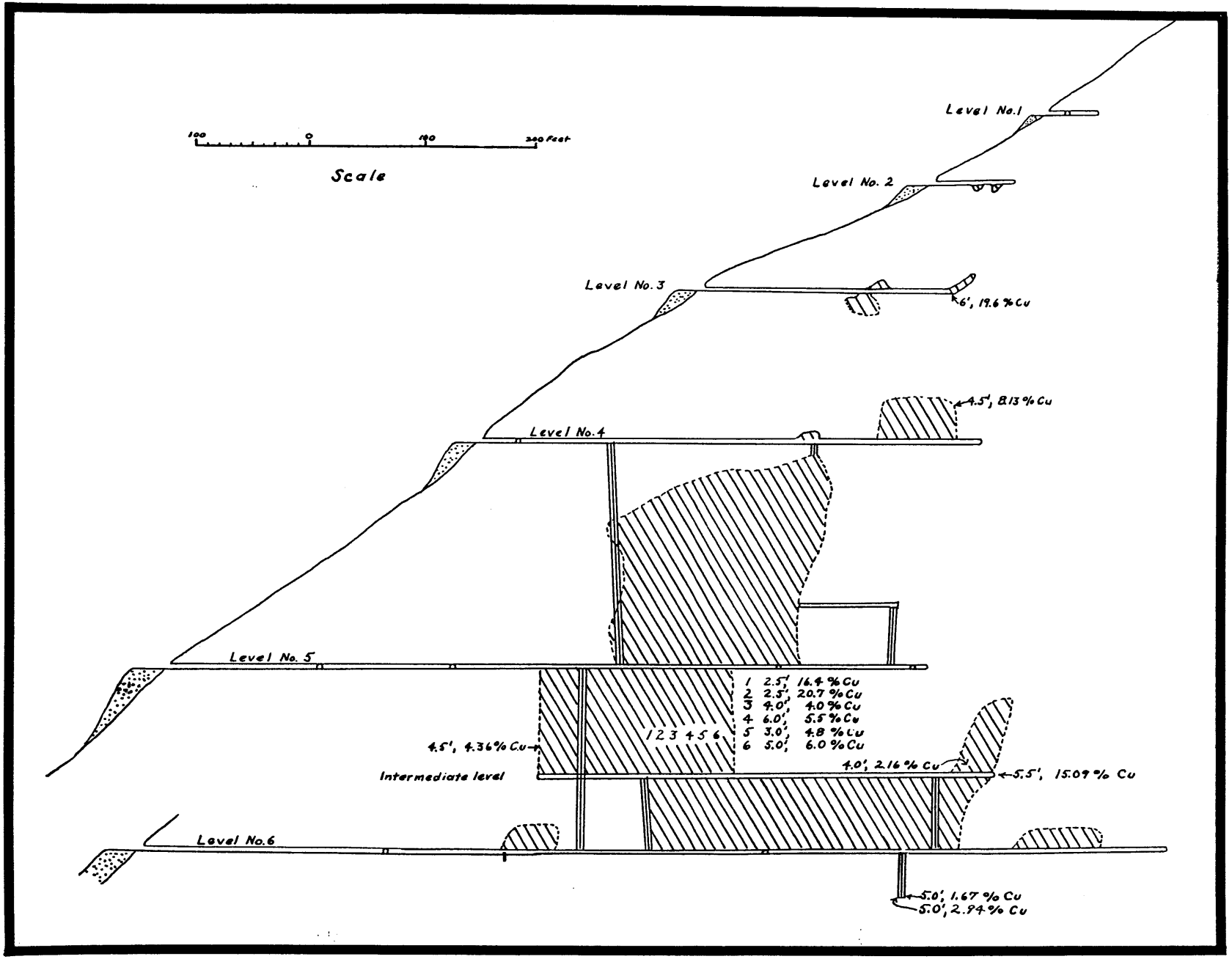


Figure 10. Longitudinal section of the Pope-Shenon Mine (Figure 2 from Anderson, 1943).

