

# History of the Triumph, Independence, and North Star Mines, Blaine County, 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 The information in this report is from a number of published and unpublished sources in the Idaho Geological Survey's mineral property files.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 Triumph, Independence, and North Star Mines, Blaine County, Idaho

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## INTRODUCTION

The Triumph, Independence, and North Star mines are in the Warm Springs mining district about 5 miles southeast of Ketchum (Figure 1). The Triumph Mine is on the north side of the East Fork of the Wood River. The original Triumph workings were near the head of Triumph Gulch at an elevation of about 7,000 feet; later operations, including the mill and tailings ponds, were in the flats of the East Fork. The Independence Mine is located in Independence Gulch, about a mile north of the original Triumph workings. The North Star Mine is in North Star Gulch, a tributary that drains into the East Fork near the locations of the Triumph Tunnel, mill, and tailings ponds (Figure 2).

All three mines are hosted by rocks of the Devonian Milligen Formation (Figure 3). Ore occurs as mineralized fissures or shear zones, most of which strike west-northwest and dip to the southwest at moderate angles, and as replacement deposits at the intersection of mineralized shear zones and susceptible limestone beds. There are three main types of ore in the Triumph and North Star mines. The fissure ores occur in pods and lenses ranging from a few inches to many feet in width; the

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<sup>1</sup>Idaho Geological Survey, Main Office at Moscow, University of Idaho, Moscow.

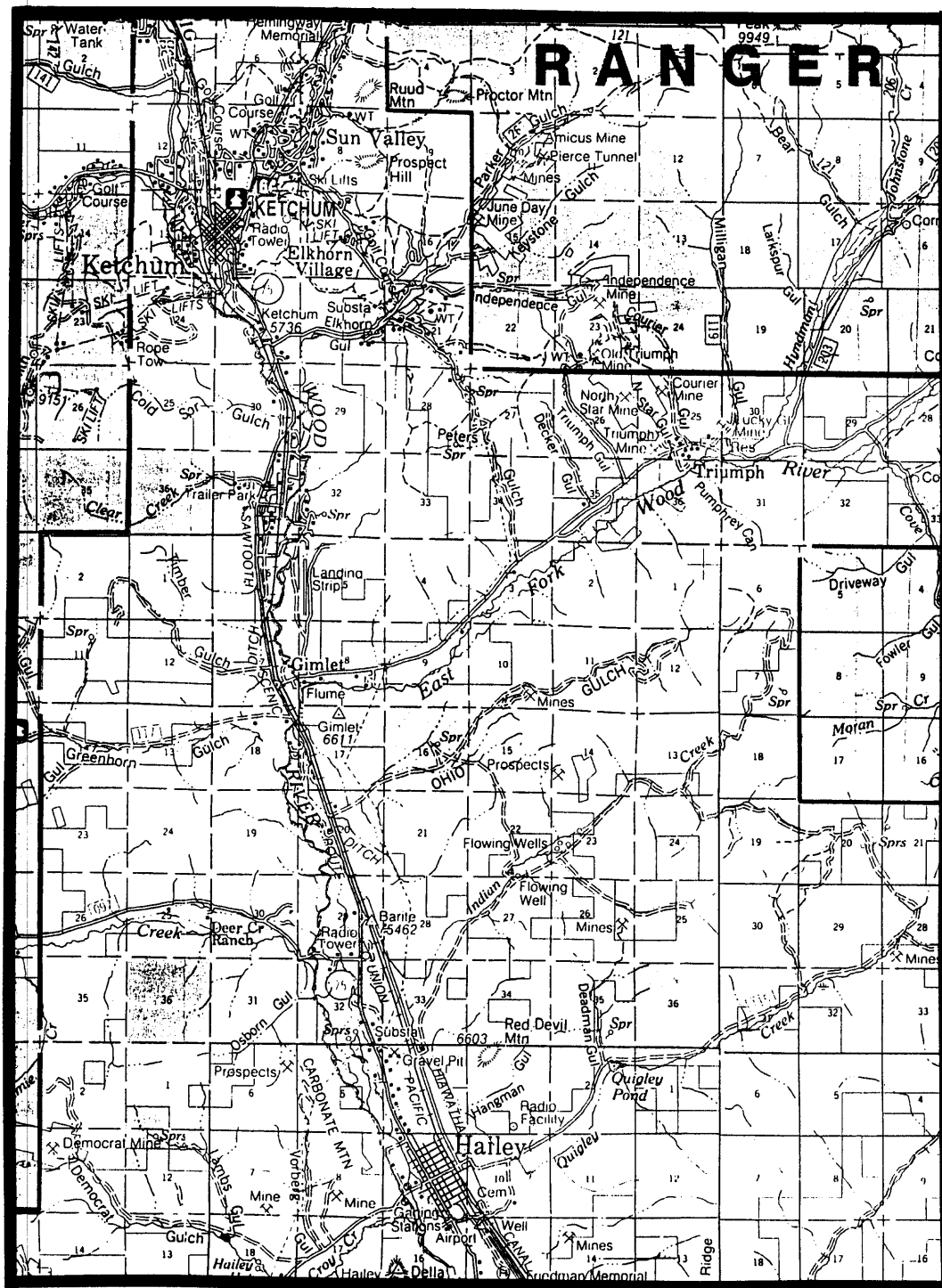


Figure 1. Location of the Triumph, Independence, and North Star mines (U.S. Forest Service Sawtooth National Forest map, scale  $\frac{1}{2}$  inch = 1 mile).

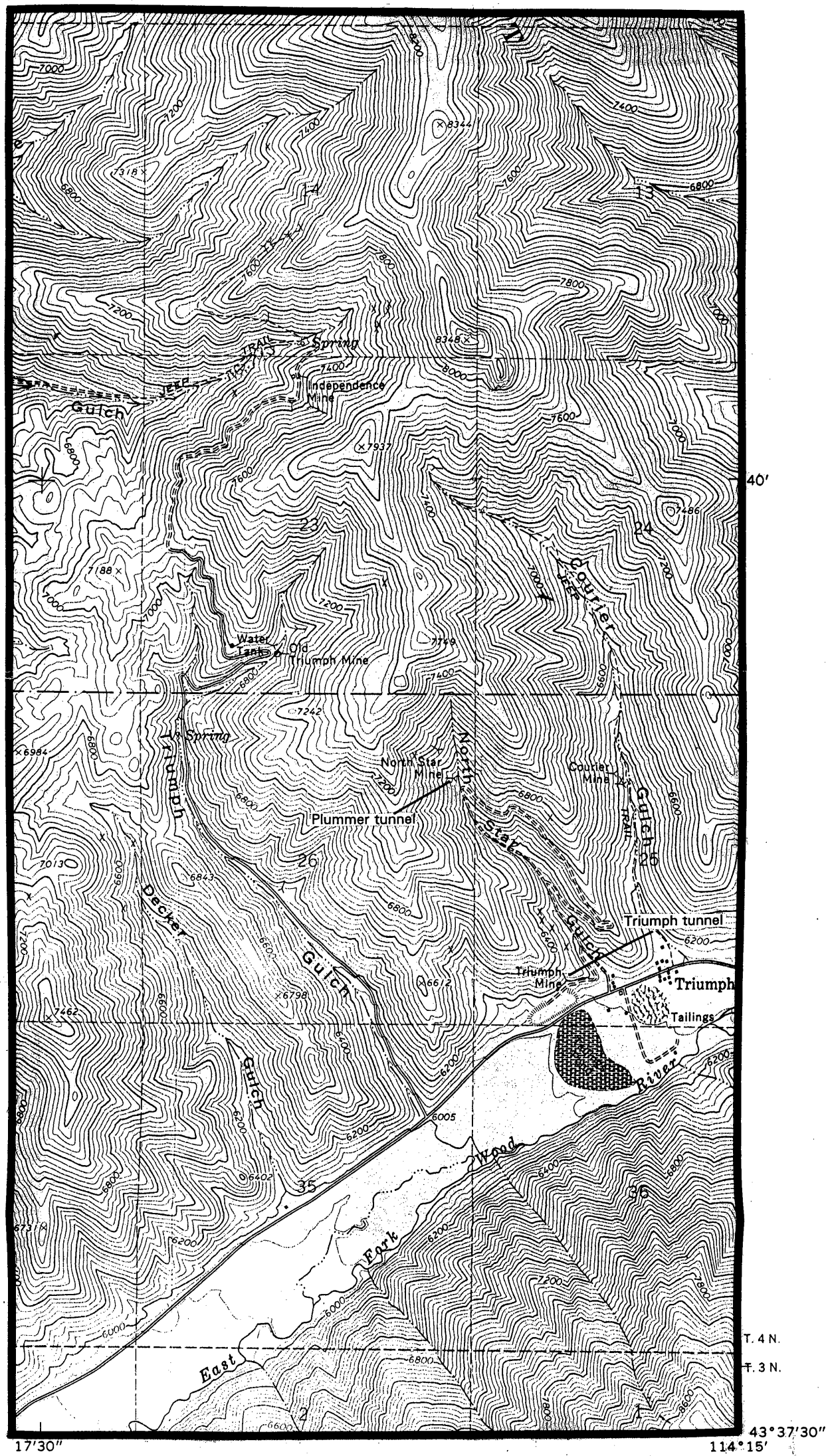


Figure 2. Topographic map of the Triumph-Independence-North Star area, Blaine County, Idaho (U.S. Geological Survey Sun Valley 7.5-minute topographic map).

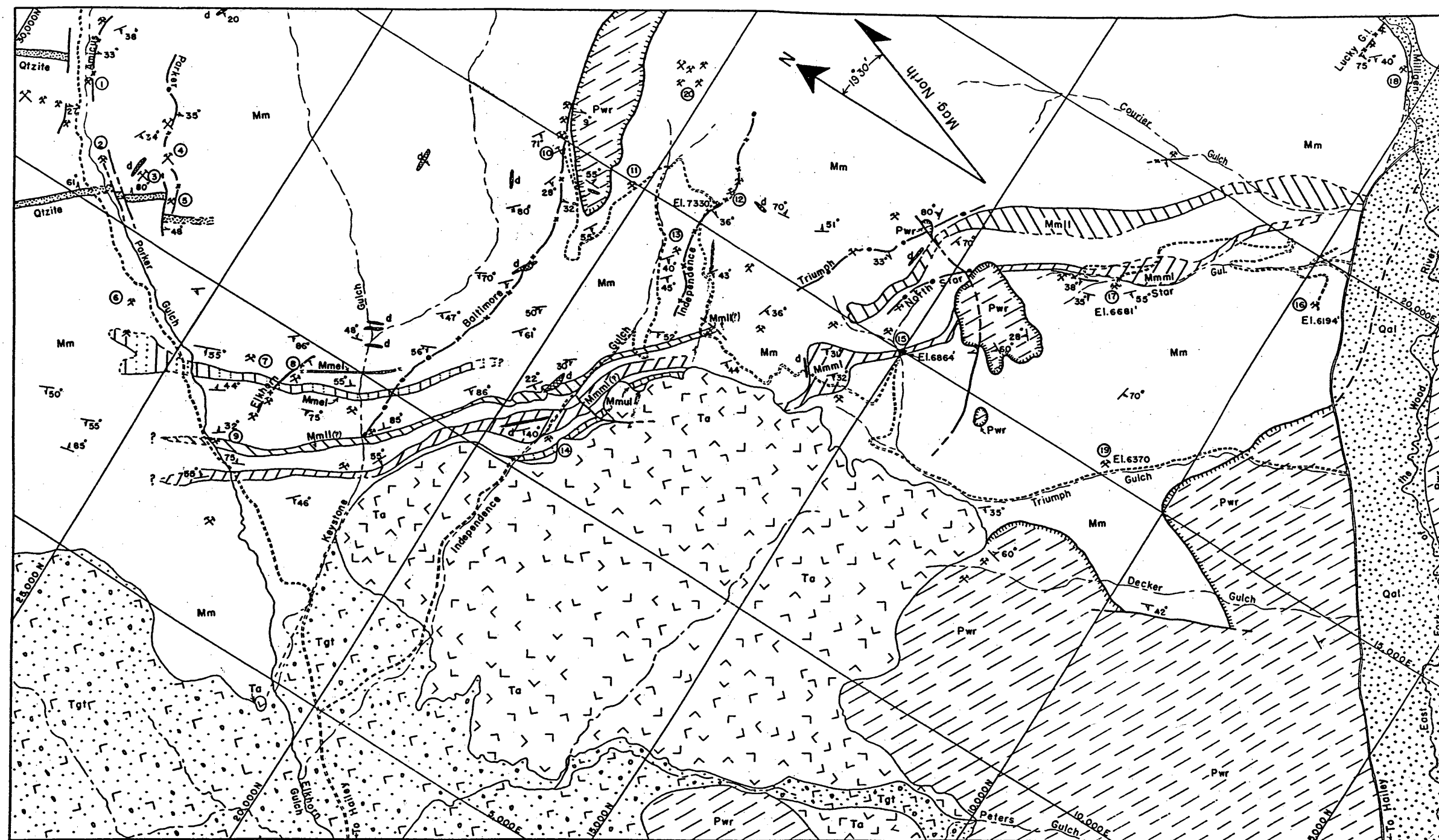


Fig. 16. GEOLOGIC MAP OF THE TRIUMPH—PARKER MINE MINERAL BELT

Geology by T.H. Killsgaard

SEDIMENTARY ROCKS	
	Recent
	Terrace gravel & alluvium
	Miocene?
	Gravel & tuff
UNCONFORMITY	
	Wood River formation
	Penn.
UNCONFORMITY	
	Milligen formation
	Upper limestone
	Middle limestone
	Lower limestone
	Elkhorn limestones

