

History of the Viola Mine, Lemhi County, Idaho

Victoria E. Mitchell

Staff Report 10-4
February 2010

Idaho Geological Survey
Morrill Hall, Third Floor
University of Idaho
Moscow, Idaho 83844-3014

History of the Viola Mine, Lemhi County, Idaho

Victoria E. Mitchell

*Staff reports present timely information for
public distribution. This publication may
not conform to the agency's standards.*

Staff Report 10-4
February 2010

Idaho Geological Survey
Morrill Hall, Third Floor
University of Idaho
Moscow, Idaho 83844-3014

CONTENTS

Introductory Note.....	v
History of the Viola Mine, Lemhi County, Idaho.	1
Introduction.	1
Geology.	1
History of the Viola Mine.	7
References	33

ILLUSTRATIONS

Figure 1. Location of the Viola Mine and vicinity, Lemhi County, Idaho.	2
Figure 2. Topographic map of the Viola Mine and vicinity, Lemhi County, Idaho.	3
Figure 3. Topographic and geologic map of the Viola Mine, showing the locations of the major workings.	4
Figure 4. Sketch map and cross section of the Birch Creek mining district.	5
Figure 5. Geologic map of the Viola Mine and vicinity, Lemhi County, Idaho.	6
Figure 6. Geologic map of the workings beneath the Viola orebodies.	10
Figure 7. Map of Viola and surrounding claims, plus claims around the smelter site, showing mine workings, sketch map of topographic features, and structural geology.....	11
Figure 8. Camp buildings and mine dumps on the Nicholia Fraction.....	15
Figure 9. Surface workings at the Viola Mine (c. 1942).	16
Figure 10. Geologic map of the workings reached from the Al Shear Shaft that were accessible in the 1940s.	17
Figure 11. Geologic map of the workings from the Dunn inclined shaft.	22
Figure 12. Geologic map of the Dunn tunnel.	23
Figure 13. Headframe and open shaft at the Viola Mine in 1994.	25
Figure 14. Open pit and open adits at the Viola Mine in 1994.	26
Figure 15. Ore chute and dumps at the Viola Mine in 1994.	27
Figure 16. Nicholia smelter site in 1994.	28
Figure 17. Overview of the Viola smelter site.....	29
Figure 18. Easternmost photograph of a three-picture panorama of the Viola smelter site.....	30
Figure 19. Middle photograph of a three-frame panorama of the Viola smelter site....	31
Figure 20. Westernmost photograph of a three-frame panorama of the Viola smelter site.	32

TABLES

Table 1. Companies and individuals operating at and near the Viola Mine.	8
Table 2. Development work, employment, and operating companies at the Viola Mine and adjacent properties, by year.	18
Table 3. Cumulative development at the Viola Mine, by year.	19

INTRODUCTORY NOTE

The first edition of 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. This report is an updated version of Staff Report 99-9. Funding for the update was provided by the State of Idaho, Department of Lands, as part of a project to compile information on inactive and abandoned mines in Idaho. The revision was needed to include new information added to the Idaho Geological Survey's mineral property files since Staff Report 99-9 was written.

The information in this report is taken from published and unpublished sources in the Idaho Geological Survey's mineral property files. Unless otherwise noted, most mine production data are 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 the present). Additional information was drawn from the Reports of the Director of the Mint (DotMR), which are particularly useful in the 1880s. 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 mostly 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 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.

History of the Viola Mine, Lemhi County, Idaho

Victoria E. Mitchell¹

INTRODUCTION

The Viola Mine is on the west-facing slope of the Beaverhead Mountains at an elevation of about 8,700 feet (Figures 1 and 2). It is in the Nicholia mining district, an area that is sometimes included in the Birch Creek mining district. The mine is 2 miles east-northeast of the townsite of Nicholia, where a smelter operated in the 1880s. While the Viola Mine consisted of one patented claim, work at various times on adjoining claims (usually under different ownership) has been directed at finding continuations of the Viola orebody. The adjacent properties include the Clark and Rossi (Pride of the Hills and Jerry claims), the Clipper (sometimes called the Climax or the Shear Brothers' Mine), the Ida (which covered part of the Salmon lode), the Nicholia Fraction, and the Enterprise (Shenon, 1928; Figure 3). The smelter and some associated prospects are in sec. 16, T. 12 N., R. 29 E.; the Viola mine and the surrounding claims are in secs. 14 and 15, T. 12 N., R. 29 E.

GEOLOGY

The mine is in an area of folded and extensively faulted Paleozoic rocks (Shenon, 1928; Anderson and Wagner, 1944; Figures 4 and 5). The host rock is the Devonian Jefferson Formation (Skipp and others, 1983). The ore occurred in three large, irregular, flat-lying bodies that were connected by steeply dipping stringers of ore. The orebodies were up to 900 feet long and ranged from 1 to 30 feet in thickness (Shenon, 1928;

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

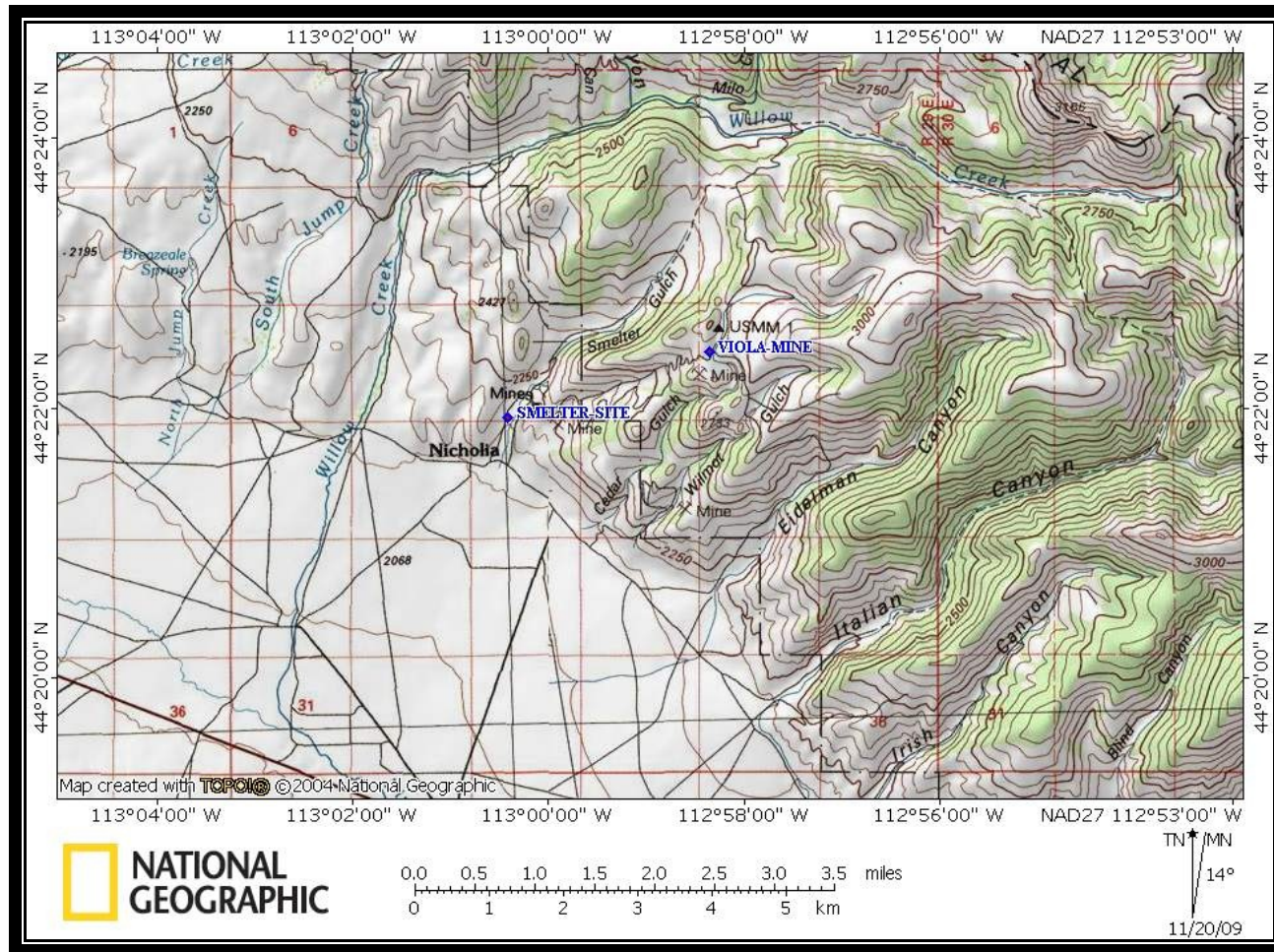


Figure 1. Location of the Viola Mine and vicinity, Lemhi County, Idaho (National Geographic TOPO! map).