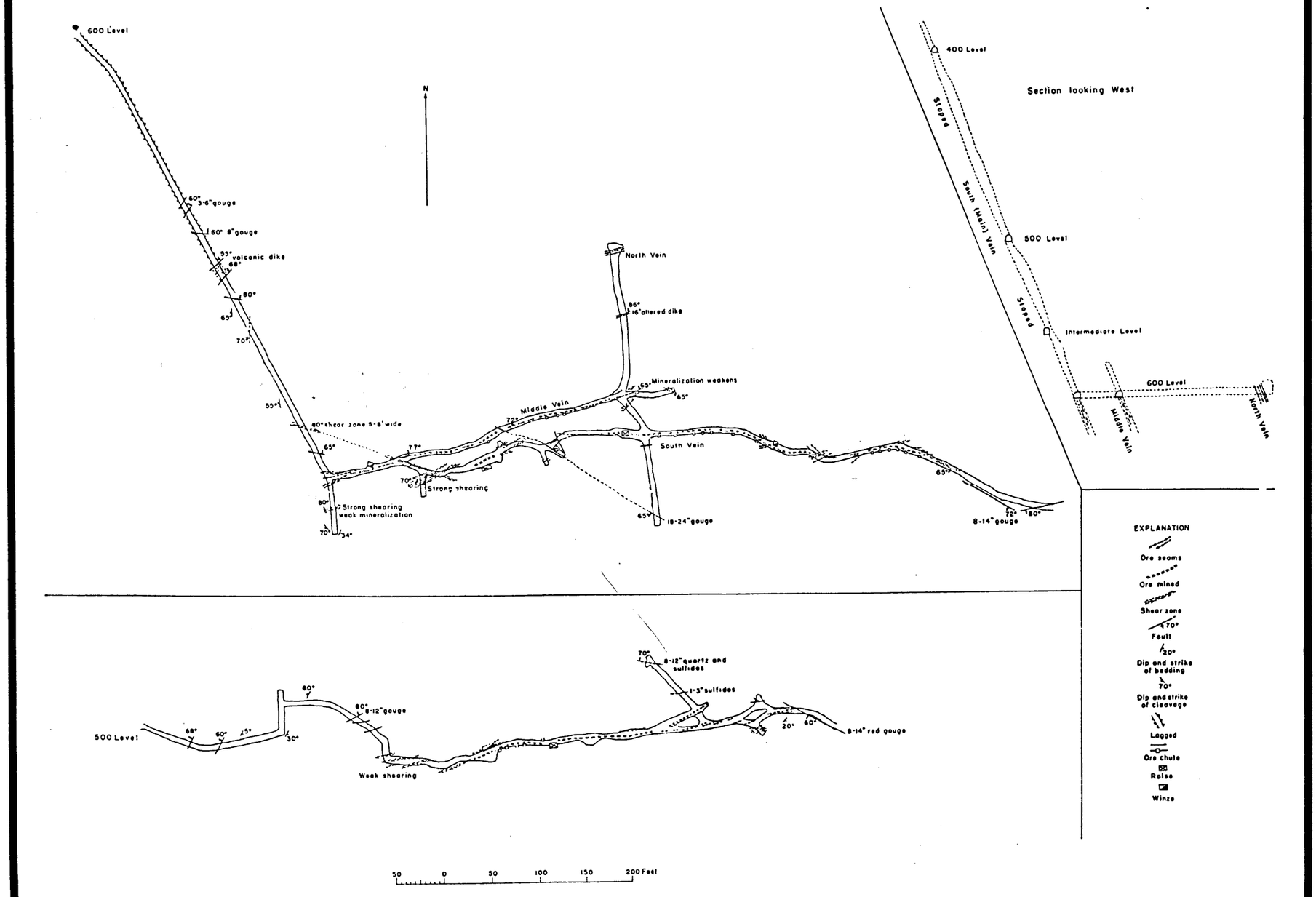


Figure 11. Geologic map of the 500 and 600 levels of the Pope-Shenon Mine (August 1954) (Figure 3 from Anderson, 1956).

Desert Peak Mines, Ltd., of Vancouver, British Columbia, Canada, announced in 1969 that it had obtained an Office of Minerals Exploration loan to explore the Pope-Shenon mine. No further mention was made of this work. Salmon Copper Mines, Inc., controlled the mine between late 1969 or early 1970 and sometime in 1971; the property was idle for most of the period. Mines Exploration operated the mine in 1972. Grandview Metals took control of the property in 1973 or early 1974 and operated the mine until 1978. The mine was inactive from then until 1989, when RCO Resources began cleanup operations at the mine. The company was said to be evaluating the mine for possible production, but did little work during the year. The mine was inspected during the summer of 1994 by an Idaho Geological Survey geologist as part of a program to evaluate inactive and abandoned mines in southern Idaho.

Between 1908 and 1975, total recorded production from the Pope-Shenon Mine was 57,470 tons of ore and 4,873 tons of old tailings. From this was produced 500 ounces of gold, 24,725 ounces of silver, 4,594,951 pounds of copper, 22,107 pounds of lead, and 14,683 pounds of zinc. Given the uncertainties of the early production and the complexities of the leasing situation in the 1940s and 1950s, probably not all the ore produced from the mine was credited to it.

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