EXPLANATION	
	Mm
	Undifferentiated Milligen formation
IGNEOUS ROCKS	
	Miocene?
	Andesite
	Dikes
	Vein outcrop
	Inferred vein outcrop
	Fault
	Overthrust side
	Thrust fault

	Concealed contact
	Intermittent stream
	Unimproved road
	Strike & dip
	Mines & prospects

MINING PROPERTIES	
1 Amicus	11 Bonanza tunnel
2 Lower Parker	12 Independence adits
3 Montgomery	13 Ida Harlan
4 Blacksmith	14 Lucky Coin
5 St. Louis	15 Triumph Shaft
6 Bald Eagle	16 Triumph tunnel
7 Silver Cord	17 Plummer tunnel (North Star)
8 Elkhorn	18 Lucky G.I.
9 June Day	19 Challenger tunnel
10 Baltimore tunnels	20 Malta group

Note: Geology compiled on aerial photographs, controlled by a triangulated base map.

Figure 3. Geologic map of the Triumph-Independence-North Star area (Figure 16 in Idaho Bureau of Mines and Geology Pamphlet 90).



ore minerals are galena, sphalerite, arsenopyrite and sulphantimonides (tetrahedrite and boulangerite) in a gangue of siderite and quartz. The bedded siliceous ores, which generally occur as replacement of limestone beds in the host rock, consist of galena and sphalerite in a gangue of quartz, siderite, and unmineralized country rock. The "complex" ores consist largely of sphalerite and galena in a pyrite gangue (the term "complex" referred to the metallurgical problems initially found in processing this ore). There is almost a complete replacement of the limestone beds by sulfides in the complex ore. This type of ore constituted the major production from the Triumph. The Independence ores were primarily in mineralized shear zones (Kiilsgaard, (1950).

The Triumph, Independence, and North Star mines were all discovered in the 1880s and operated intermittently for many years. In 1916, Federal Mining & Smelting purchased the North Star Mine. Federal acquired the Independence Mine in late 1917 and connected the two mines through the 6,200-foot Plummer tunnel in 1920. Both the Independence and the North Star were closed down in 1923, except for work by lessees. Snyder Mines, Inc., began operating the Triumph Mine in 1936. In addition, Snyder leased the North Star and connected the workings with the Triumph through the Plummer tunnel. The Independence was leased to Snyder in 1938, and from 1939 on, the three mines were worked as a single operating unit.

Between 1884 and 1967, the Triumph produced \$39,719,400 worth of metals; the North Star produced \$8,685,100 between 1883 and 1942; and the Independence produced \$3,335,800 between 1884 and 1933 (this amount includes material shipped from the Independence dumps in 1963). Table 1 shows the value of the production for the three mines, and Table 2 shows the total amounts of ore mined and metals produced.

## TRIUMPH MINE

The Triumph Mine was discovered in June 1884. Considerable development work was done then and in the 1880s and 1890s. The Triumph produced \$40,000 of ore through 1912 (Table 3; Umpleby and others, 1930). By this estimate, the production given in Table 3 is somewhat low.

In 1909, the Ivanhoe Mining Company was organized to consolidate the separate holdings of the company's founders. Among these properties was the Triumph Group. The company never conducted any mining operations of its own. (Table 4 lists the companies operating at the mine.)

By 1912, the Triumph shaft was flooded. The 1912 IMIR said that the mine "has several extensive levels disclosing a body of massive sulphide ore carrying 8 to 10 per cent lead and an ounce of silver to each unit of lead with very little zinc. This ore resource is from 5 to 8 feet thick and proven to be several hundred feet in length" (p. 81). In 1913, the main shaft of the Triumph was 300 feet deep and the estimated

Table 1. Total production for Triumph, Independence, and North Star mines, in dollars.

	North Star Mine (1883-1942)	Independence Mine (1884-1933, 1963)	Triumph Mine (1883-1958, 1963-1967)	Totals (by metal)
Gold <sup>1</sup>	\$ 1,102,325	\$ 91,813	\$ 2,125,193	\$ 3,319,331
Silver <sup>1</sup>	1,891,262	2,144,438	9,475,320	13,511,020
Copper <sup>1</sup>	97,126	15,144	579,080	691,350
Lead <sup>1</sup>	1,933,600	1,081,905	13,398,494	16,414,000
Zinc <sup>1</sup>	3,660,822	2,516	14,141,322	17,804,660
<b>Totals</b>	<b>8,685,135</b>	<b>3,335,816</b>	<b>39,719,409</b>	<b>51,740,361</b>

<sup>1</sup>Dollar amounts of production obtained by multiplying amount of metal produced during the year by the average metal price for the year. As such, these number represent an estimate of the *gross* output for each mine; no allowances have been made for any operating costs. Metal prices from printed reports by U.S. Bureau of Mines, U.S. Geological Survey, and other sources.

resources of the mine were about 50,000 tons of a grade similar to the adjoining North Star (about 14 percent zinc and 6 percent lead). The Idaho Mine Inspector proposed that a cross-cut tunnel be driven from the East Fork of the Wood River to intersect the Triumph ores at depths between 100 and 1,000 feet and at a distance of about 2,000 feet from the portal. He speculated that such a tunnel would discover "important" additional reserves of ore. The 1913 IMIR (p. 141) placed the gross production of North Star and Triumph Mines at \$75,000.

The 1915 IMIR noted the Triumph and North Star properties were "the subject of serious consideration . . . by one of the ablest mining engineers in the country"; part of the problem lay in finding a suitable method for treating the complex ore at both mines. The report described the ore and the problems associated with its treatment (IMIR, p. 74):

At the North Star and Triumph Mines, . . . an extensive resource of base zinc-lead-silver ore that it is believed will aggregate a hundred thousand tons of mineral above its bottom development levels and carrying about 15 per cent zinc with 8 per cent lead and 8 ounces of silver, is the subject of serious consideration at the present time by one of the ablest mining engineers of the country, Mr. Ralph Nichols, whose worldwide experience as a practical operator of large properties guarantees possible maximum results in working out the problem involved, which is admittedly a knotty one in this instance, as the ore is extremely base by a complication of massive arsenical pyrite association, but, it

Table 2. Total production for the Triumph, Independence, and North Star mines, by metal.

Mine	Ore	Old Tailings	Gold (ounces)	Silver (ounces)	Copper (pounds)	Lead (pounds)	Zinc (pounds)
Triumph Mine (1884-1967)	1,655,091	34,013	60,897	12,051,752	3,526,845	139,229,827	176,295,742
Independence Mine (1884-1963)	162,663	2,653	4,419	2,301,037	102,495	17,528,838	23,775
North Star Mine (1883-1942)	338,918	3,361	35,665	2,593,891	827,382	33,974,077	50,385,871
	2,156,672	40,027	100,981	16,946,680	4,456,722	190,732,742	226,705,388

Table 3. Production for Triumph Mine, by year

Year	Ore	Old Tailings	Gold (ounces)	Silver (ounces)	Copper (pounds)	Lead (pounds)	Zinc (pounds)	Class of ore	Treatment
1884 <sup>1</sup>	10	---	---	1,026	---	11,926	---	---	---
1886 <sup>2</sup>	3	---	---	215	---	2,778	---	---	---
1888 <sup>2</sup>	21	---	---	1,118	---	22,779	---	---	---
1891 <sup>2</sup>	53	---	0.03	4,021	---	80,679	---	---	---
1892 <sup>2</sup>	6	---	4.46	382	---	5,797	---	---	---
1893 <sup>2</sup>	9	---	---	997	---	11,313	---	---	---
1894 <sup>2</sup>	6	---	1.67	411	---	5,171	---	---	---
1927	4,932	---	27.94	41,093	---	740,227	1,272,775	Pb-Zn	Comb. Met., Bauer
1928	17,920	---	111.26	131,239	---	2,446,305	4,139,786	Pb-Zn	Comb. Met., Bauer
1929	26,239	---	125.10	163,108	71	2,858,722	4,837,286	Pb-Zn	O.S.L. Ry/U.S.S./Int'l.
1930	25,030	---	248.88	214,039	---	4,008,787	7,298,472	Pb-Zn	O.S.L.
1933	41	---	.22	531	---	7,842	19,810	Pb-Zn	---
1935	195	---	1.13	2,061	625	30,825	78,114	---	---
1936	33,477	---	197.88	276,634	92,972	4,877,717	8,352,606	---	---
1937	62,083	---	865	437,755	153,458	7,329,347	12,619,350	Zn-Pb, Au-Ag	---
1938	99,918	---	4,010	1,000,549	104,947	14,069,100	22,920,000	Zn-Pb, Au-Ag	---
1939	107,081	---	12,400	1,190,775	241,520	11,111,664	14,921,000	Zn-Pb, Au-Ag-Pb	Comb. Met., Bauer; Tooele
1941	97,267	41	5,548	745,202	211,300	10,599,608	16,984,682	Zn-Pb, Pb, Zn, Fe	Comb. Met., Bauer; Tooele
1942	110,660	218	4,202	636,398	331,938	7,545,150	12,562,704	Zn-Pb, Pb, Zn, Fe	Comb. Met., Bauer; Tooele; Murray; Midvale
1943	108,394	778 <sup>3</sup>	5,732	713,135	330,880	7,241,885	9,354,700	Zn-Pb, Pb, Zn, Fe	Comb. Met., Bauer; Tooele; Murray; Garfield

<sup>1</sup>Production from USGS Bulletin 814; U.S. Bureau of Mines lists production as 3,089 ounces of silver.

<sup>2</sup>Production from USGS Bulletin 814.

<sup>3</sup>U.S. Bureau of Mines Yearbook reports source of tailings was Independence dump.

Table 3 (continued). Production for Triumph Mine, by year.