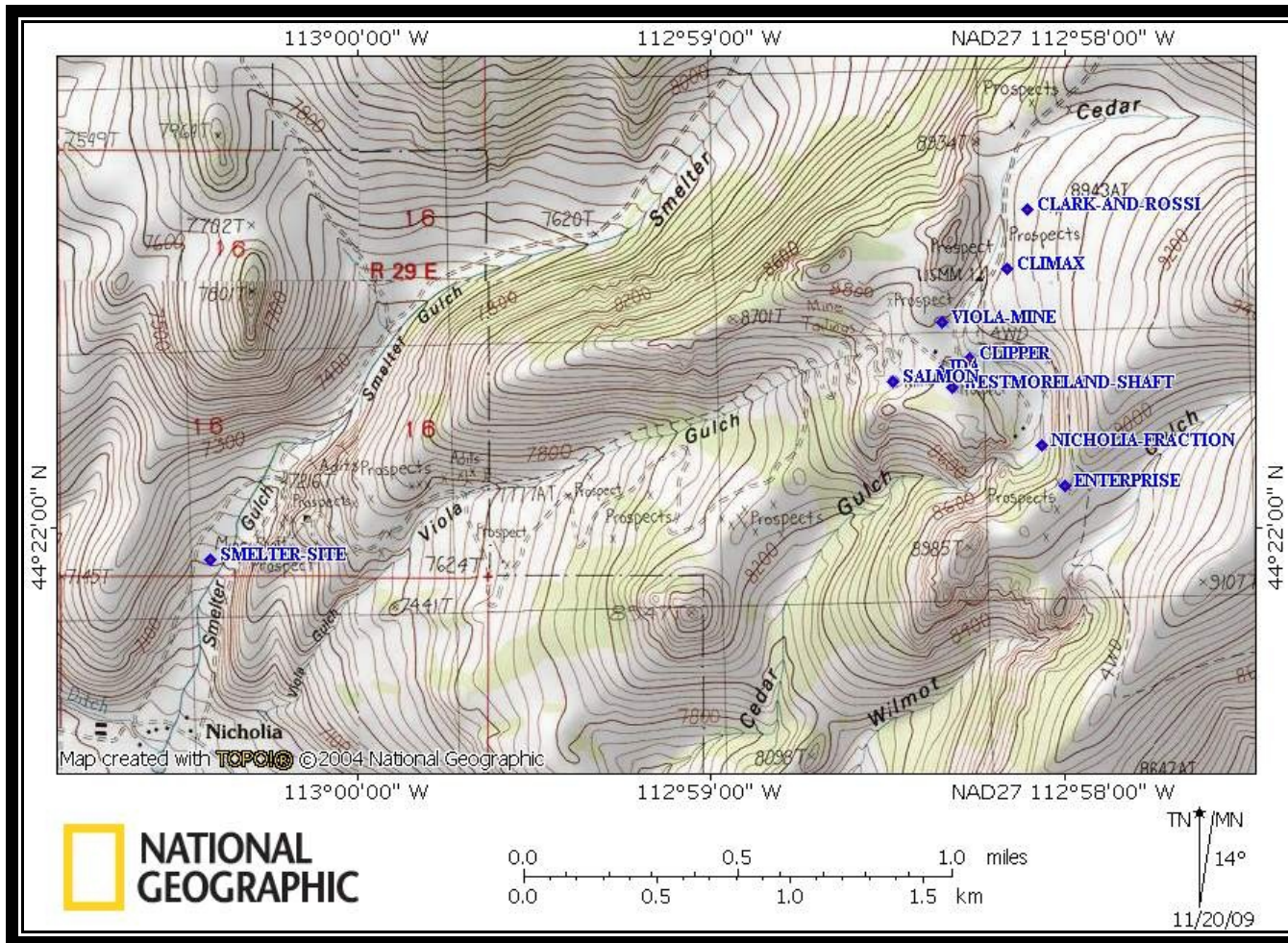


Figure 2. Topographic map of the Viola Mine and vicinity, Lemhi County, Idaho (National Geographic TOPO! map).

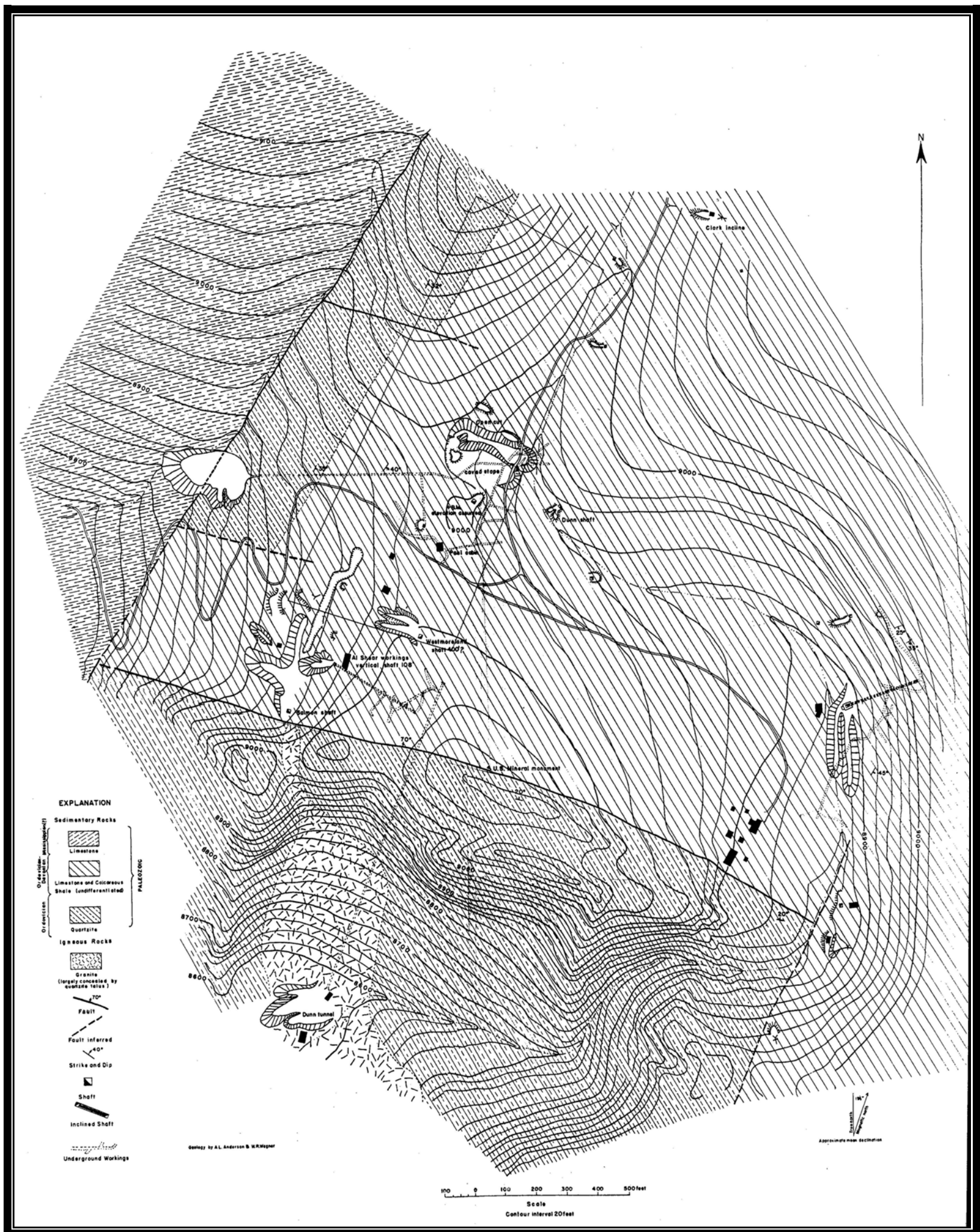


Figure 3. Topographic and geologic map of the Viola Mine, showing the locations of the major workings (Anderson and Wagner, 1944, Figure 6).

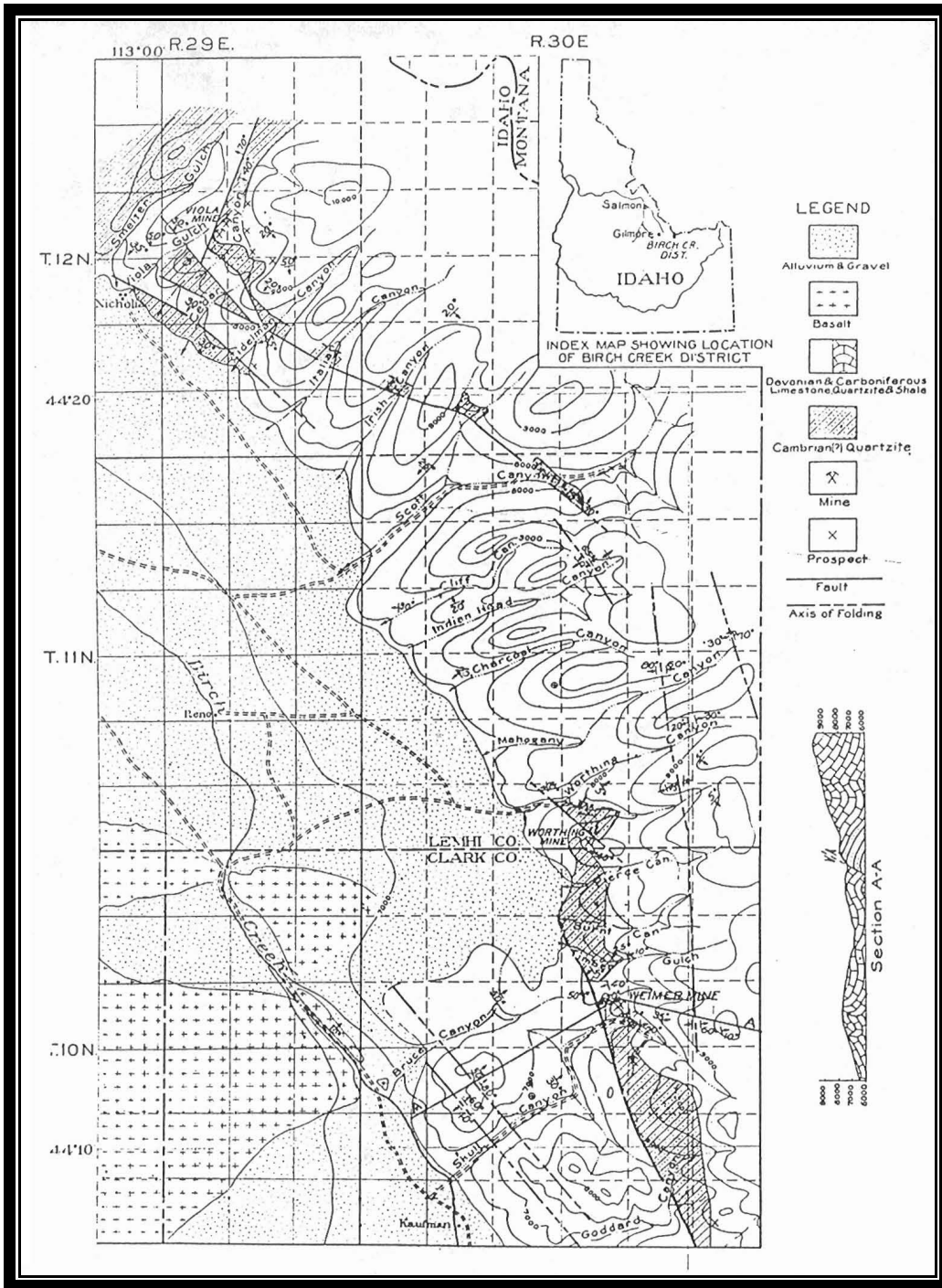


Figure 4. Sketch map and cross sections of Birch Creek mining district (Shenon, 1928, Plate II). Compare this map with Figure 5.

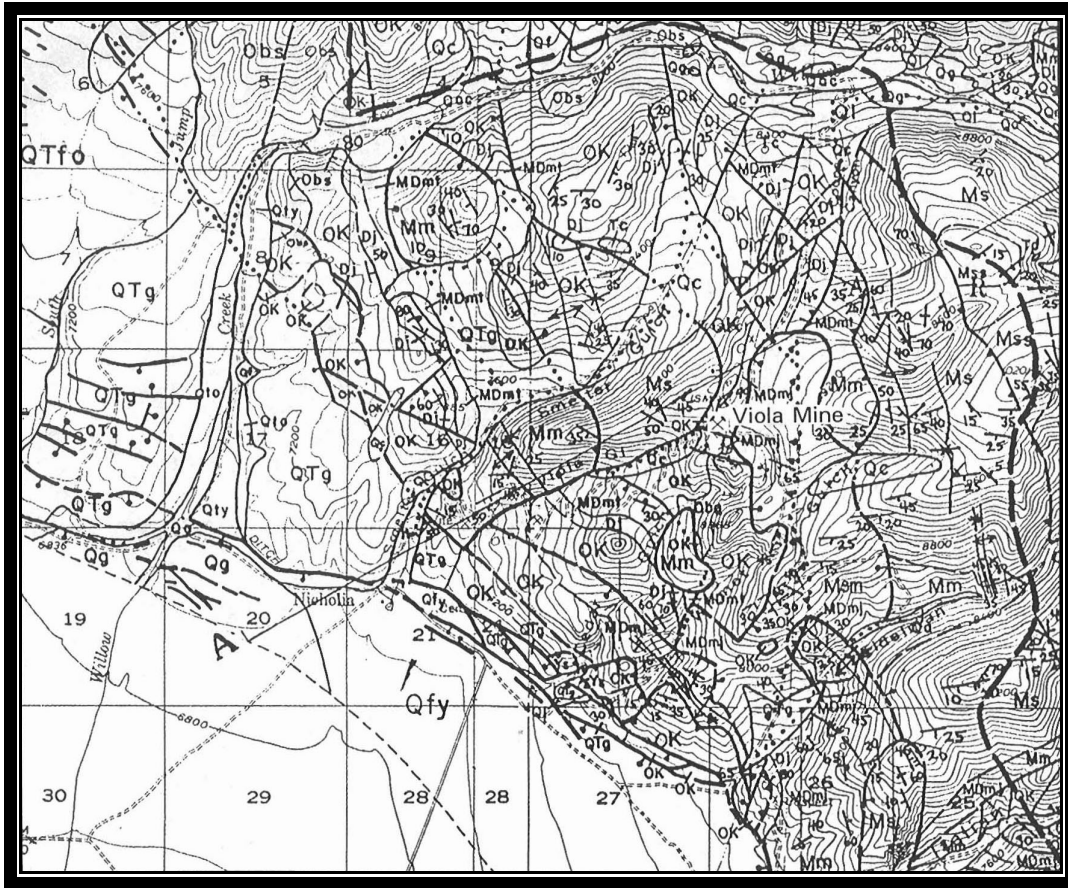


Figure 5. Geologic map of the Viola Mine and vicinity, Lemhi County, Idaho (Skipp, 1984). Ys = Middle (?) Proterozoic sandstone; Ok = Ordovician Kinnikinic Quartzite; Obg, Obs = Ordovician Beaverhead Mountains pluton; Dj = Devonian Jefferson Formation; MDmt = Devonian Three Forks Formation and Mississippian McGowan Creek Formation, undivided; MDmj = Devonian Three Forks and Jefferson Formations and Mississippian McGowan Creek Formation, undivided; Mm = Mississippian Middle Canyon Formation; Ms = Mississippian Scott Peak Formation; Msm = Mississippian Scott Peak and Middle Canyon Formations, undivided; Mss = Mississippian Surret Canyon Formation; QTg = Pliocene and Pleistocene gravel; QTfo = Pliocene and Pleistocene fan gravel; Qto, Qty = Pleistocene tarrace gravel; Qg = Pleistocene glacial deposits; Qc = Holocene colluvium; Qa = Holocene alluvium. Heavy lines are faults: ball-and-bar symbols are on the downthrown blocks of normal faults; sawteeth are on the upper plates of thrust faults. Lines with double arrows are the axes of folds. Very heavy dashed line is the southwestern boundary of the Italian Peak Middle Roadless Area.

Anderson and Wagner, 1944). Beneath the orebodies was a mass of quartz monzonite (Lettridge, 1957). The Viola orebody was on the east limb of an anticline with a northeast-trending axis (Anonymous, n.d.). The deposits were originally classified as oxidized replacement deposits derived from magmatic hydrothermal fluids that migrated along the range front. However, recent work (Lambeth and Mayerle, 1983; Skipp and others, 1983) suggests that the deposits may be stratabound, with the underlying Kinnikinic Quartzite serving as the conduit for migration of metal-rich fluids and the overlying Three Forks and McGowan Creek Formations providing an impermeable cap above the host rocks of the Jefferson Formation. The most abundant minerals in the deposit were cerussite, anglesite, plumbojarosite (a rare hydrous lead-iron sulphate), wulfenite, and pyromorphite. Primary sulfide minerals, preserved locally as remnants in the oxidized ore, included galena, sphalerite, chalcopyrite, pyrite, and tetrahedrite. Smithsonite was segregated into zones on the underside of the main oxidized lead orebodies. The most common gangue minerals were barite, limonite, manganese oxides, jasper, gypsum, siderite, hematite, and quartz (Anderson and Wagner, 1944).

HISTORY OF THE VIOLA MINE

The Viola was discovered around 1880 (Umpleby, 1913). According to Shenon (1928), the mine was accidentally found by a horse wrangler in 1881, who sold the property for \$6,000 to a Captain Rustin of Omaha, Nebraska, later that same year. Table 1 lists the individuals and companies operating at the mine. Mining began in 1882, with ore being hauled by wagon to the railroad at Camas and sent from there to smelters in Kansas City and Omaha. During the mine's first year, a shaft was sunk 120 feet on carbonate ore (DotMR). Between 5,000 and 7,000 tons of ore, averaging 50 to 60 percent lead and 10 to 12 ounces of silver per ton, was shipped between 1882 and 1885 (Umpleby, 1913). The 1884 DotMR (1885, p. 277) described the Viola as follows:

This is a vast vein of carbonate and galena ore, about 60 feet in width, carrying from 40 to 70 per cent. of lead and from 30 to 70 ounces of silver per ton; 2,500 tons of ore per month have been shipped from the mine to the smelters at Kansas City, Omaha, and Denver. All the workings are in ore and it is estimated that there are over 60,000 tons in sight. This mine has produced nearly half a million dollars in less than two years.

Umpleby (1913) also estimated \$500,000 in production for the period prior to the construction of the smelter.

In 1883, the mine was sold to a British corporation, the Viola Mining Company (or possibly the London Viola Mining Company). The new company began making plans for a smelter, and two lead furnaces were installed in lower Smelter Gulch just above Nicholia (Anderson and Wagner, 1944). In the fall of 1885, the furnaces were blown in, and from then on the ore was treated locally. According to Shenon (1928, p. 20): "The ore was almost self fluxing, and little difficulty was experienced in the smelting process.

Table 1. Companies and individuals operating at and near the Viola Mine.

Company Name	Officer	Date Incorporated	Charter Forfeited	Year(s) at Mine
Unknown discoverer	—	—	—	1881
Captain Rustin	—	—	—	1881-1883
Viola Mining Company (London Viola Company)	— ¹	— ¹	— ¹	1883-c. 1890
Milo Zook (lessee)	—	—	—	early 1920s-?
William Dunn and C.H. Stallings ²	—	—	—	1922-early 1930s
Beaverhead Lead Mines Co. ³	John Salsberry, President	Filed in Idaho: May 12, 1927	1934	1927-1934
Lead Mountain Mining Co. ⁴	George W. Snyder, President- Manager	August 26, 1929	1939	1929-1939
Lessees	—	—	—	1941-1942
Lessees ⁵	—	—	—	1947-1948
Asa W. Reid ⁵	—	—	—	1949-1950
Joe E. Zook ⁶	—	—	—	1954-1956
Edward Anderson ⁷	—	—	—	1956
J.H. Stocks and C.A. Gunderson ⁷	—	—	—	1957-1958

¹Information is not in IGS's files.

²Work mostly done on Nicholia Fraction.

³Owner of the Viola Mine.

⁴Operator of most of the claims surrounding the Viola.

⁵Includes work done on the Nicholia Mine.

⁶Work was done on the Nicholia Mine.

⁷Shipped slag from Nicholia smelter dump.

Charcoal was burned in the vicinity, and iron ore and limestone were hauled from nearby sources.”

The next two years were the most productive period in the mine’s history. The ore was transported from the mine to the smelter by aerial tramway, and during the busiest period, up to 130 tons per day (tpd) was smelted (Shenon, 1928). In 1886 and 1887, the Nicholia smelter produced 11,900 tons of lead bullion, valued at around \$1 million (Umpleby, 1913). The accompanying silver production was not recorded, but Umpleby estimated it was about 300,000 ounces. According to Wells (1983), the Viola Company stock more than doubled in price by the end of 1886. The company paid out a 20 percent dividend in 1886 and a 22 percent dividend in 1887.

Early in 1888, the large orebodies began to run out (Umpleby, 1913). A collapse in lead prices increased the company’s difficulties in meeting operating costs, and efforts to cut mine wages failed after a strike. In addition, a fire burned the hoist and shaft timbers (Wells, 1983). Discovery of ore on the Salmon lode and the purchase of ore from mines in the surrounding area kept the smelter running into 1889. Operations were discontinued in 1890 (Anderson and Wagner, 1944), and the smelter was salvaged. The Viola vein had been worked over a length of 1,200 feet and a depth of 100 feet, but was cut off by a fault (Wells, 1983). Umpleby (1913) estimated that production from the mine during this period totaled around \$2.5 million¹.