Year	Ore	Old Tailings	Gold (ounces)	Silver (ounces)	Copper (pounds)	Lead (pounds)	Zinc (pounds)	Class of ore	Treatment
1944	109,727	888	7,455	614,353	251,068	6,603,785	7,706,122	Zn-Pb, Pb, Zn, Fe	Comb. Met., Bauer; Tooele; Murray; Garfield
1945	92,067	---	6,041	457,671	225,075	4,659,450	5,356,670	Zn-Pb, Pb, Zn, Fe	Comb. Met., Bauer; Murray
1946	69,836	---	3,567	413,049	205,100	3,203,940	4,055,000	Zn-Pb, Pb, Zn, Fe	Comb. Met., Bauer; Murray; Tooele
1947	52,169	1,238	2,470	416,207	257,590	3,588,556	5,186,295	Zn-Pb, Pb, Zn, Fe	Comb. Met.; Murray; Midvale; Garfield
1948	35,552	744	2,094	264,166	220,087	2,574,297	3,019,535	Zn-Pb, Pb, Zn, Fe	Comb. Met., Bauer; Midvale; Garfield
1949	49,014	142	2,183	466,325	309,677	4,646,540	3,253,647	Zn-Pb, Pb, Zn, Fe	Comb. Met., Bauer; Midvale; Garfield
1950	44,846	---	1,296	501,395	216,291	5,284,510	2,410,154	Zn-Pb, Pb, Zn, Fe	Comb. Met., Bauer
1951	76,204	1,288	580	499,563	78,414	6,084,466	3,640,138	Zn-Pb, Pb, Zn, Fe	Comb. Met.; Midvale; E.H.; ACM; Garfield
1952	97,050	---	373	629,953	47,054	6,897,813	4,242,733	Zn-Pb, Pb, Zn, Fe	Bauer; Midvale; East Helena; Tooele
1953	93,132	---	227	559,708	81,678	5,146,248	6,048,763	Pb, Zn	East Helena; ACM
1954	77,624	---	250	554,215	70,300	4,828,800	5,168,000	Pb, Zn	---
1955	77,406	---	244	426,735	51,600	4,774,200	3,667,000	Pb, Zn	East Helena
1956	56,555	---	179	345,184		3,606,900	2,775,300	Pb, Zn	East Helena/(illegible)
1957	30,455	---	141	245,679	41,100	2,580,700	2,415,600	Pb, Zn	East Helena; Anaconda; Midvale
1958	109	---	7	1119	300	20,200	34,600	Pb, Zn	Midvale
1964	---	1,311	5	4,127	100	48,900	81,600	Pb-Zn	Tooele
1966	---	18,881	135	46,840	---	762,100	1,005,100	Pb-Zn	B.H.
1967	---	8,484	173	44,774	3,700	910,800	868,200	Pb, Zn	Midvale
<b>Total</b>	<b>1,655,091</b>	<b>34,013</b>	<b>60,896</b>	<b>12,051,752</b>	<b>3,526,845</b>	<b>139,229,827</b>	<b>176,295,742</b>	---	---

Table 4. Companies operating at the Triumph Mine.

Company Name	Officer	Date Incorporated	Charter Forfeited	Year(s) at Mine
Ivanhoe Mining Co.	Fred Clark, President	July 28, 1909	1	1909- <sup>1</sup>
Silver Triumph Mining Co.	Frank Dillon, Manager	Nov. 14, 1919	Dec. 1, 1922	1919-1921
Combined Metals & Reduction Co.	1	1	1	1926
Triumph Development Co.	J.C. Jensen, President/Mgr.	Mar. 28, 1928	Nov. 30, 1928	1928
Hailey Triumph Mines Co.	George W. Snyder, President	Aug. 23, 1929	Nov. 30, 1937	1929-1937
Hailey Tramway Co.	George W. Snyder, President	Aug. 28, 1929	Nov. 30, 1937	1929-1937
The Snyder Mines, Inc.	E.H. Snyder, President	Sept. 23, 1936; May 24, 1940	Nov. 30, 1939; Nov. 30, 1941	1936-1944
Triumph Mining Co.	J.W. Swent, President	Feb. 23, 1940	1	1940-
Mexico-Pacific Mining Co.	Patrick M. Tabor, President	Aug. 1, 1962	changed name to Id.-Pacific Mining Co.	1963
Idaho-Pacific Mining Co.	Patrick M. Tabor, President	name change: Nov. 22, 1963	Nov. 30, 1966	1964
Federal Resources	Nels W. Stahlheim, Pres.	Nov. 29, 1956	1	1964- ?
Triumph Silver Corp.	Betty Lavery	Aug. 20, 1970	Taken over by Triumph Mineral Co.	1970
Triumph Mineral Co., Inc.	Rupert House, President	Nov. 9, 1971	1	1971- <sup>2</sup>
Bear Creek Mining Co.	1	Oct. 22, 1945	1	Exploration: 1978-1979
Ventures West	1	1	1	Exploration: 1981
Getty Oil Co.	1	1	1	Exploration: 1984-1985
Peregrine Mining Co.	1	1	1	Option: 1986

<sup>1</sup>Information not available in IGS's files.

<sup>2</sup>Owner of record.

is believed that the recent advance in the electro-chemical treatments on zinc values will solve the problem of this deposit and transform its idle resources into a mining and milling enterprise of very considerable capacity and profit.

In 1919, Silver Triumph Mining Co. leased, with an option to purchase, the Triumph and Imperial Groups and began cleaning out the old workings. The company planned to install a 100-ton-per-day (tpd) concentrating plant. The Triumph Mine had 5,000 feet of drifts, 2,335 feet of cross-cuts, and a 300-foot shaft. That year, the Mine Inspector credited the Triumph with \$40,000 of lead-silver production "in the early days of Wood River" and reported that the property contained "extensive" resources of ore containing good lead-silver and zinc values. In 1920, Silver Triumph reopened, cleaned, timbered, and laid track in about 2,400 feet of tunnels. (Table 5 shows the development work, men employed, and operating companies at the mine, by year.) The mine had approximately 10,000 feet of tunnels, drifts, crosscuts, raises, and shafts.

According to the 1926 IMIR, Combined Metals & Reduction Co., a subsidiary of the National Lead Co., was working at the Triumph Mine. The report gives no details, and the company did not pursue its interest. However, future production from the mine was processed at Combined Metals' custom flotation plant in Bauer, Utah, for most of the time the mine was operating.

In 1927, the Triumph Development Co. leased the Triumph Group from the Ivanhoe Mining Co. Triumph constructed a head frame and new buildings, and installed mining equipment, including an electrically driven double-drum hoist and a 700-cubic-foot compressor. After dewatering and repairing the shaft, production was started at 50 tpd (later increased to 75 tpd). The ore was shipped to a custom milling plant at Salt Lake City, which produced both lead-silver and zinc concentrates. The Mine Inspector noted (IMIR, p. 75), "The reopening and subsequent profitable operation of this mine were made possible by selective flotation, whereby mixed lead-zinc ores can now be treated which could not be separated by gravity concentration methods." The total workings in 1927 were about 7,000 feet, with development on three levels from a 300-foot deep shaft.

The following year, Triumph Development Co. produced 75 tpd until September. The Triumph produced over 17,000 tons of ore in 1928. The ore consisted chiefly of sphalerite and galena, and was separated into lead and zinc concentrates at the Combined Metals Reduction Co. plant. In 1928, the Triumph ranked fourth in the state as a producer of zinc, tenth as a producer of silver, and thirteenth as a producer of lead. In September, production was suspended while the company sunk the winze on the No. 3 level to a greater depth and constructed a mill near the railroad siding of the Oregon Short Line Railroad. The company also surveyed the route and made plans to construct a 4.1-mile-long tramway from the mine to a point adjacent to the railway (Figure 4).

The aerial wire rope tramway was built by the Broderick & Bascom Rope Co. of St. Louis and had a capacity of 20-32 tons per hour (150 tons per 8 hours). It was

Table 5. Development work, employment, and operating companies at the Triumph Mine.

Year	No. of Men employed	Tunnels (feet)	Sinking (feet)	Cross-cutting (feet)	Drifting (feet)	Raising (feet)	Operator
1920	4	---	---	---	---	---	Silver Triumph Mining Co.
1927	40	---	---	---	---	---	Triumph Development Co.
1928	65	---	---	---	---	---	Triumph Development Co.
1929	85	---	400	---	---	---	Hailey Triumph Mines Co.
1930	75	---	235	450	900	---	Hailey Triumph Mines Co.
1931	60	---	400	425	650	---	Hailey Triumph Mines Co.
1936	150	---	---	---	---	---	Snyder Mines, Inc.
1937	175	---	---	---	---	---	Snyder Mines, Inc.
1938	200	---	---	---	---	---	Snyder Mines, Inc.
1939	208	---	---	700	6,300	---	Snyder Mines, Inc.
1940	250	---	220	750	5,560	---	Snyder Mines/Triumph Mining Co.
1941	250	1,300	70	---	2,500	---	Snyder Mines/Triumph Mining Co.
1942	266	2,250	50	---	2,500	---	Snyder Mines/Triumph Mining Co.
1943	295	3,300	300	300	1,600	---	Snyder Mines/Triumph Mining Co.
1944	258	2,480	150	500	4,000	---	Snyder Mines/Triumph Mining Co.
1945	225	---	---	1,100	2,900	3,000	Triumph Mining Co.
1946	180	---	---	---	3,800	2,100	Triumph Mining Co.
1947	200	---	---	---	4,456	1,410	Triumph Mining Co.
1948	175	---	410	654	4,334	796	Triumph Mining Co.
1949	125	---	---	497	4,906	1,266	Triumph Mining Co.
1950	125	---	---	1,102	1,735	2,673	Triumph Mining Co.
1951	135	---	543	1,405	2,000	2,000	Triumph Mining Co.
1952	175	---	220	140	5,100	2,300	Triumph Mining Co.
1953	160	---	181	215	3,150	1,534	Triumph Mining Co.
1954	147	---	---	110	1,572	1,432	Triumph Mining Co.
1955	130	---	229	829	1,856	921	Triumph Mining Co.
1956	130	---	---	373	3,044	1,973	Triumph Mining Co.
1957	75	---	---	1,485	836	672	Triumph Mining Co.
1958	35	---	---	600	---	---	Triumph Mining Co.
1964	10	---	---	---	---	---	Idaho-Pacific Corp.



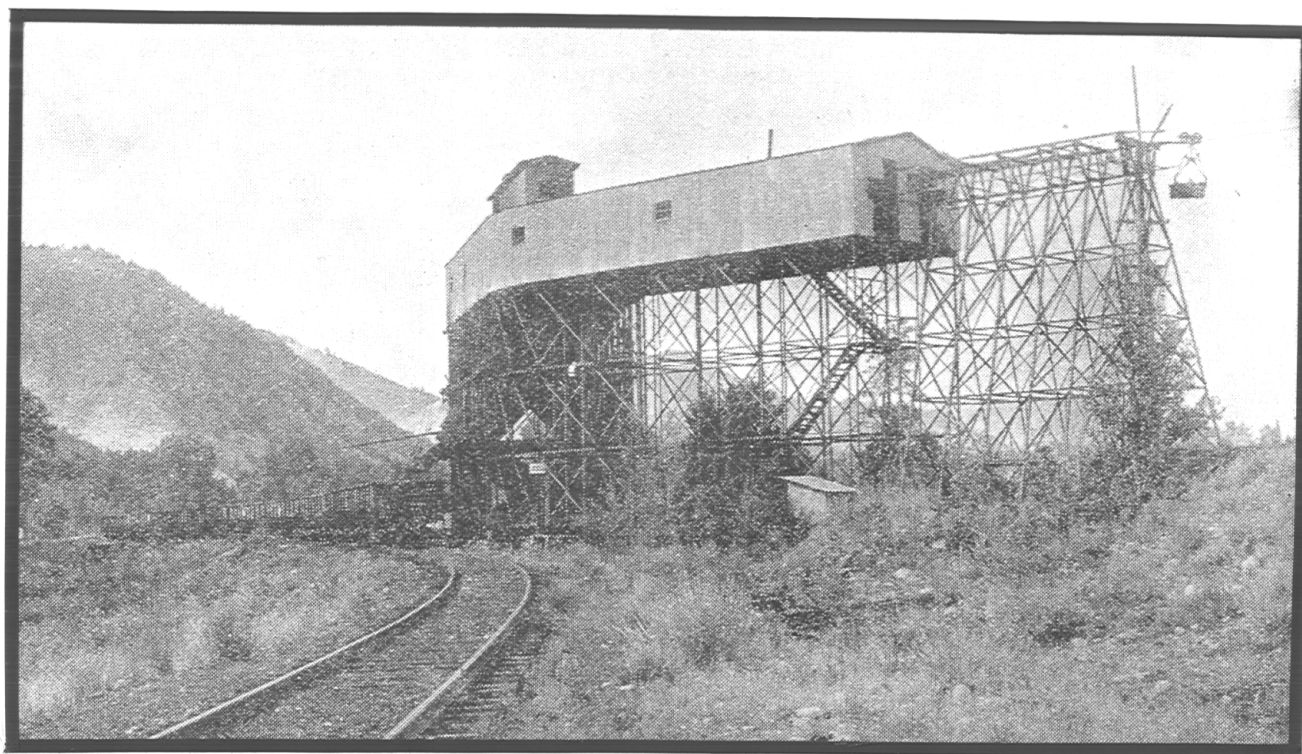


Figure 4. Lower terminal of Triumph Mining Company's tramway, 1939 or 1940 (page 158 in Campbell, Arthur, 1942, Forty-third annual report of the mining industry of Idaho for 1941).

operated by the Hailey Tramway Co., which was incorporated on August 28, 1929, and had the same officers as the Hailey Development Co. The tramway was completed in January 1930. The company hauled ore under contract from the Triumph Mine to the railroad. The Hailey Tramway Co. owned a block of mining claims along the tramway's right-of-way. These claims apparently were to be developed for the company by Hailey Triumph Mines Co., but little work was ever done. The Hailey Tramway Co. forfeited its corporate charter on November 30, 1937.