Total workings in the mine, most of which dated from this period, are not known. Lambeth and Mayerle (1983) noted the haulage workings totaled 2,500 feet. The lower Viola tunnel (which was below the orebodies and which opened into Viola Gulch at an elevation of about 8,600 feet) was about 900 feet long when it reached the main workings in the ore stopes; in 1927, this tunnel was open for 700 feet, but cave-ins prevented exploration of the stopes and the mineralized zone (Shenon, 1928). About 2,500 feet of workings extended from this tunnel (Figure 6). The Westmoreland shaft may date from this period; it was at least 400 feet deep (Figure 7). A tunnel connected the 175-foot level of the Salmon shaft with the Westmoreland; the total depth of the Salmon shaft is unknown, but later workings connected with some of the Salmon stopes (Anderson and Wagner, 1944). All the workings in the district are currently inaccessible (Lambeth and Mayerle, 1983).

In 1903, the adjacent Clipper claim changed hands, and the Idaho Mine Inspector predicted significant development on the property. The 1904 IMIR (p. 101) contained a glowing description of the Viola (as did most IMIRs for the next decade):

¹ Bell (1903 IMIR) estimated that production for this period was worth \$7 million and that the Viola produced 30,000 tons of crude ore during the first two years of operation. Given price of lead at the time (between 4 and 4.5 cents a pound for most of the period), the remoteness of the mine (about 80 miles from the nearest railroad), and the difficulties involved in shipping such quantities of ore, these numbers seem high.

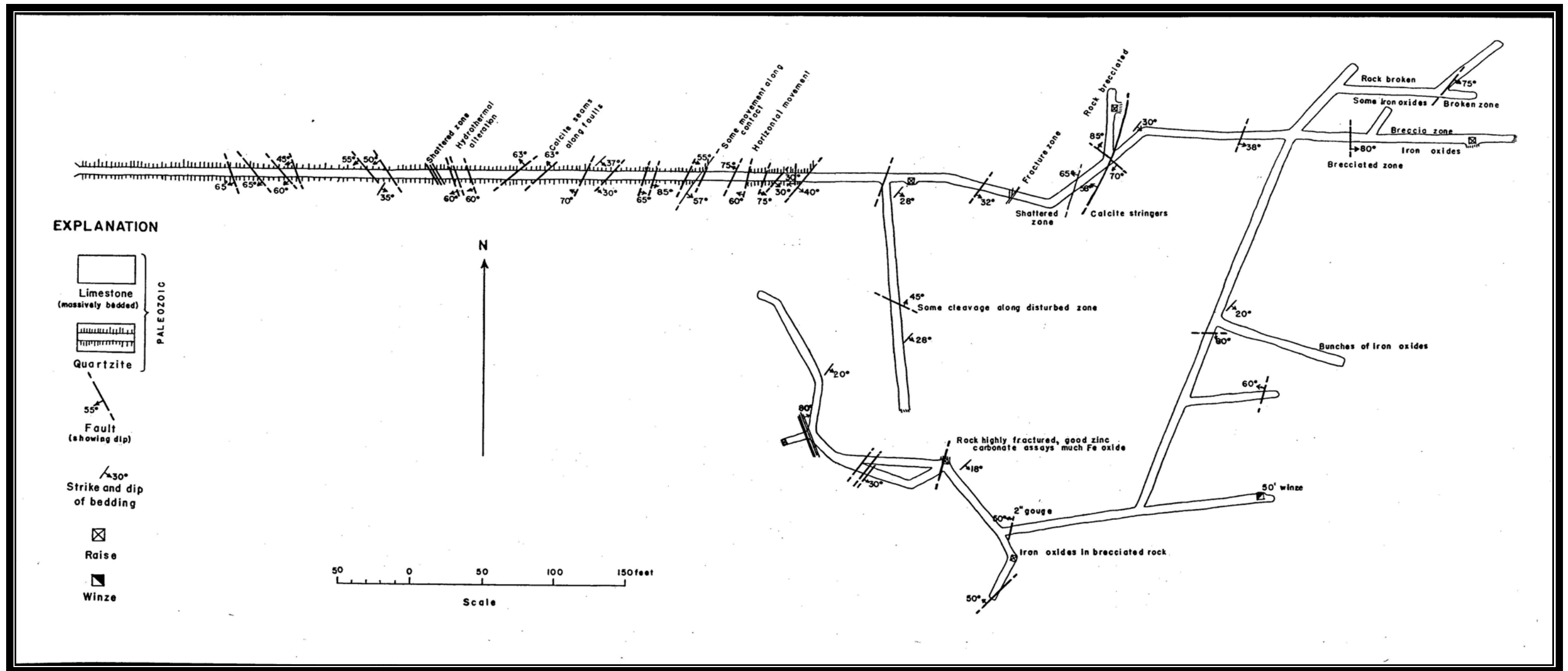


Figure 6. Geology of the workings beneath the Viola orebodies (Anderson and Wagner, 1944, Figure 7).

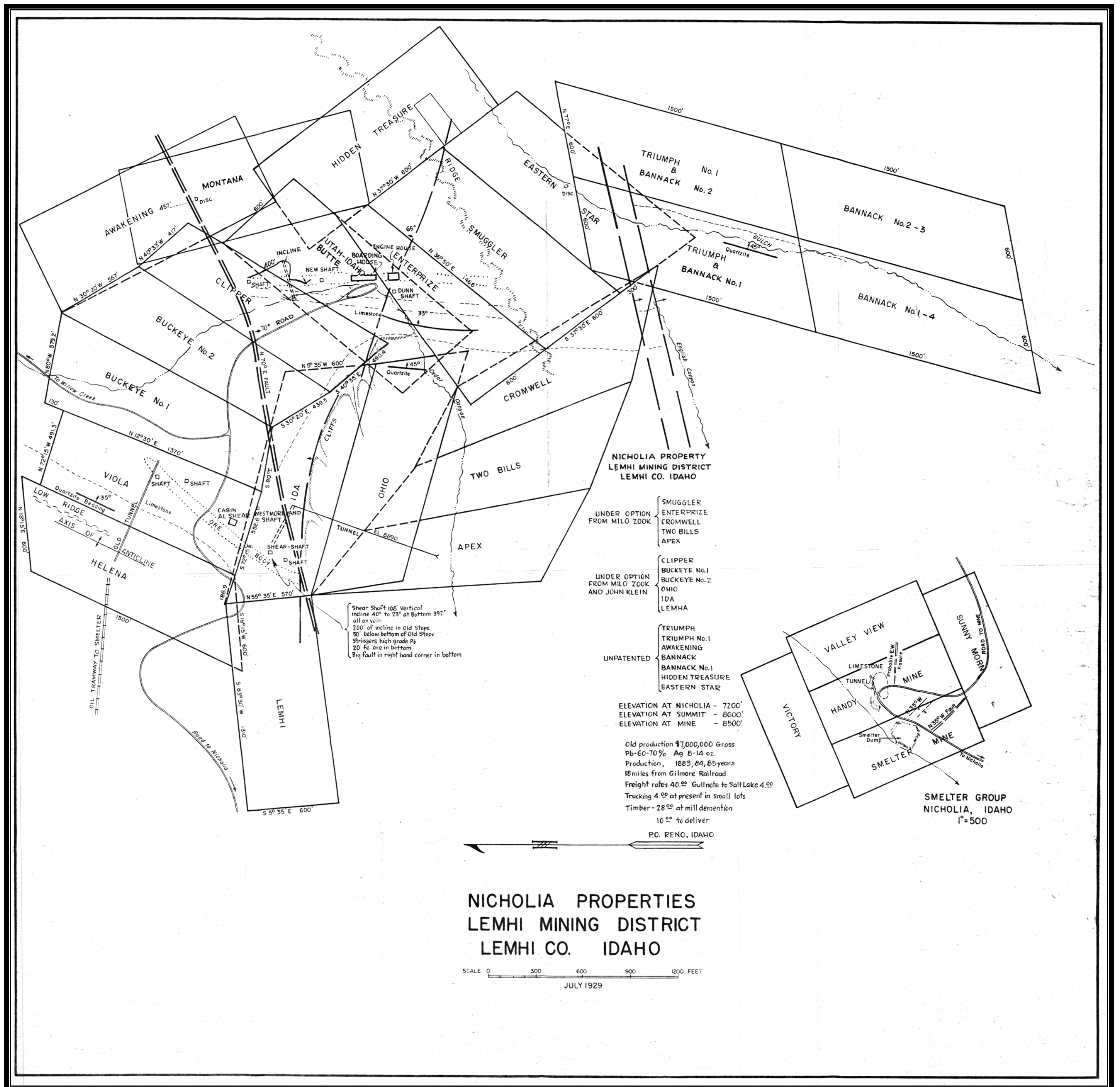


Figure 7. Map of Viola and surrounding claims, plus claims around the smelter site, showing mine workings, sketch map of topographic features, and structural geology (Anonymous, 1929).

Twenty years ago, when the present great lead bonanzas of the Coeur d'Alenes were in the embryotic process of being discovered and recognized, Idaho had already attained great prominence in the lead markets of the United States, by the remarkable output of lead ore from the famous Viola mine, in Lemhi County.

During the five years subsequent to its discovery in 1882 the Viola mine in Nicholia . . . was shipping the equivalent of 20,000 tons of lead ore a year, containing an average value of 60 per cent lead and twelve ounces silver per ton, which was all clean sand carbonate ore, derived from a single monster body of mineral, in shaly blue lime, near a quartzite contact that was 1,000 feet long, and from one to seventy feet thick, and went down on a flat dip of about twelve or fifteen degrees for 200 feet, where it terminated in a body of soft, brown iron-oxide gangue, fifty feet thick, containing light values in lead.

The Viola workings were reopened in 1905 and an “extensive search” was undertaken for the continuation of the orebodies. This work was notably unsuccessful (Umpleby, 1913). The 1905 IMIR contained a description of the Clipper (Climax) Group and its relationship to the Viola (p. 93):

[T]he Climax Group of claims, adjoining the famous old Viola, has been bonded and some work is in progress upon it at the present time.

This is one of the most flattering chances for the discovery of a big body of lead-silver ore that Lemhi County affords. The claims carry a body of soft iron oxide ore that has been proven by development to be at least 200 feet square, without any limits being found. It carries a light dissemination of lead carbonate all through its mass and is likely to be underlaid or succeeded on its dip by a body of lead ore similar to that already mined from the Viola claim immediately to the south of it, which was 1,200 feet long and as much as 70 feet thick of 60 per cent lead carbonate ore. This great mass of mineral went down about 200 feet at a flat dip of about 15 degrees in the blue limestone, within 20 feet of a massive quartzite contact and produced over \$5,000,000 in three or four years' operation at the shallow depth mentioned. It was cut off by a fault, and it is the impression that the Climax iron body is the continuation of it and the channel from which its great resource of lead mineral was derived.

The 1906 IMIR continued to promote the property (p. 102):

A short distance north of the Viola fault on the Shear Brothers' group², a body of soft limonite and brown mushy iron oxide that carries a light sprinkling of lead carbonate has been developed with shafts, tunnels and cross-cuts to the extent of a cube of clean oxidized mineral two hundred feet in all dimensions without finding any limit.

The further extensive development of this mass of mineral is likely to lead at depth to another lead or[e] deposit of the magnitude of the Viola near by.

This is one of the prospect offerings that has been a drug on the market in this section for several years at a nominal figure. It is reported to have been tied up by some Pittsburg people with a view of its further exploration, and it is to be hoped that they will

²The Clipper group was owned by Al Shear (or Shears) and his brothers.

get a move on themselves, invest a little capital in it, and give the district a chance to prove itself the coming summer. There is nothing doing at the property at this date.

When Shenon (1928) visited the district in 1927, the Clipper had been explored by two tunnels and a shaft. The shaft was probably on what had been the Climax claim, but by the 1920s, that name was not listed in the holdings of any individual or company that reported to the Idaho Inspector of Mines. Shenon noted that a 20-foot-wide body of highly oxidized, porous, reddish brown material, containing low values of lead and zinc, was exposed near the portal of the upper tunnel. The other workings were inaccessible, but the ore averaged about 4 percent lead.

About current ore deposit models that governed the exploration efforts at the Viola, the 1906 IMIR p. 102) reported:

The Viola mine . . . produced five million dollars worth of lead silver ore twenty years ago that was all secondary material. No important bodies of galena were ever found in the mass, and according to the accepted theory of ore deposition based on world wide experience, it is eminently probable that as long as the fissure continues well mineralized with oxidized ore, its valuable secondary ore bodies are likely to be repeated with others at depth until the permanent water level and primary ore, from which they were derived, are encountered.

Of recent operations at the Viola, the 1907 IMIR (p. 131) stated:

The property, unfortunately, fell into indifferent hands and has remained idle for a number of years. It is situated near a defined contact of massive quartzite and shaly blue limestone. This contact can be traced along the mountain slope for miles and carries a number of other great iron blossoms associated with some lead at the surface, that warrant extensive development.

Some development work was done at the mine during 1911. The 1911 IMIR (p. 85) described the mine as:

a geological problem that wants solution. The unraveling of this problem offers a remarkably rich prize for its solution. It has not been an uncommon experience in lead mining history to find rich ore bodies cut off by a fault which has terminated the history of the mine. There is hardly an instance, however, in western lead mining history where the completely altered carbonate ores have not been followed to the rich live sulphide ores from which they were most generally derived. The ore of this particular deposit was completely altered. In fact, . . . it was very rare to find even a specimen of primary sulphide in the deposit. If such primary ore occurs in the locality and is found in any such size deposit as this great blossom, a bonanza of the first magnitude would be the prize. A long cross-cut tunnel is now being run on the Shear Group of claims, which embraces part of the original Viola ore body. This tunnel has encountered a porphyry dike, which is something new for this locality and may prove a guide to profitable results.

Despite such arguments, development work in the vicinity of the Viola failed to find any extension of the orebody.

The Nicholia Fraction claim was located in 1922 about half a mile southeast of the Viola. In 1924, a shaft house, a blacksmith shop, and a boarding house were built on the property (Figure 8), but the boarding house burned down in 1927. A two-compartment shaft was sunk in 1924 and 1925. At 124 feet, it reached the limestone-quartzite contact; drifts and a 130-foot incline were run along the contact, but no ore was found (Shenon, 1928).

The 1922 IMIR (p. 107) noted “considerable prospecting and development work” was done in the district during the year. The exploration work produced “a number of very important new discoveries,” and a few carloads of ore were shipped. The work continued in 1923.

In 1924, ore was shipped from the Viola. According to Shenon (1928), this was from the dumps and low-grade material left in the stopes by earlier mining operations. The ore was treated by jigs before being shipped to Murray, Utah. Average smelter returns were 31 percent lead, 7.5 percent zinc, and 7.5 ounces of silver per ton (Shenon, 1928). Lead-zinc ore containing cerussite and calamine was found in one of the old Viola stopes during the year.

The mine shipped ten cars of oxidized lead ore and one lot of zinc ore in 1925. Development work by a lessee located a body of zinc carbonate ore. In 1926, the Viola shipped several carloads of lead concentrate produced by jigging. Beaverhead Lead Mines Co. was organized the following year, and two lessees operated the mine throughout 1927. Shenon (1928) noted the ore shipped from most of the lead-silver mines in the district was carefully sorted and ran over 40 percent lead, while the “run of mine” ore averaged closer to 20 percent lead. The low-grade ore was stored in the mines or used to backfill the stopes.

In 1928, the Viola shipped several cars of oxidized lead ore. The company cleaned out the 900-foot tunnel, but noted it was in such poor condition that no other underground work was done. Lessees produced all the shipping ore from surface workings, which were also mined during World War II (Figure 9). The Ida property (also known as the Nicholia group), which consisted of most of the claims surrounding the Viola, shipped one carload of lead ore during the year. The property had been under lease to Milo Zook since the early 1920s (Anderson and Wagner, 1944). In 1927, the Ida claim had a 250-foot inclined shaft with numerous laterals and raises (Shenon, 1928). According to Anderson and Wagner (1944), the Al Shear shaft (on the Ida claim) was vertical for 108 feet and then inclined at an angle of 240-280 for about 350 feet. Numerous drifts extended on both sides of the inclined section of the shaft and eventually totaled about 950 feet of workings (Figure 10).

Lessees at the Viola shipped several cars of lead carbonate ore and lead concentrate to Utah for smelting in 1929. In addition, new equipment was installed, and the company started to clean out one of the old shafts. Tables 2 and 3 lists development work and cumulative development work at the mine from 1928 to 1951. A new road was



Figure 8. Camp buildings and mine dumps on the Nicholia Fraction. The rocks in the background are Kinnikinic Quartzite at the head of Cedar Canyon south of the Viola Mine (Anderson and Wagner, 1944, Plate 2A).

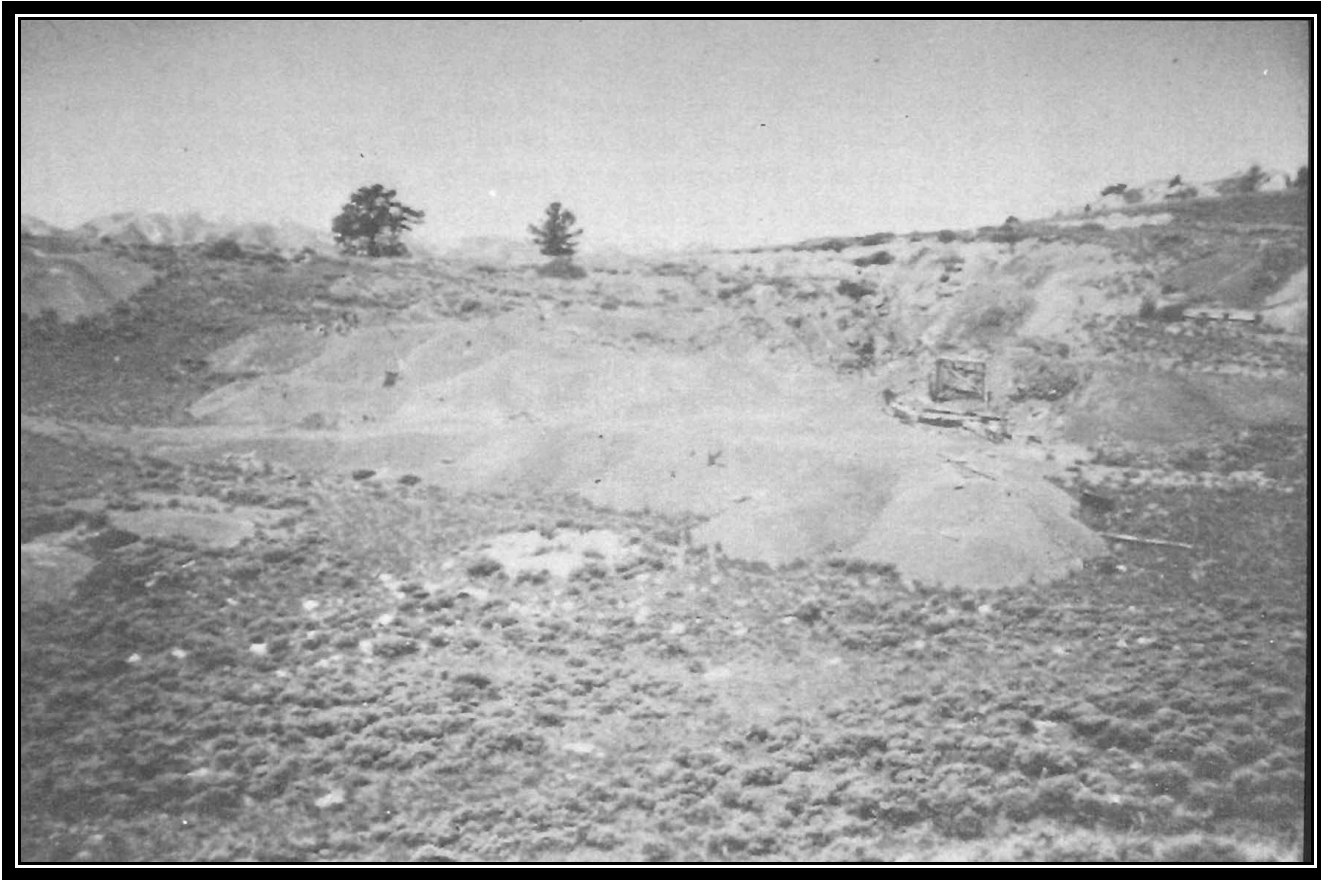


Figure 9. Surface workings at the Viola Mine (c. 1942). This open cut is near the original outcrop of the Viola orebody. This area was mined for zinc during World War II, and much of the right side of the cut contains zinc ore (Anderson and Wagner, 1944, Plate 2B).