The Triumph Development Co. forfeited its charter on November 30, 1928, and operations were taken over by the Hailey Triumph Mines Co., which was incorporated on August 23, 1929. According to the company, principal development work consisted of extending the winze on the No. 3 level 400 feet, which was equal to 200 feet below the bottom of the shaft. (The USBM gives the development as 300 feet of inclined winze and 1,000 feet of drifts.) This work opened up a "substantial tonnage" of ore containing galena and sphalerite; some of the new reserves were close to the adjoining North Star property. The Warm Springs district produced 26,647 tons of lead-zinc ore during 1929, mostly from the Triumph; the mine was the sixth largest producer of zinc in the state. A large bunk and boarding house and a number of new homes were built during the year; considerable mining equipment was added as well. Total development of the mine was given as approximately 13,000 feet. (Figure 5 shows the claim locations and the mine workings at about this time.)

Production and development continued until June 20, 1930. At that time, production was suspended, but development continued with a crew of 20-30 men until September, when all operations ceased due to decreases in metal prices. Lead and zinc prices decreased from 1925 to 1932, and zinc, lead, and silver all reached historic lows in 1932 (zinc, 2.9 cents per pound; lead, 3.2 cents per pound; and silver, about 28 cents per pound). The crude ore, containing mostly sphalerite and galena, was shipped to Combined Metals Reduction Co. in Bauer, Utah. Even with the reduced operations, the Triumph was the second largest zinc producer in Idaho and ranked eleventh in the state in the production of both silver and lead. Additions to the mine and plant in 1930 included doubling the capacity of the sorting plant and bins. The mine had 17,775 lineal feet of workings, consisting of 425 feet of vertical shafts, 650 feet of inclined shafts, 4,100 feet of raises, and 12,650 feet of tunnels, crosscuts, and drifts. Daily wages were \$4.75-\$5.25 for miners, \$4.25-\$4.75 for muckers, and \$5.00 to \$6.00 for blacksmiths and hoistmen.

Although company reports show some development work took place during 1931, the mine was idle most of the year. It remained idle through 1935, although one lessee removed some ore. One carload of lead-zinc ore was shipped to Bauer, Utah, in 1933.

In 1934, the Silver Purchase Act became law. Under this act, the federal government bought all domestically mined silver at a substantial premium over the

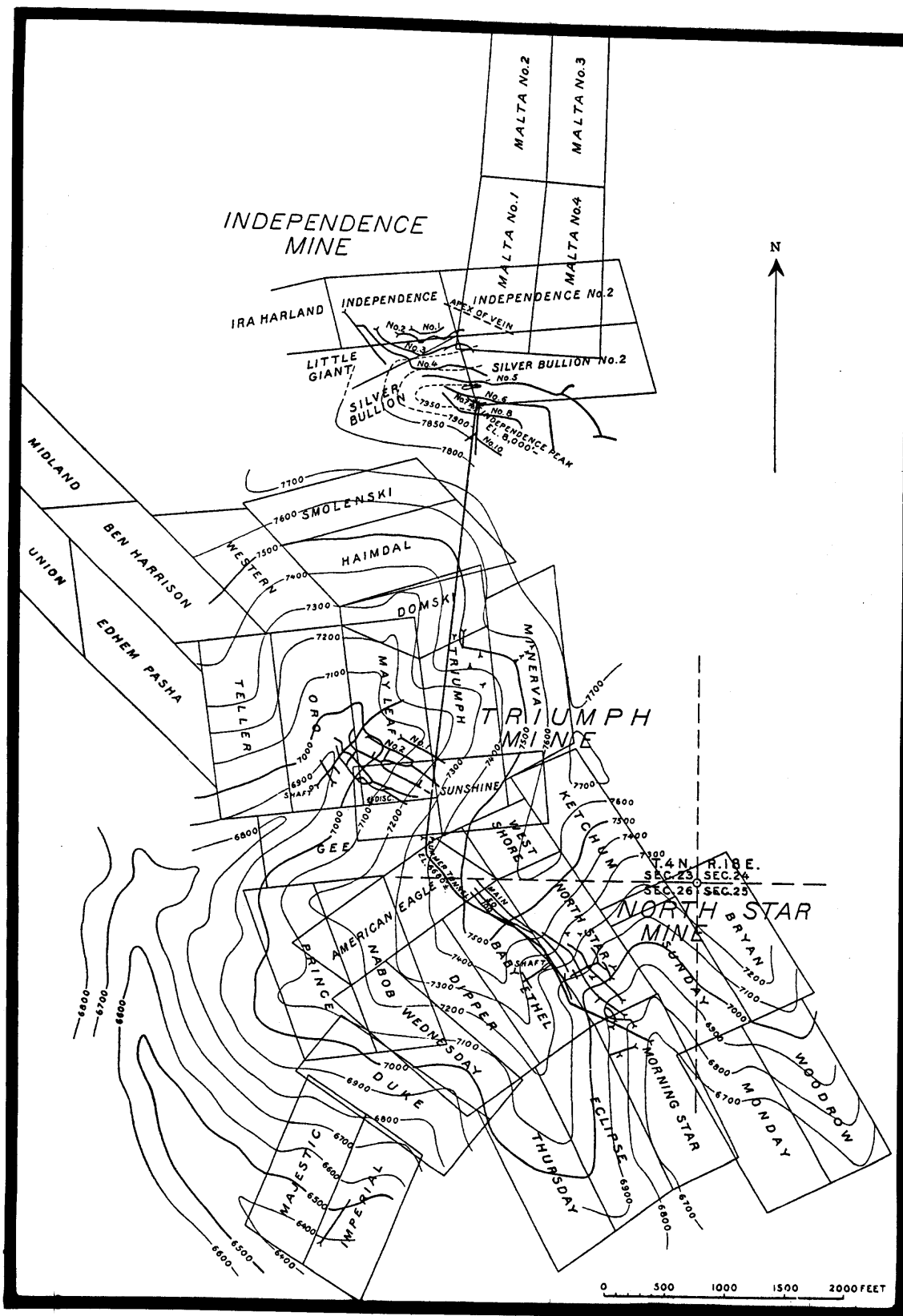


Figure 5. Claim map of Triumph-Independence-North Star area (c. 1930).  
Topography shows relationship to Figure 2 (Plate 22 in U.S. Geological  
Survey Bulletin 814).

world market price from 1934 to 1964. Many mines throughout the West made preparations to reopen after closing early in the Great Depression.

A little lead-zinc ore was shipped from the Triumph waste dumps in 1935. The company began dewatering the Triumph Mine on December 15, 1935. Mining operations began on April 15, 1936, by Snyder Mines, Inc. The company was also working the West Shore claims between the Triumph and North Star shafts. The West Shore claim was listed as part of the original Triumph Group, but the ownership of this claim was given at different times as the Triumph, the North Star, and an independent unit. During 1936, Snyder took over the North Star from Federal Mining and Smelting Company and connected it with the Triumph Mine. Federal received a 9 percent interest in future production but would not operate the property. The Triumph shipped about 215 tons of ore a day to the railroad over its tramway, making it the largest mine in Blaine County. The mine operated continuously from 1936 to 1957, and for most of that period, the Triumph was the largest producing mine in Idaho outside the Coeur d'Alene district.

In 1937, Snyder continued to operate the Triumph, while work on the North Star and Independence was carried out by lessees. The ore was shipped to Utah for treatment. The Triumph was the second largest producer of zinc in Idaho in 1938, as well as ranking fourth in lead production and sixth in silver. Hailey Triumph Mines forfeited its charter on November 30, 1937. Snyder Mines carried on an extensive development program during 1938.

During 1938, the Challenger Mines Co. began work on the adjoining Snider Group (Pete Snider Claims). (There is no connection between the Pete Snider who owned these claims and lived in Hailey, and the Snyders from Salt Lake City, Utah, who controlled Snyder Mines, Inc.) The company did 1,000 feet of development work in 1940. On December 11, 1943, Challenger Mines signed a joint working agreement with the Triumph Mining Co. (incorporated in 1940) for Triumph to develop the property. World War II delayed work under this agreement, but by July 1947, Triumph Mining Co. was driving two drifts toward the Snider claims and had reached the property line. Some ore was shipped in 1949, but according to Challenger Mines Co., not enough for Triumph Mining Co. to recover the costs of developing the property. Challenger Mines reported that Triumph Mining continued working on its property through 1956.

Snyder built a hoist house and did about 7,000 feet of development work during 1939 on the Triumph, North Star, and Independence mines. (Figure 6 shows the claims and mine workings at this time.) The property was worked through the Plummer tunnel and the Triumph shaft. Approximately 10,000 tons of complex silver-lead-zinc sulfide ore, with a fair gold content, was produced every month. About 65,000 tons of zinc-lead ore was shipped to Combined Metals Reduction Co.'s flotation plant at Bauer, Utah, while 41,461 tons of gold-silver ore and 682 tons of lead ore were shipped to a smelter at Tooele, Utah. The mine was the largest

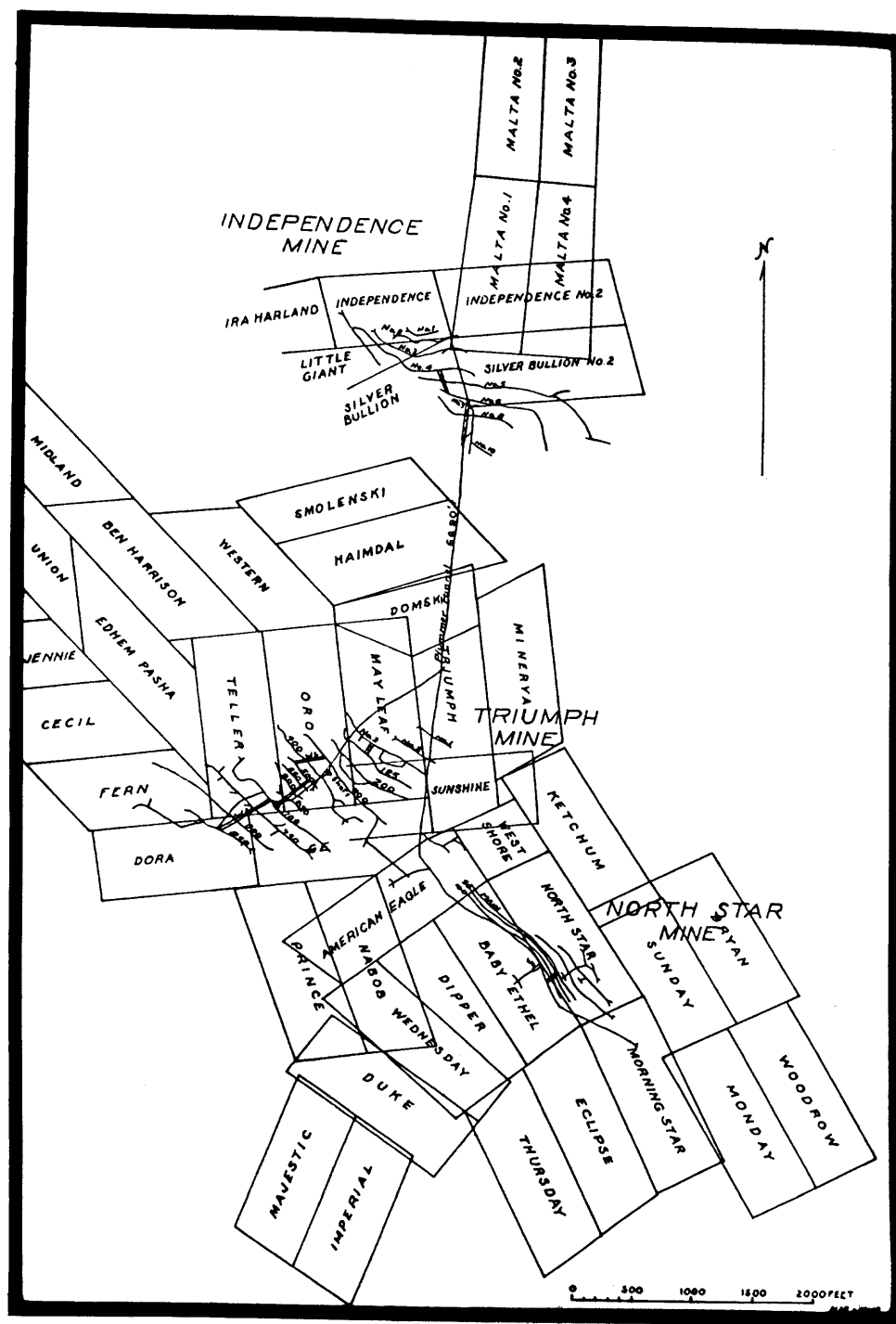


Figure 6. Claim map of Triumph-Independence-North Star area, 1939. Note the expansion of the Triumph workings over that shown in Figure 4 (page 160 in Campbell, Arthur, 1940, Forty-first annual report of the mining industry of Idaho for 1939).

producer of gold in Idaho in 1939, and it ranked third in zinc production, fourth in silver, and fifth in lead. In September, fire destroyed the boarding house which held the general and engineering offices. Snyder Mines, Inc., forfeited its charter on December 1, 1939.

Snyder Mines continued to operate the mines until March 16, 1940, when the property was formally transferred to the newly incorporated Triumph Mining Co. Even then, Snyder managed the property almost until the end of the war. Additions to the mine and plant during 1939-1940 included a new hoist house (the hoist was a 48-inch double drum Ottumwa), head frame, change house, general office, and time keeper's office (Figure 7). Other mining equipment included 100 ore cars, 3 underground hoists, 3 mucking machines, 45 air drills, and 14 slusher hoists. A partially dismantled 150 ton mill was on the property, but (in the company's words) was "not in use." Total combined workings of the three mines were given as about 50,450 feet; 20,750 feet of the workings were on intermediate levels of the Triumph Mine. Daily wages were \$5.80 for miners, \$5.30 for muckers, and \$6.30 for hoistmen and blacksmiths. The Triumph was the fourth largest producer of gold in Idaho in 1940. It was also among the top five zinc producers for the year and was a significant producer of lead and copper.

A new compressor house was built at the Triumph tunnel in 1941; it housed a Worthington 2,600-cubic-foot compressor with a 400-horsepower motor. A new change house and a new blower house were also added, and plans were made for a concentrating plant. The 300-tpd gravity concentration and flotation plant at the old North Star mill was reconditioned and put into operation in 1942. The mill treated 32,512 tons of low-grade zinc-lead-silver ore that could not be profitably mined in 1941.

The ore grade mined in 1942 was lower than that mined in 1941. During World War II, the U.S. government assigned production quotas to base metal mines based on 1941 production, with premiums to be paid on production in excess of the quotas. Triumph Mining Co. was granted a basic quota of about 550 tons of lead and 900 tons of zinc per month; at the company's request, this quota was revised several times. Although production remained at capacity throughout the war, the mining of lower grade ores kept the amount of metals recovered below 1941 levels for most years.

In 1943, the Triumph Mine was on the list of the top ten producing mines in Idaho for each of the following commodities: gold, silver, copper, lead, and zinc. The Triumph tunnel was driven for several thousand feet along the strike of the North Star vein, and several new ore shoots were discovered. The mine shipped 74,889 tons of zinc-lead ore to custom flotation mills at Bauer and Tooele, Utah, for treatment. The concentrating plant at Triumph treated 33,505 tons of marginal zinc-lead ore, which yielded 9,431 tons of zinc-lead middlings. The middlings were shipped to Utah, and 778 tons of old tailings (lead-silver) was sent from the Independence dump.

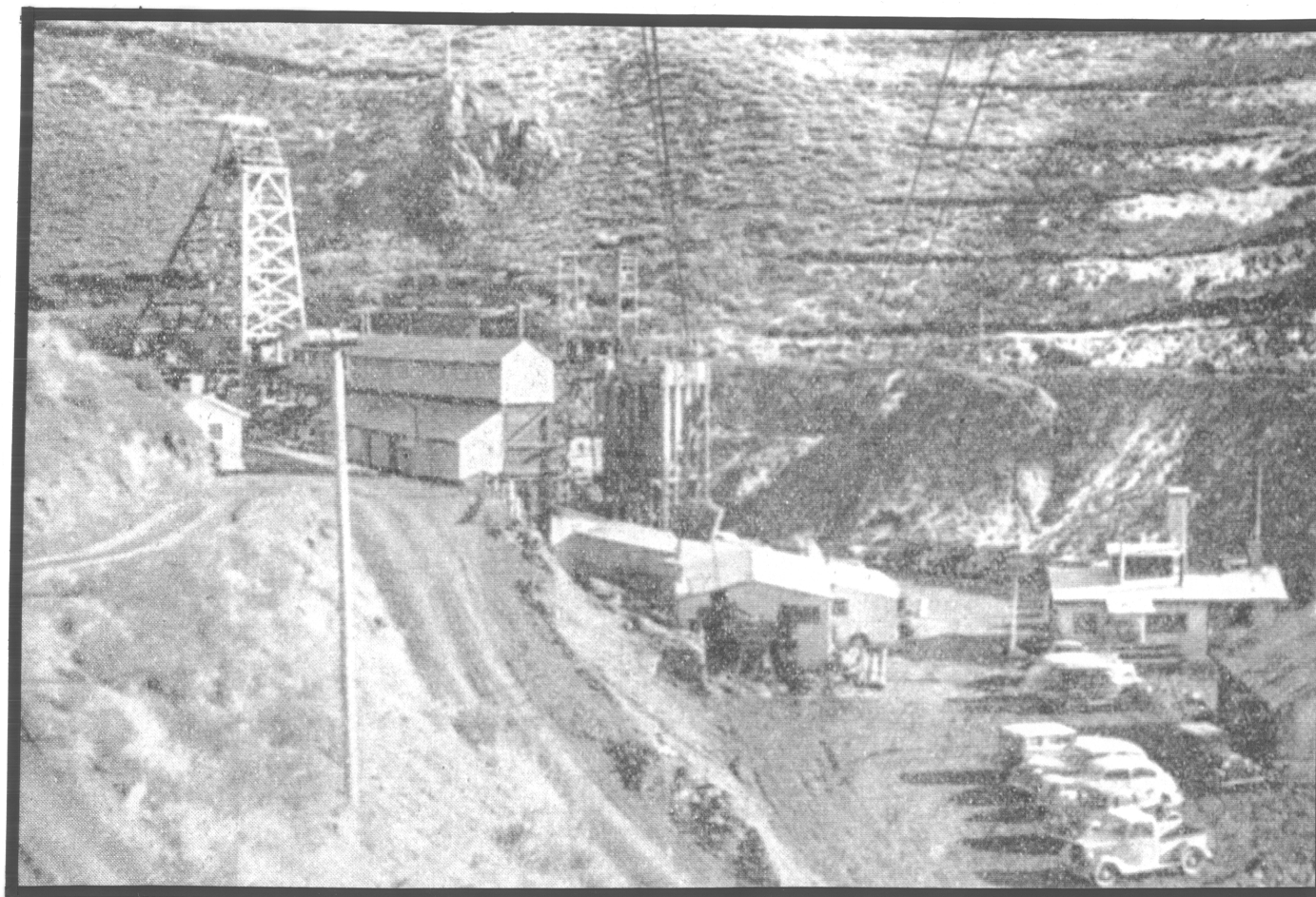


Figure 7. Triumph Mining Company's surface plant, 1939 or 1940 (page 157 in Campbell, Arthur, 1942, Forty-third annual report of the mining industry of Idaho for 1941).



In 1944, the company completed work on the 8,000-foot Triumph tunnel, and transferred operations from the Triumph shaft. The Triumph tunnel was a lower-level haulage tunnel intended to bypass the bottleneck of the Triumph shaft; it was driven from near the North Star mill to intersect with the 700 level of the Triumph workings. New change rooms, ore bins, a timber framing shed, and a blacksmith and car repair shop were built at the Triumph tunnel portal. The company processed 52,060 tons of low-grade lead-zinc-silver ore through its concentrator, recovering 13,349 tons of zinc-lead middlings and 2,893 tons of lead-silver concentrates. The middlings and 57,667 tons of higher grade zinc-lead-silver ore were shipped to Bauer and Tooele. The concentrates were shipped directly to a lead smelter. An additional 888 tons of old (silver) tailings was shipped to a copper smelter.

The company added a new 40-foot Dorr thickener to the old North Star mill in 1945. Total mine workings were 76,000 feet. There were 7 tunnels, 4 shafts, and 20 intermediate levels. The principal shaft was 700 feet deep. Daily wages were \$7.65 for miners, \$7.18 for muckers, \$8.63 for blacksmiths, and \$8.12 for hoistmen. During 1945, the company treated 61,695 tons of low-grade zinc-lead-silver ore at its gravity flotation plant and recovered 1,593 tons of lead-silver concentrates and 17,722 tons of zinc-lead middlings. The middlings were shipped to Bauer, Utah, along with 30,372 tons of higher grade zinc-lead-silver ore. The lead-silver concentrate was shipped directly to a lead smelter.

Although lead, zinc, and silver prices increased in 1946, production from the Triumph decreased from 92,067 tons in 1945 to 69,836 tons in 1946. Part of the reason was a strike that started on April 12 after two employees were discharged for allegedly blasting timbers in the mine. Miners went back to work on June 3. Terms of the agreement with the union included an 18.5-cent-an-hour raise, effective April 1; half of the increase was made retroactive to September 15, 1945. The company treated 56,799 tons of ore in its mill and produced 15,036 tons of zinc-lead middlings and 2,474 tons of lead-silver concentrate. The concentrates were shipped to a lead smelter; the middlings, plus 13,037 tons of zinc-lead-silver ore, were shipped to the Combined Metals mill in Utah.

Fire destroyed the old North Star mill on January 18, 1947 (Figure 8). The mill was valued at over \$300,000 (Mining World, 1951). In spite of this, the company treated 3,790 tons of ore in its own mill and shipped 48,379 tons to Utah for processing. In addition, 1,063 tons of zinc-lead ore and 175 tons of silver ore from the Triumph dumps were shipped during the year by lessees. An extensive development campaign was started to develop sufficient reserves to justify building a new mill (Mining World, 1951).

The Triumph Mine remained the largest producer in southern Idaho in 1948 despite substantial decreases in production. Triumph Mining Co. shipped 35,552 tons of ore to milling plants in Utah, while lessees shipped 744 tons of zinc-lead ore from the Triumph dumps.



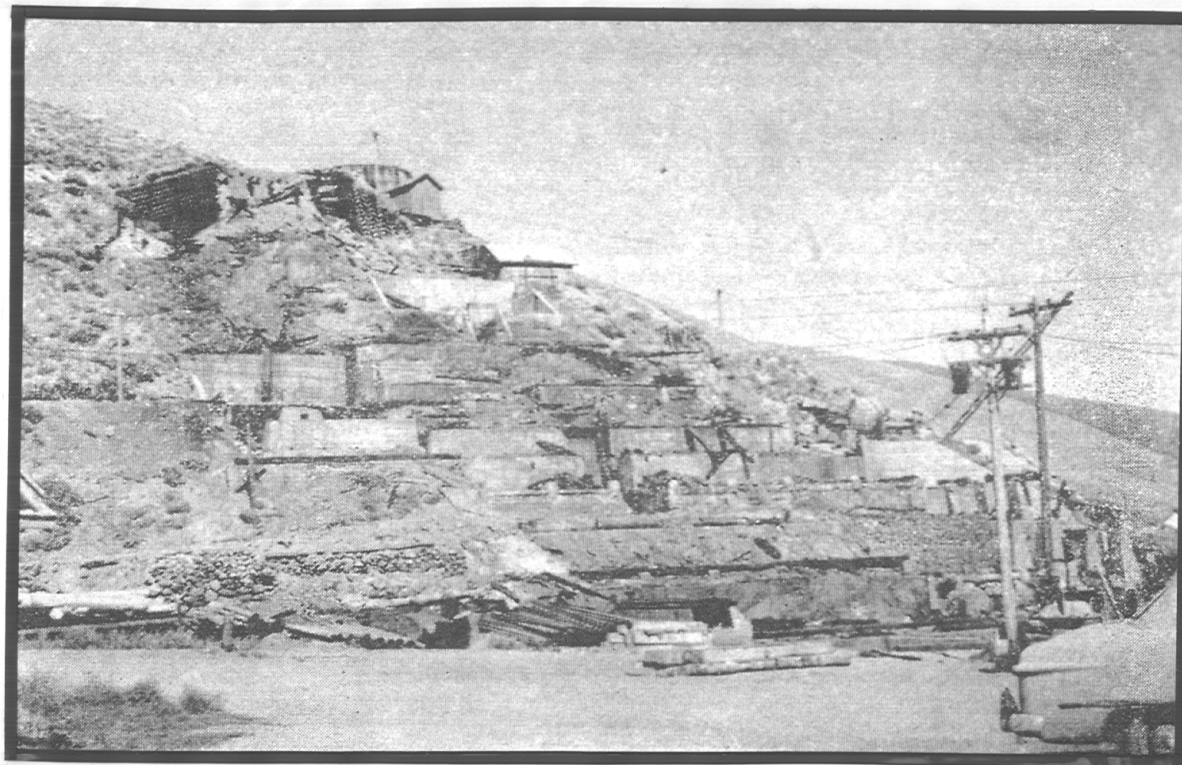


Figure 8. Rubble and the concrete foundation of the Triumph (old North Star) mill, which burned in 1947 (p. 22 from Mining World, 1951).