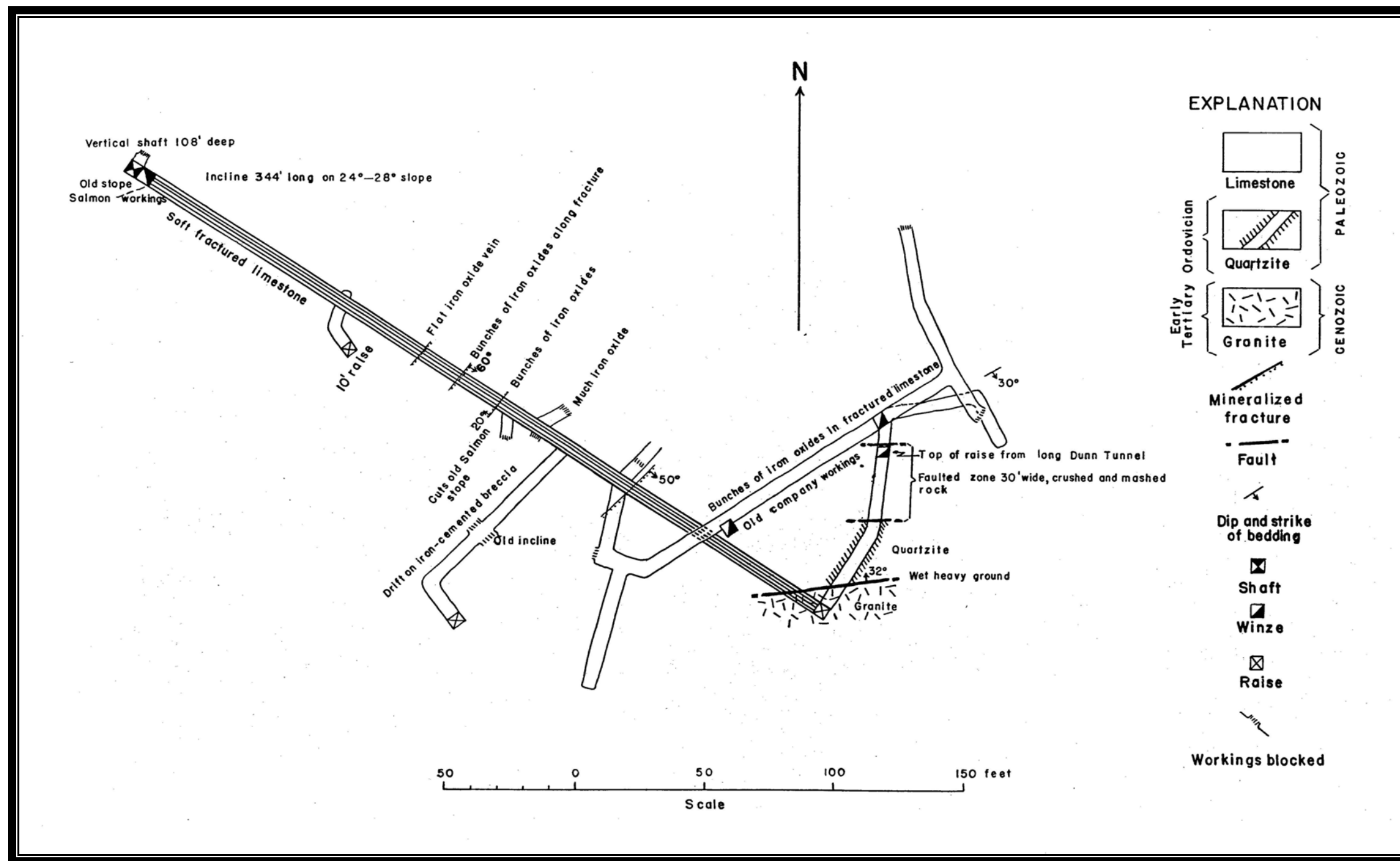


Figure 10. Geologic map of the workings reached from the Al Shear Shaft that were accessible in the early 1940s (Anderson and Wagner, 1944, Figure 8).

Table 2. Development work, number of men employed, and operating companies at the Viola Mine, by year. Information is taken from companies' annual reports to the Idaho Inspector of Mines, unless otherwise noted.

Year	No. of Men employed	Tunnels (feet)	Sinking (feet)	Cross-cutting (feet)	Drifting (feet)	Raising (feet)	Operator
1929	10	100±	150	—	—	—	Lead Mountain Mining Co. ²
1930 ¹	16	—	—	—	—	—	Lead Mountain Mining Co. ²
1931 ^{1,3}	13	—	—	—	—	—	Lead Mountain Mining Co. ²
1934	4	—	70	—	—	—	Lead Mountain Mining Co. ²
1950	5	—	60	—	60	—	T. C. Anderson Mining Company ⁴
1951	2	—	25	—	—	—	T. C. Anderson Mining Company ⁴

¹Work for the year was described as “development,” but footage was not given.

²This company was working the Nicholia Group and other claims.

³Work was done in the last half of 1930. Company reported no work was done after January 1, 1931.

⁴This company leased 120 acres in sec. 16, T. 12 N., R. 29 E.

Table 3. Cumulative development at the Viola Mine, by year. Information is from company reports to Idaho Inspector of Mines; discrepancies in numbers reflect inconsistencies in the original data.

Year	Total Development (ft)	No. of Tunnels	Total Length of Tunnels, Crosscuts, and Drifts (ft)	No. of Shafts	Total length of shafts (ft)	No. of Raises	No. of Crosscuts	No. of Drifts	Length of Principal Tunnels (feet)	
									No. 1	No. 2
1928 ⁴	— ¹	1	—	—	—	—	—	—	—	—
1929 ⁴	—	1	—	many	—	many	many	many	900 ²	—
1930 ⁴	—	1	—	1 ³	70	—	—	—	~1,200	—
1929 ⁵	—	2	—	6	150 ⁶	—	—	—	1,000±	300±
1930 ⁵	1,800	1	1,200	2 ⁷	600	—	—	—	200	—
1931 ⁵	1,000	3	600	4	400 ⁸	—	—	—	100	—
1933 ⁵	—	1	—	—	400 ⁹	—	—	—	1,000	—
1934 ⁵	3,000	1	2,400	2 ¹⁰	600	—	—	—	1,100 ¹¹	—
1935 ⁵	—	1	—	2 ¹²	—	—	—	—	1,100±	—
1950 ¹³	120	1	80	1 ¹⁴	40	—	—	—	80	—
1951 ¹³	225	2 ¹⁵	—	2 ¹⁶	—	0	0	0	180	20

¹Information not reported to Idaho Inspector of Mines.

²The vertical distance between this tunnel and the surface was 135 feet.

³This was a vertical shaft.

⁴This information was reported by Beaverhead Lead Mines Co.

⁵This information was reported by Lead Mountain Mining Co.

⁶This is the length of the main shaft. It had two compartments and was inclined.

⁷The principal vertical shaft was 400 feet deep and had two compartments.

Table 3 footnotes (continued).

⁸The principal inclined shaft was 400 feet long.

⁹The principal inclined shaft was 400 feet long and gained a vertical depth of about 250 feet.

¹⁰The principal vertical shaft was 70 feet deep. The principal inclined shaft was 400 feet long and gained a vertical depth of about 250 feet.

¹¹The distance between this tunnel and the surface was 300 feet.

¹²The principal vertical shaft was 150 feet deep. The principal inclined shaft was 450 feet long and gained a vertical depth of about 300 feet.

¹³This work was done by the T. C. Anderson Mining Company near the old Viola millsite. Details of the company's work were not mentioned by the USBM.

¹⁴The principal vertical shaft was 40 feet deep.

¹⁵The distance between Tunnel No. 1 and the surface was 300 feet. There was 100 feet between Tunnel No. 1 and Tunnel No. 2.

¹⁶The principal vertical shaft was 50 feet deep.

constructed to the mines. The Lead Mountain Mining Co. took over the Nicholia group under lease and option in June; the company also leased the Ida block of claims from Milo Zook at about the same time. Lead Mountain constructed new mine and camp buildings (Figure 7) and installed mining equipment. Active development started through the Dunn inclined shaft and continued through the latter part of the year. The property had two tunnels, 1,000 feet and 300 feet long, and a 150-foot, two-compartment shaft inclined at 65 (the Dunn inclined shaft), as well as several short prospect shafts and tunnels.

In 1930, lessees at the Viola mine shipped three cars of oxidized lead ore. Development at the mine consisted of 70 feet of shaft sinking (possibly on the Dunn shaft) and 125 feet of drifting. The mine had about 1,200 feet of open tunnels. Lead Mountain Mining Co.'s operation at the Nicholia group was the largest development campaign in the county. The company completed the Dunn inclined shaft to a depth of 250 feet (the total length of the shaft was 400 feet) and opened 1,200 feet of crosscuts and drifts at the bottom of the shaft (Figure 11). About 600 feet of shaft work and 500 feet of drifts and crosscuts were also done on the claims leased from Zook. In October 1930, I.A. Guck, an Anaconda geologist, mapped and examined the property (Anonymous, n.d.).

Lessees operating the Viola in 1931 shipped 107 tons of "first-class" oxidized lead ore to smelters in Utah. Only annual labor was done on the Nicholia Group.