Production from the Triumph increased in 1949. The company shipped 49,014 tons of ore to milling plants in Utah, where it was reduced to 4,446 tons of lead concentrate, 4,180 tons of iron concentrate, and 3,044 tons of zinc concentrate. Lessees shipped 102 tons of zinc-lead ore and 40 tons of silver ore from the Triumph dumps. In 1949, the total development for the mine was 100,563 feet. (Figures 9 and 10 show a map and cross section of the mine.) The mine had 7 tunnels, 4 shafts, 20 raises, 20 cross-cuts, and 27 drifts. The principal shaft was 700 feet deep, and the lengths of the tunnels were as follows: No. 1, 13,000 feet; No. 2, 5,000 feet; No. 3, 800 feet; No. 4, 350 feet; No. 5, 1,800 feet; No. 6, 250 feet; and No. 7, 200 feet. Daily wages in 1949 were \$11.05 for miners, \$10.58 for muckers, and \$11.40 for blacksmiths and hoistmen.

The 1950 production declined from that of 1949, and all the ore was shipped to Utah for processing. In 1951, Triumph Mining Co. installed a new 300-ton selective flotation mill to replace the mill destroyed in 1947 (Figures 11 and 12). The new mill was touted as a model of efficiency, with a layout that made it possible to operate at capacity with a minimum of personnel. It had been designed to process at 175 to 200 tpd, but was operated at rates up to 350 tpd (Engineering and Mining Journal, 1952). Mining World (1951, p. 24-26) described the operation of the new mill:

#### **Primary crushing**

A 30-inch Stevens-Adamson apron feeder transfers the ore from the bins to a 30-inch belt conveyor. A grizzly at the end of the conveyor separates the ore into two fractions—plus and minus two inches. The coarse fraction is crushed to minus two inches by a 15- by 24-inch Blake-type, Traylor jaw crusher which the finer fraction bypasses.

An 18-inch belt conveyor then transfers the ore to a 300-ton steel bin at the head of the main mill building. From this bin the ore is taken by a 24-inch vari-speed feeder conveyor to the 48-inch Wemco Special Helix classifier that removes as slime the troublesome carbon, bypassing it around the secondary crushing and grinding sections.

#### **Secondary crushing & grinding**

The sands from the classifier are transferred by an 18-inch conveyor to a three by eight foot Allis-Chalmers Ripl-Flo screen where the ore is again separated into two fractions—plus and minus ½ inch. The coarser material is crushed to minus ½ inch by a Symons cone crusher. The fine fraction and the crushed coarse fraction are then joined and fed to a seven by six foot Allis-Chalmers ball mill operating in closed circuit with a 36-inch Wemco Special Helix classifier that receives the overflow from the primary classifier in the crushing circuit.

#### **Flotation**

Overflow from the second classifier is pumped to the lead flotation circuit made up of 44-inch Fagregren-type Wemco cells. Six cells are used in the rougher circuit, two in the primary cleaner, and one in the secondary cleaner. The lead concentrate, after being dewatered by a 20-foot Wemco thickener and a six-foot, two-leaf Eimco filter, is temporarily stored in a 75-ton steel concentrate bin.

Tailing from the lead circuit flows by gravity to a five by six foot Wemco conditioner in preparation for zinc flotation. After flotation in a circuit similar to that for

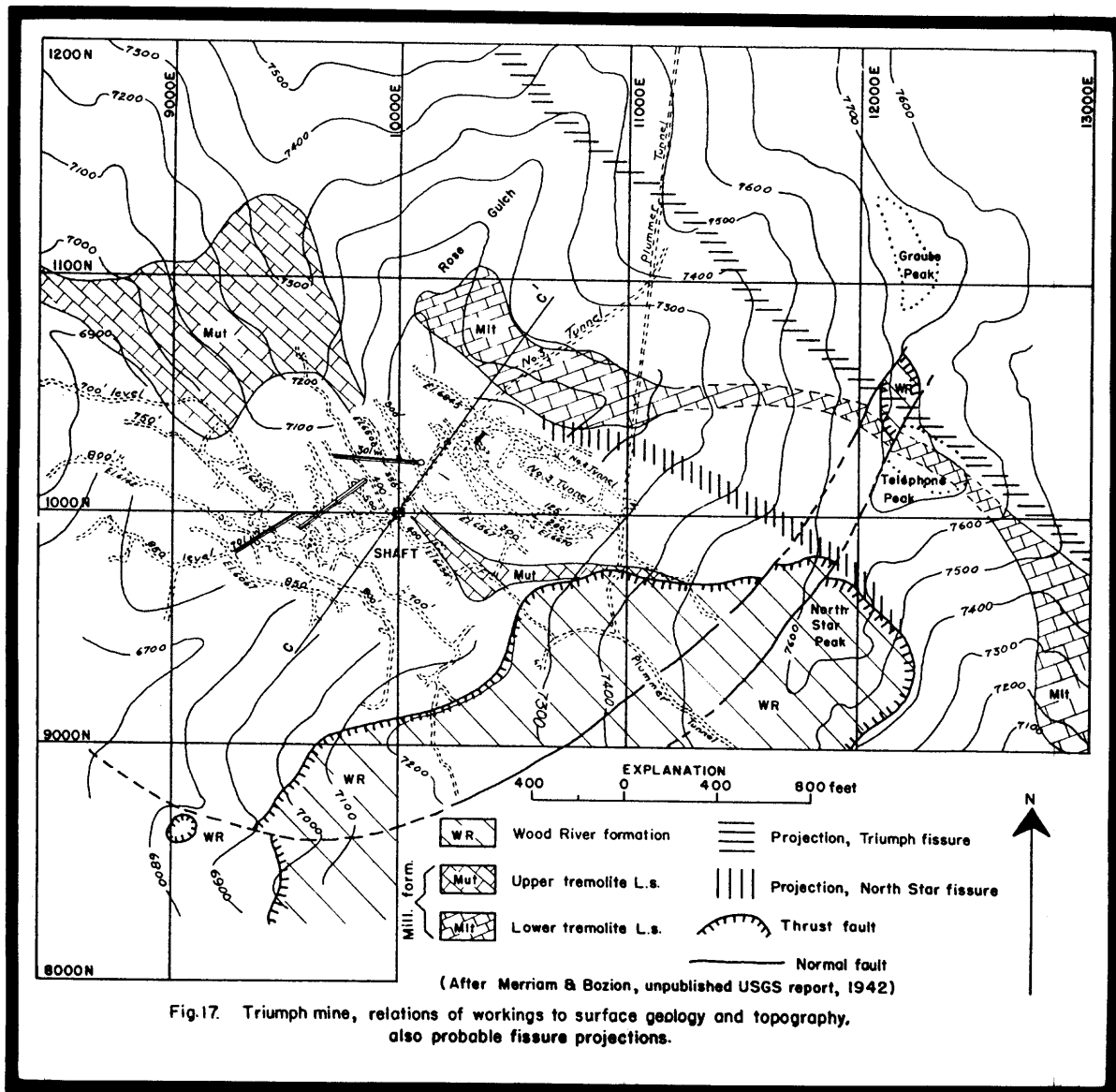


Figure 9. Geologic map of the Triumph mine, showing topography and surface projections of the workings (Figure 17 in Idaho Bureau of Mines and Geology Pamphlet 90).

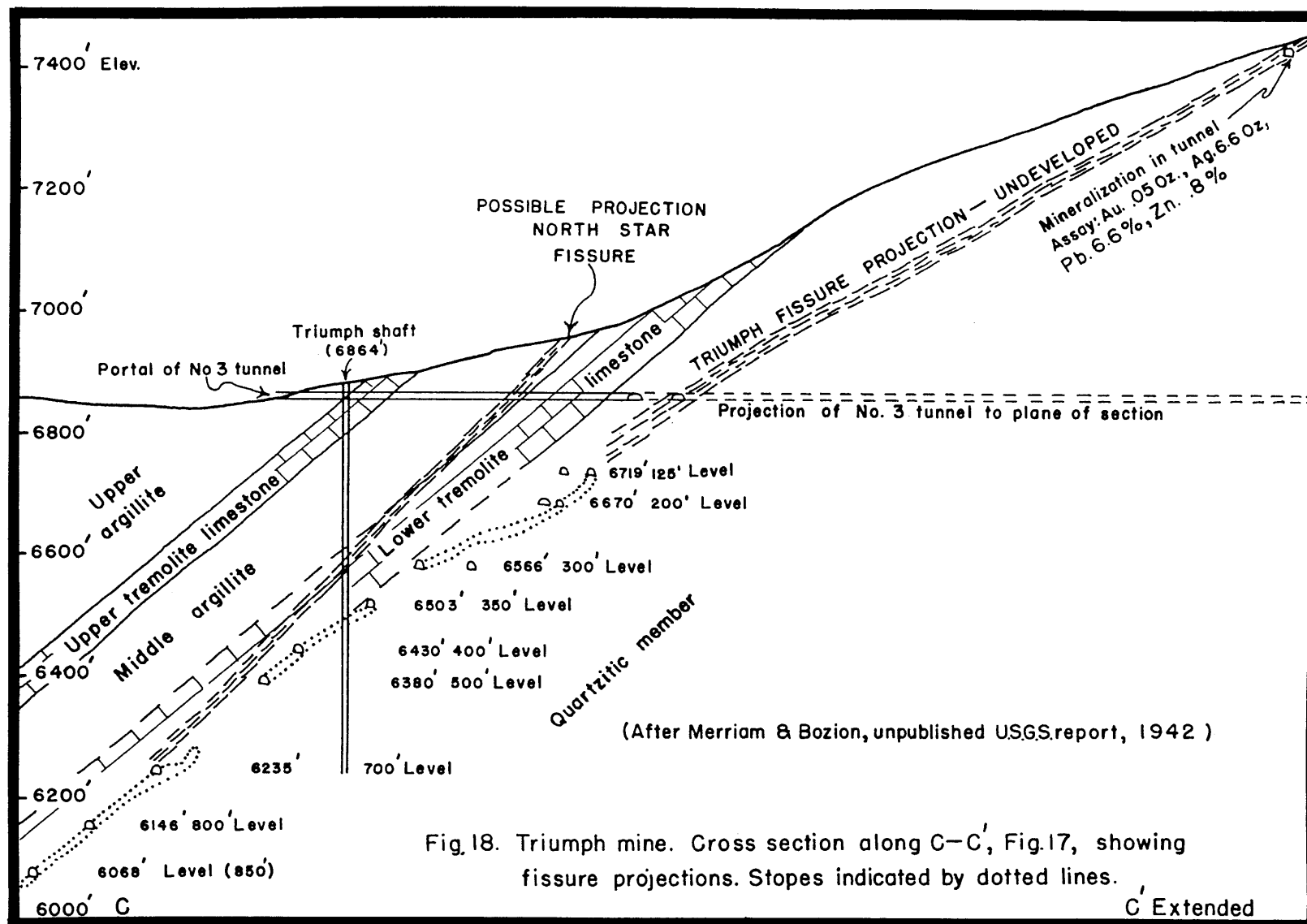


Figure 10. Cross section of the Triumph Mine (Figure 18 in Idaho Bureau of Mines and Geology Pamphlet 90).

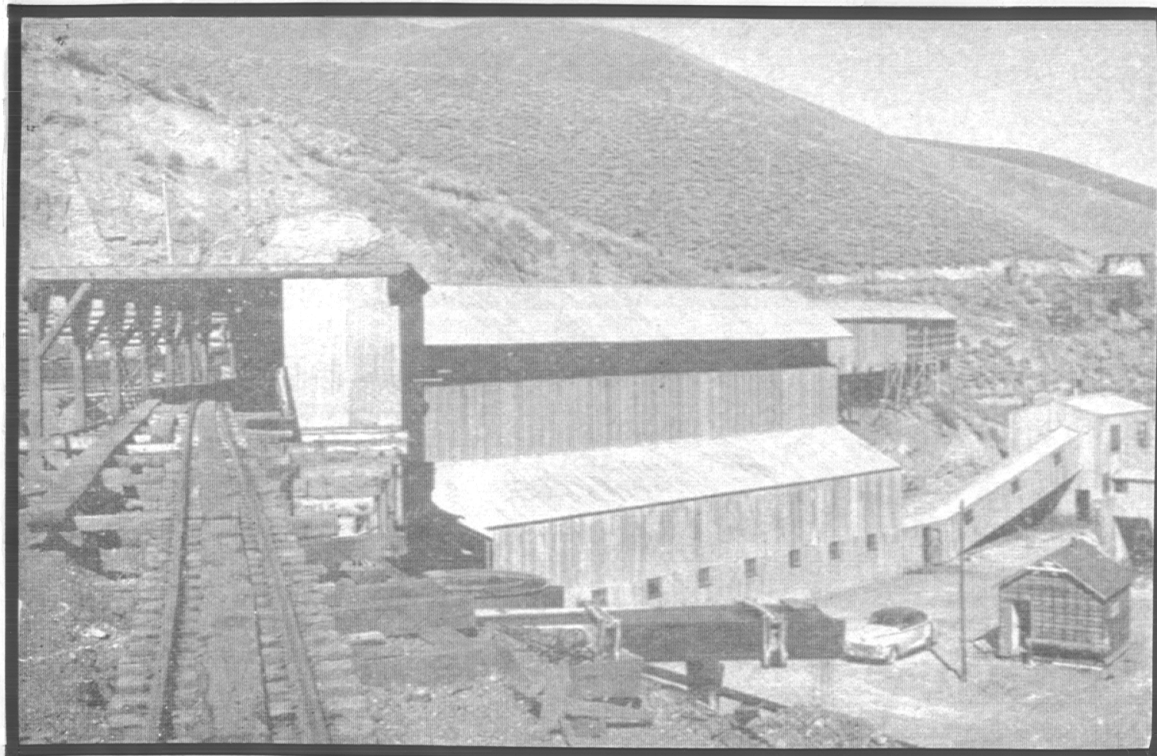


Figure 11. Upper part of Triumph Mining Co.'s new mill. The tracks on the left lead to the grizzly of the coarse ore bin and the crusher house. The conveyor on the right leads to the lower mill buildings, shown in Figure 12 (page 22 from Mining World, 1951).

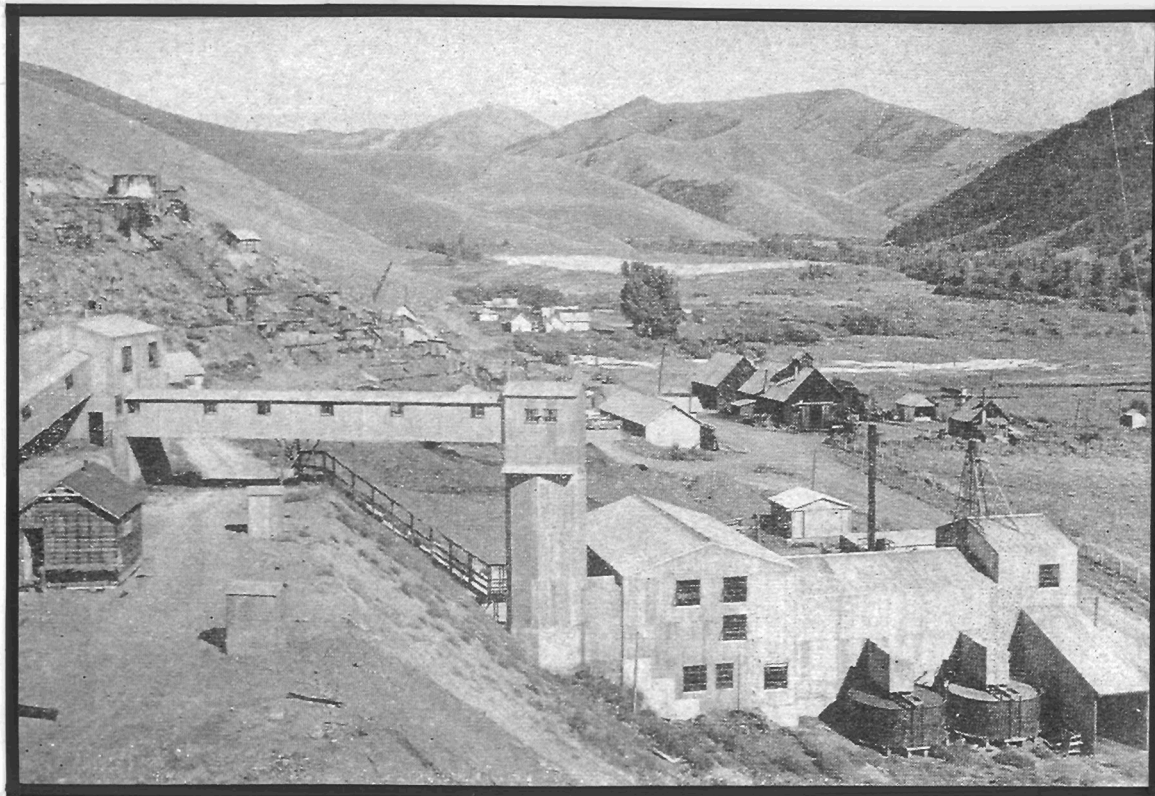


Figure 12. Lower part of Triumph Mining Co.'s new flotation mill, with the foundation of the old mill in the background (page 23 from Mining World, 1951).

lead and dewatering by a 20-foot Wemco thickener and a six-foot, three-leaf Eimco filter, the zinc concentrate is temporarily stored in a second 75-ton steel bin to await shipment. Both the lead and zinc concentrates are trucked six miles over a paved highway from the mill to the transfer docks on the Union Pacific railroad near Gimlet, Idaho. Tailing from the mill is carried by a trestled flume to a pond in the valley below the mine and mill [Figure 13 and 14].

Figure 15 shows the flow sheet for the mill.

The new mill began operation in February 1951 and substantially contributed to increased production. For much of the year, the mine was producing about 200 tpd; dump material was mixed with the ore before running it through the mill. According to Mining World (1951), the addition of the dump material was needed because the mine was not producing ore as fast as the mill was processing it. Mine equipment on site was sufficient to produce a maximum of 300 tons per day, and plans were made to increase the mine's production in 1952. Tailings from the North Star dump were milled by the United States Smelting, Refining & Milling Co. in Utah.

During 1952, Triumph Mining Co. operated its mill three shifts a day, seven days a week. The mill processed 93,653 tons of ore and produced 4,961 tons of lead concentrates and 3,668 tons of zinc concentrates. T.V. Williams produced 2,402 tons of ore from his lease on the Triumph property, and another lessee shipped a small amount of zinc-lead ore from the Triumph dump. By 1952, daily wages had risen to \$13.87 for miners, \$12.42 for muckers, \$14.37 for blacksmiths, and \$14.65 for hoistmen.

Disaster struck late in 1952 when blasting broke into a zone saturated with ground water. The four lower levels of the mine flooded quickly. Fortunately, the flood occurred at shift change, so no lives were lost.

Production in the early part of 1953 was reduced due to the flooding. The mine was pumped out by early February. After the flood damage was repaired, a large sump was dug below the 1000 level and a permanent pumping station was installed. The Triumph Mining Co.'s flotation plant milled 93,132 tons of ore, which yielded 3,871 tons of lead concentrates and 5,636 tons of zinc concentrates.

A Defense Minerals Exploration Administration (DMEA) exploration contract for \$143,354 was awarded to the Triumph Mining Co. on August 9, 1954. U.S. government participation was 50 percent. During the year, the mill produced 3,686 tons of lead concentrate and 4,960 tons of zinc concentrate from 77,624 tons of ore. Development work in 1954 included exploration of the adjacent Challenger Mines property.

The Challenger ground was actively explored during 1955 in accordance with the joint working agreement signed between the two companies in 1943. The company's DMEA contract was on the government's active list for the year. Production was at about the same level as 1954; lead production decreased slightly, while zinc output increased substantially.



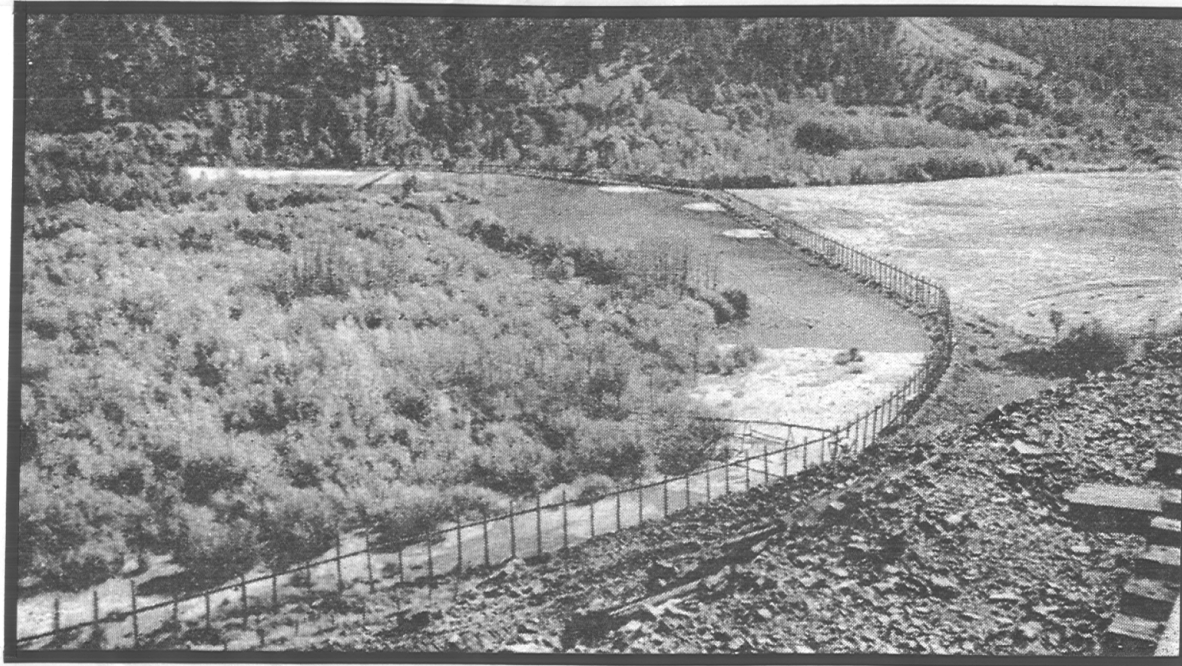


Figure 13. Triumph Mining Co.'s tailings pond, 1951. The pond was fed by a trestled flume that followed its margins (page 25 from Mining World, 1951).