The Viola was idle in 1932, but Lead Mountain drove more than 900 feet of tunnels. This is contradicted by the company's 1933 annual report to the Idaho Inspector of Mines, which states that all the work on the property was done before 1931. However, the company usually did not report work done on the leased claims. If the 1931 development was on the Dunn tunnel (Figure 12), which was driven northward from Cedar Canyon toward the Westmoreland and Al Shear shafts, it would have been on the leased block of claims. This would be consistent with Anderson and Wagner's (1944) statement that the Dunn tunnel was driven in the early 1930s, but after the previously mentioned work on the Dunn inclined shaft on the Nicholia Fraction claim. Ultimately, the Dunn tunnel was about 1,100 feet long and connected by a raise to the lowest workings reached by the Al Shear shaft. The Dunn tunnel, according to Lettridge (1957), is in the underlying quartz monzonite for its entire observable length. Development on the property by 1932 consisted of more than 3,750 feet of workings.

In 1933, only assessment work was done. Lead Mountain Mining sank a 70-foot vertical shaft on its property in 1934. The company forfeited its lease on the Ida group and other claims during the year. No activity was reported at the Viola during 1934, and no further activity occurred in the district until World War II.

In 1942, lessees at the Viola Mine shipped 434 tons of carbonate zinc ore to the International slag-fuming plant at Tooele, Utah. Anderson and Wagner (1944) stated that ore was also shipped in 1943; USBM records indicate the shipments were made in 1941 and 1942. Because the ore had a high iron content, there was no ready market for it (Anderson and Wagner, 1944).

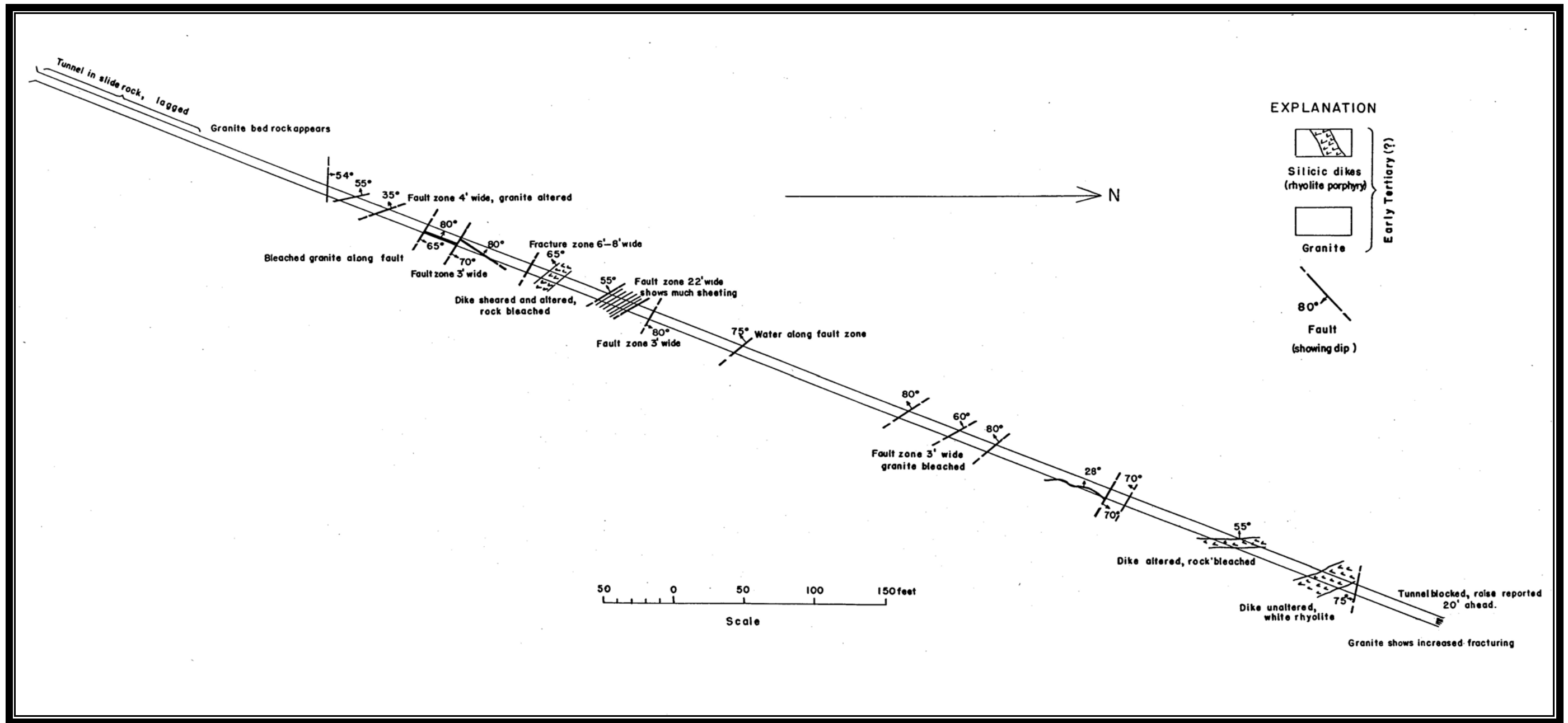


Figure 12. Geologic map of the Dunn tunnel (Anderson and Wagner, 1944, Figure 10).

Lessees worked the Nicholia Mine for a few months in 1947. They shipped 187 tons of lead ore and 130 tons of zinc-lead ore to smelters in Utah. In 1948, 2,273 tons of smelter slag was shipped from the old smelter dump at Nicholia. This material contained 1,303 ounces of silver, 386,210 pounds of lead, and 165,472 pounds of zinc. The Viola Mine produced 18 tons of lead ore, and both the Viola and the Nicholia properties produced zinc-lead ore.

Asa W. Reid operated the Viola throughout 1949 and shipped 527 tons of ore to smelters in Utah. This ore yielded 4 ounces of gold, 3,530 ounces of silver, 1,100 pounds of copper, 283,527 pounds of lead, and 89,243 pounds of zinc. In addition, 504 tons of old slag, which contained lead and zinc, was shipped from the dump at Nicholia.

In 1950, Reid operated the Nicholia group for seven months. He shipped 234 tons of lead ore to a smelter in Utah. The ore contained 1 ounce of gold, 1,391 ounces of silver, 633 pounds of copper, 138,582 pounds of lead, and 17,866 pounds of zinc.

Joe E. Zook shipped small quantities of lead and zinc concentrates and crude lead ore from the Nicholia Mine in 1954 and a small tonnage of lead ore in 1955. Between July and November 1956, he produced 5 tons of lead ore from the Nicholia. Also in 1956, Edward Anderson shipped old slag from the Nicholia smelter dump; this material contained recoverable silver, lead, and zinc.

J.H. Stocks and C.A. Gunderson shipped over 29,000 tons of slag from the Nicholia smelter dump to the Bunker Hill smelter in 1957. The slag averaged 5.3 percent lead and 6.1 percent zinc. Also in 1957, both the Bunker Hill Company and the Sunshine Mining Company examined the property, but neither decided to explore it further. In 1958, the USBM noted a large decrease in the tonnage recovered from the Nicholia smelter dump. Lead and zinc ore was produced from the Nicholia property in 1963.

Other mine workings in the area include a 220-foot inclined shaft with a 43-foot drift and a short raise, a 40-foot adit, and a 10-foot adit on the Clark and Rossi property to the north (Lambeth and Mayerle, 1983). Sampling by the USBM in 1980 indicated a moderate resource potential for additional lead-zinc resources at the Viola Mine, and local residents indicated that there are several thousand tons of zinc-bearing ore in the mine. About 2,000 tons of slag were left at the Nicholia smelter (Lambeth and Mayerle, 1983).

The mine was visited by an Idaho Geological Survey geologist during the summer of 1994 as part of a program to evaluate inactive and abandoned mines in southern Idaho. Figures 13, 14, 15, and 16 show the site as it appeared at that time. The Viola was again visited by an Idaho Geological Survey geologist in 2003 as part of a project to make extensive site examinations of selected inactive and abandoned mines in southern Idaho. Figures 17, 18, 19, and 20 were taken at that time.

Total recorded production between 1924 to 1974 from the Viola Mine and associated claims was 5,586 tons of ore. Smelter slag shipped from the Nicholia smelter dump totaled 21,366 tons. This material yielded 26 ounces of gold, 31,596 ounces of silver, 6,133 pounds of copper, 4,140,931 pounds of lead, and 4,140,931 pounds of zinc.

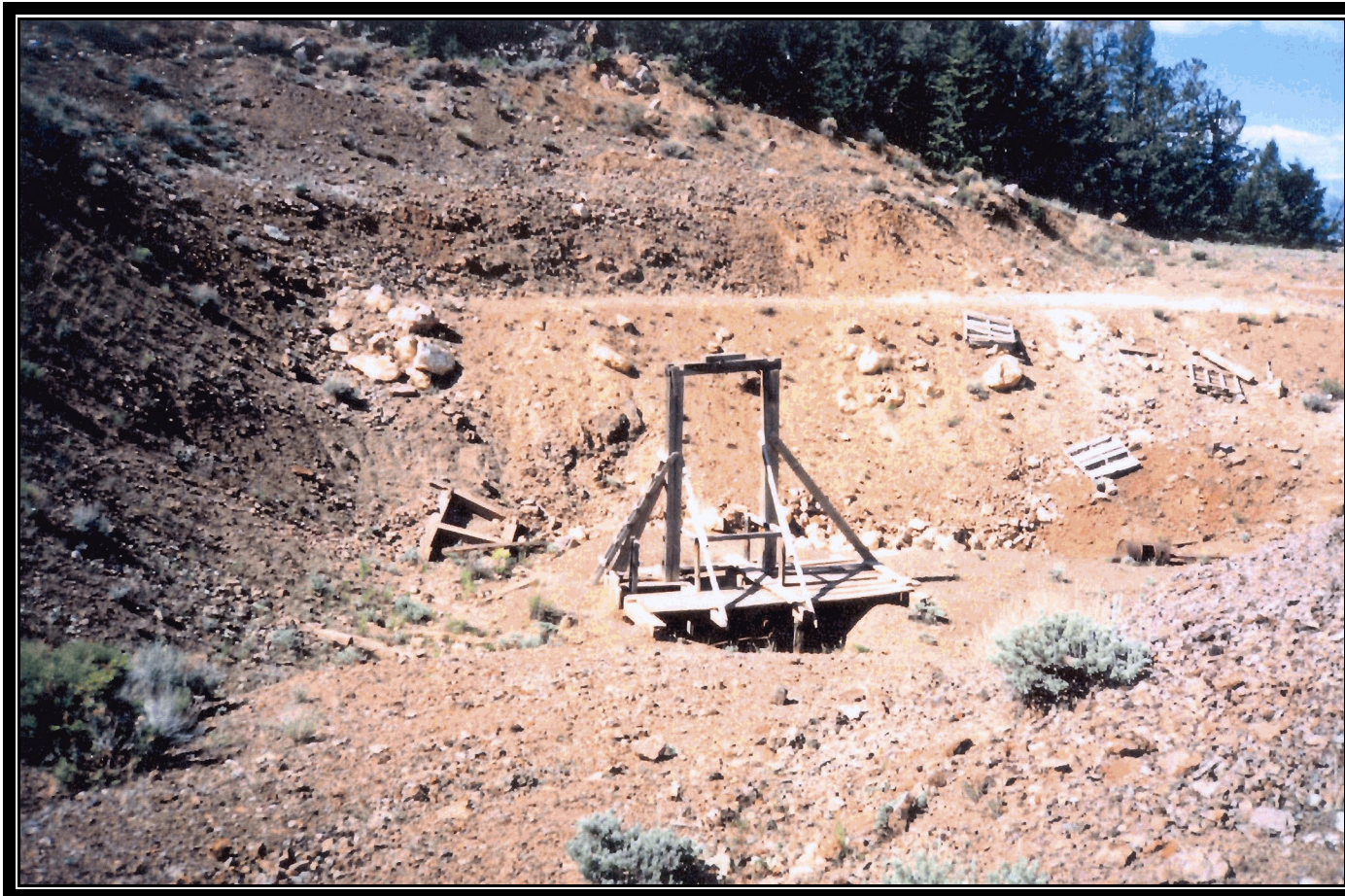


Figure 13. Headframe and open shaft at the Viola Mine in 1994 (photograph by Falma J. Moye, Idaho Geological Survey).

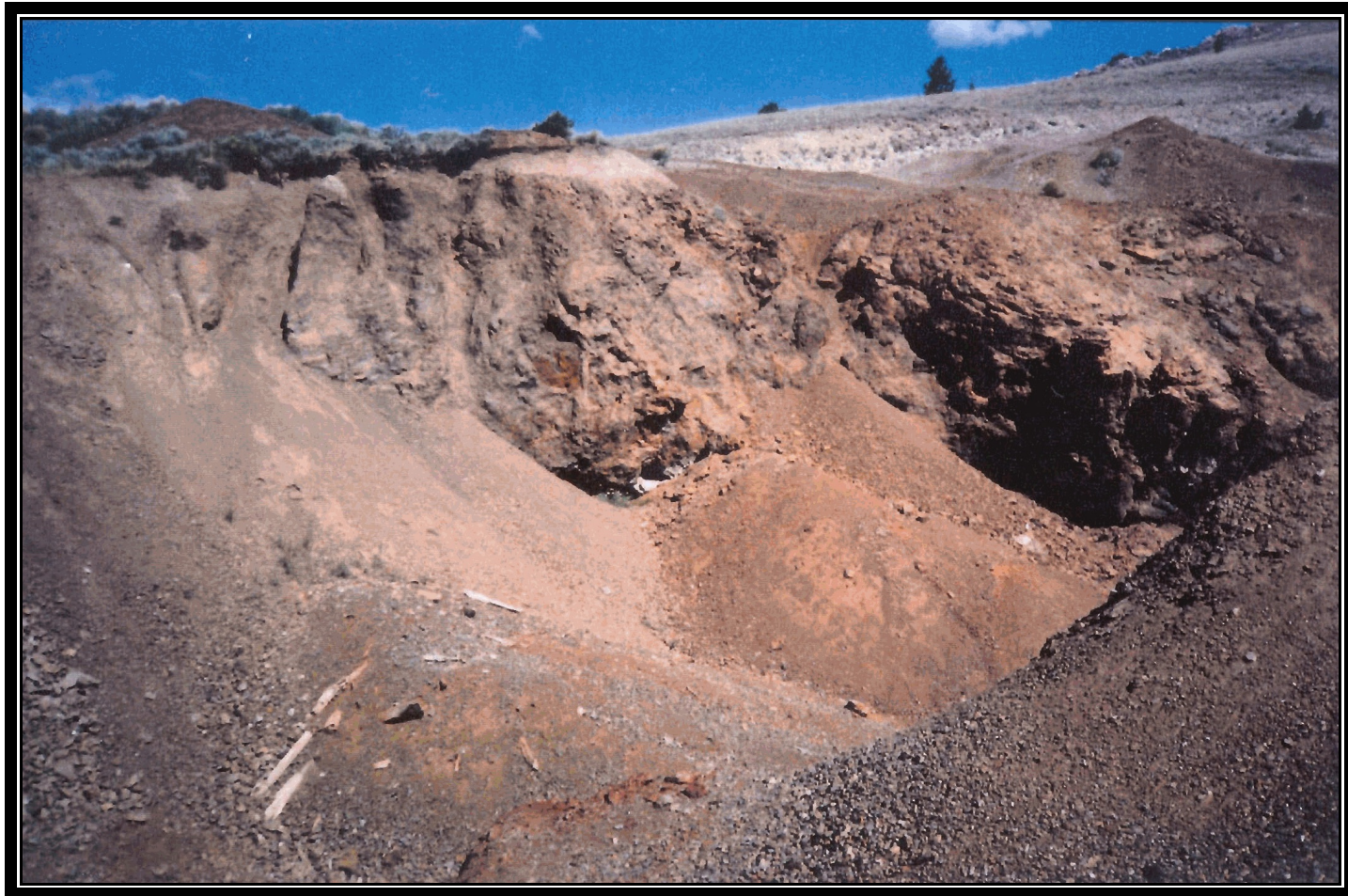


Figure 14. Open pit and open adits at the Viola Mine in 1994 (photograph by Falma J. Moye, Idaho Geological Survey).



Figure 15. Ore chute and dumps at the Viola Mine in 1994 (photograph by Falma J. Moye, Idaho Geological Survey).



Figure 16. Nicholia smelter site in 1994 (photograph by Falma J. Moye, Idaho Geological Survey).



Figure 17. Overview of the Viola smelter site in 2003. Note the smelter slag (dark material visible between the bushes), and the mine workings and ore chute on the opposite hillside (photograph by Earl E. Bennett, Idaho Geological Survey).



Figure 18. Easternmost photograph of a three-picture panorama of the Viola smelter site, taken in 2003. The dark material on the left side of the frame is smelter slag (photograph by Earl H. Bennett, Idaho Geological Survey).



Figure 19. Middle photograph of a three-frame panorama of the Viola smelter site, taken in 2003. Note the dark smelter slag in the right center of the frame (photograph by Earl H. Bennett, Idaho Geological Survey).



Figure 20. Westernmost photograph of a three-frame panorama of the Viola smelter site in 2003 (photograph by Earl H. Bennett, Idaho Geological Survey).

References

- Anderson, A.L., and W.R. Wagner, 1944, Lead-zinc-copper deposits of the Birch Creek district, Clark and Lemhi counties, Idaho: Idaho Bureau of Mines and Geology Pamphlet 70, 43 p.
- Anonymous, n.d., Untitled consultant's report in Idaho Geological Survey's mineral property files: 6 p. [partial copy available in Idaho Geological Survey's mineral property files.]
- Anonymous, 1929, Nicholia properties, Lemhi Mining district, Lemhi Co., Idaho: 1 p. [consultant's map available in Idaho Geological Survey's mineral property files.]
- Director of the Mint's (DotMR) report on the production of precious metals in the United States, 1881-1893.
- Idaho Bureau of Mines and Geology/Idaho Geological Survey's (IGS) annual reports on regional developments in minerals, mining, and energy in Idaho, 1975-1992.
- Idaho Geological Survey's mineral property files (includes copies of company reports to the Idaho Inspector of Mines).
- Idaho Inspector of Mines (IMIR) annual reports on the Mining Industry of Idaho, 1899-1970.
- Lambeth, R.H., and R.T. Mayerle, 1983, Mineral investigation of the Italian Peak RARE I1 area (No. I-1945), Beaverhead County, Montana, and Italian Peak Middle RARE I1 area (No. M-4945), Clark and Lemhi counties, Idaho: U.S. Bureau of Mines Mineral Land Assessment Open-File Report 53-83, 26 p.
- Lettridge, R.W., 1957, Letter to Roger R. McConnel dated September 7, 1957, regarding the Viola Mine, 8 p. [copy available in Idaho Geological Survey's mineral property files.]
- Shenon, P.J., 1928, Geology and ore deposits of the Birch Creek district, Idaho: Idaho Bureau of Mines and Geology Pamphlet 27, 25 p.
- Skipp, Betty, 1984, Geologic map and cross sections of the Italian Peak and Italian Peak Middle Roadless areas, Beaverhead County, Montana, and Clark and Lemhi counties, Idaho: U.S. Geological Survey Miscellaneous Field Studies map MF-1601-B.

Skipp, Betty, J.C. Antweiler, D.M. Kulik, R.H. Lambeth, and R.T. Mayerle, 1983, Mineral resource potential of the Italian Peak and Italian Peak Middle Roadless Areas, Beaverhead County, Montana, and Clark and Lemhi Counties, Idaho: U. S. Geological Survey Miscellaneous Field Studies Map MF-1601-A, 13 p.

Umpleby, J.B., 1913, Geology and ore deposits of Lemhi County, Idaho: U.S. Geological Survey Bulletin 528, 182 p.

U.S. Geological Survey (USGS)/U.S. Bureau of Mines (USBM) Minerals Yearbook chapters for Idaho, 1900-1970.

Wells, M. W., 1983, Gold camps and silver cities: nineteenth century mining in central and southern Idaho: Idaho Bureau of Mines and Geology Bulletin 22, 165 p.