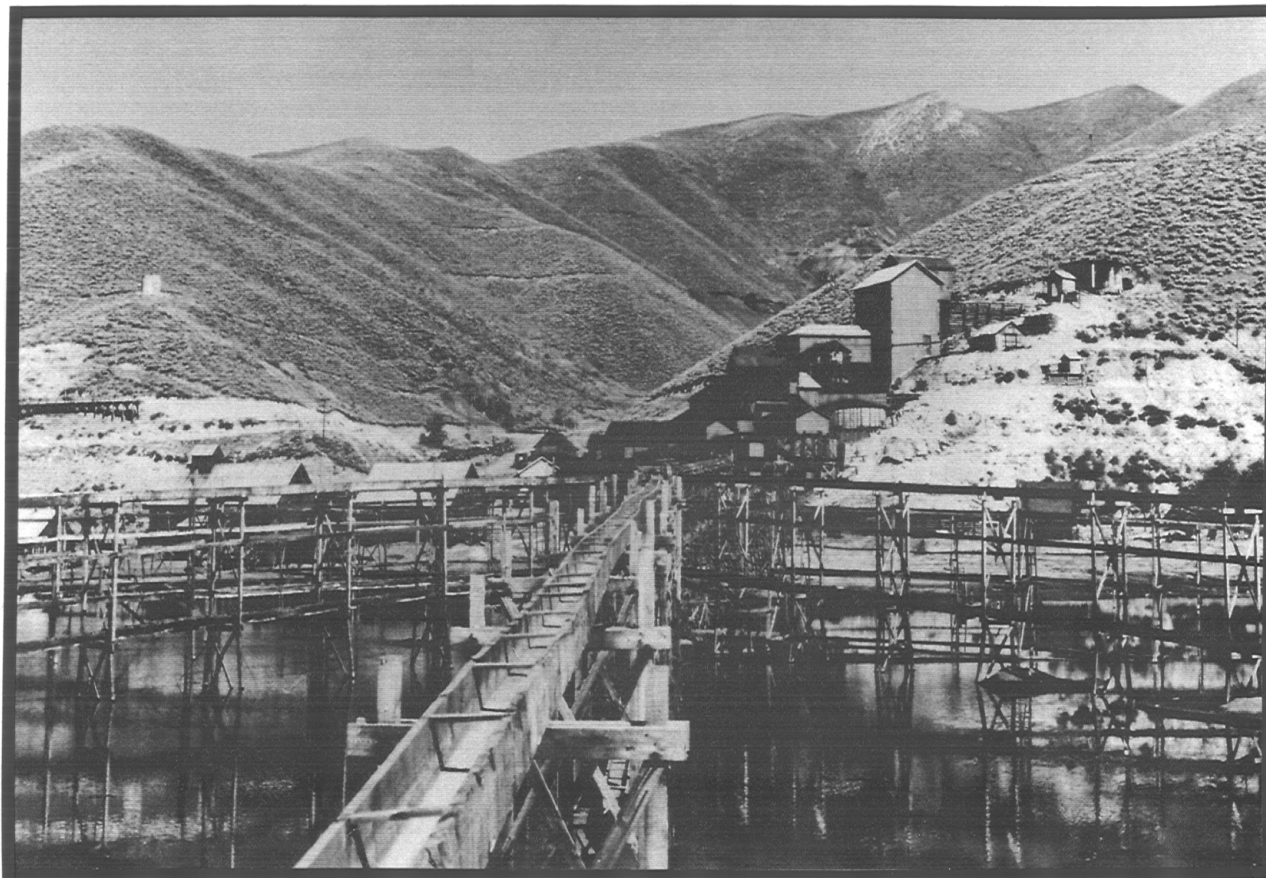
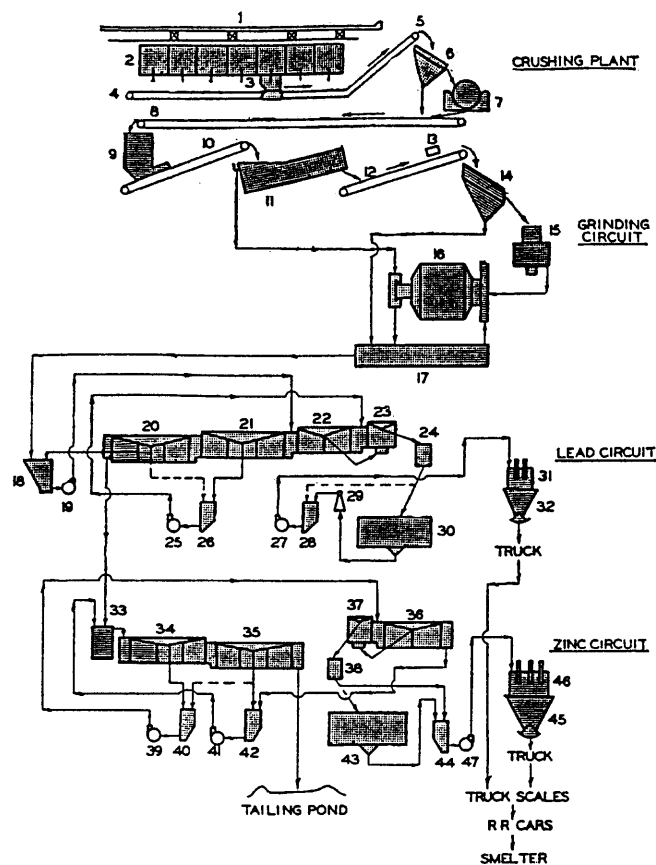


Figure 14. Triumph mill, showing tailings impoundment (Idaho Geological Survey photo).

# TRIUMPH MINING COMPANY MILL FLOW SHEET



## EQUIPMENT LIST

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	UNLOADING PLATFORM WITH 10 GRIZZLY	25	1-1/2" WEMCO SAND PUMP
2	7-100 TON BINS WITH GATES	26	1-PUMP FEED BOX
3	1-30' TRAVELLING FEEDER & HOPPER	27	1-1/2" WEMCO SAND PUMP
4	1-30' BELT CONVEYOR	28	1-PUMP FEED BOX
5	1-MAGNETIC PULLEY	29	1-2" WEMCO DIAPHRAGM PUMP
6	1-3x5x2 1/2" OPENING BAR GRIZZLY	30	1-20x8' WEMCO THICKENER
7	1-15x24" TRAYLOR JAW CRUSHER	31	1-2 LEAF EIMCO FILTER
8	1-18" BELT CONVEYOR	32	1-75 TON CONCENTRATE STORAGE BIN
9	1-300 TON ORE BIN	33	1-5x6' WEMCO CONDITIONER TANK
10	1-24" PIOCHE FEEDER CONVEYOR	34	3-44' WEMCO-FAGERGREN FLOTATION CELLS
11	1-48" WEMCO S-H CLASSIFIER	35	3-44' WEMCO-FAGERGREN FLOTATION CELLS
12	1-18" CONVEYOR	36	2-44' WEMCO-FAGERGREN FLOTATION CELLS
13	1- SUSPENDED ELECTROMAGNET	37	1-44' WEMCO-FAGERGREN FLOTATION CELLS
14	1-3x6x 1/2" OPENING ALLIS CHALMERS SCREEN	38	1- JUNCTION BOX
15	1-2' SYMONS CONE CRUSHER	39	1-1/2" WEMCO SAND PUMP
16	1-7x6' ALLIS CHALMERS BALL MILL	40	1- PUMP FEED BOX
17	1-36" WEMCO S-H CLASSIFIER	41	1-1/2" WEMCO SAND PUMP
18	1-CONCRETE SUMP	42	1- PUMP FEED BOX
19	1-2" WEMCO SAND PUMP	43	1-20x8' WEMCO THICKENER
20	3-44' WEMCO-FAGERGREN FLOTATION CELLS	44	1- PUMP FEED BOX
21	3-44' WEMCO-FAGERGREN FLOTATION CELLS	45	1-75 TON CONCENTRATE STORAGE BIN
22	2-44' WEMCO-FAGERGREN FLOTATION CELLS	46	1-3 LEAF EIMCO FILTER
23	1-44' WEMCO-FAGERGREN FLOTATION CELL	47	1-1/2" WEMCO SAND PUMP
24	1- JUNCTION BOX		

Figure 15. Flow sheet for Triumph Mining Co.'s mill (page 26 from Mining World, 1951).

Triumph Mining Co.'s DMEA contract remained active during 1956, and over 5,000 feet of development work took place during the year. This included 1,406 feet of drifting, 1,144 feet of cross-cuts, 756 feet of slusher drifts, and 1,618 feet of raising. Production dropped substantially from 1955 levels.

Higher costs and lower prices forced the company to restrict activities early in 1957 and to completely suspend operations on July 15. The company shipped its lead concentrates to the East Helena, Montana, smelter and its zinc concentrates to the smelter at Anaconda, Montana. At the time of the closure, the mine had seven main tunnels and seven shafts. The principal vertical shaft was still 700 feet deep. The lengths of the tunnels were as follows: No. 1, 13,000; No. 2, 5,000 feet; No. 3, 800 feet; No. 4, 3,500 feet; No. 5, 3,200 feet; No. 6, 3,600 feet; and No. 7, 3,200 feet (Triumph Mining Co.). The Triumph tunnel was 11,000 feet long and the Plummer tunnel was 3,500 feet (USBM). (For this entire period, the companies' reporting practices for the lengths of their haulage tunnels were not consistent. It is not known if the company's 1957 list included the Plummer and Triumph tunnels, or if those tunnels were excluded.) Daily wages workmen were \$16.79 for miners, \$15.34 for muckers, \$17.57 for blacksmiths, and \$17.57 for hoistmen.

In 1958, the company removed the underground equipment from the mine and allowed the lower levels to flood. The mill was dismantled, and the equipment was sold and removed from the property. Some lead-zinc ore was shipped from the Triumph by a lessee.

The Idaho-Pacific Mining Co. processed material from the Independence dump in 1963. In 1964, Idaho-Pacific milled the Triumph dumps using a 700-tpd Wemco #2 heavy media separation plant. Federal Resources optioned the Triumph dump from Idaho-Pacific, and Idaho-Pacific terminated all operations in the area at midyear.

Bear Creek Mining Company did exploration and development work at the Triumph during 1978 and 1979. In 1981, Ventures West drilled five holes at the mine. The target was apparently below the 800-foot level. Getty Oil Company ran a drilling program in 1984 and 1985. Getty's option was picked up by Peregrine Mining Company in 1986. Peregrine evaluated the data from Getty's project and from Bear Creek's drilling, then dropped its option late in the year. Very little ore was discovered by these ventures, and the mine is believed to be worked out.

Total recorded production for the Triumph between 1884 and 1967 was 1,655,091 tons of ore and 34,013 tons of old tailings. This material yielded 60,896 ounces of gold, 12,051,752 ounces of silver, 3,526,845 pounds of copper, 139,229,827 pounds of lead, and 176,295,742 pounds of zinc (Table 3).

In 1991, the Environmental Protection Agency (EPA) evaluated the mine's tailings pond (Figure 16) for the possibility of lead and arsenic contamination of nearby homesites and waterways. An EPA contractor, Ecology and Environment, Inc., analyzed sixty air, water, and soil samples and concluded that the tailings posed an immediate threat to public health. Area residents were encouraged to undergo

blood and urine tests for lead and arsenic. Results showed little sign of lead or arsenic in the thirty-nine people (including children) who had been tested. However, EPA continued the evaluation to determine if the site should be included on its National Priorities List for cleanup under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, or Superfund).

EPA continued to evaluate the site in 1992. Tests made during the summer showed higher blood lead levels in area residents, but no children had levels higher than 10 micrograms per deciliter, the level of concern established by the Center for Disease Prevention. At the end of the year, the EPA was evaluating a bio-uptake experiment where pigs were fed the tailings to see how much metal they would absorb from the material.

The controversy over the Triumph continued throughout 1993. Local citizens protested the proposed Superfund listing, claiming the tailings posed little or no health risk. EPA, however, stated that the site had a Hazard Ranking of 90.33, the highest score ever recorded by the agency, and officially proposed adding Triumph to the National Priorities List in May. Political maneuvering and public protests postponed the final listing. In November, the state of Idaho requested that it be given the lead in cleaning up the Triumph, since 20 of the 60 acres where the tailings are located are state land which was leased to Triumph Mining Co. In December, EPA agreed to turn control of the cleanup over to the state and to postpone listing the site as a Superfund priority. Concurrently, the state signed an agreement in November with the Idaho National Engineering Laboratory (INEL) to study ways to clean up the site, and the Department of Lands circulated a Request for Proposals for a contractor to oversee the cleanup efforts. The Triumph was identified by the Western Governors' Association as a potential pilot project for cleanup under the DOIT (Demonstrate On-site Innovative Technologies) program, as were several other sites in Idaho.

Political maneuvering over the cleanup continued in 1994. In March, the Idaho Department of Environmental Quality (DEQ) announced that it would establish an office in Hailey or Ketchum to oversee the cleanup, and the Idaho Department of Lands selected Kennedy/Jenks Consultants to conduct the engineering work at the site. However, the state did not sign the 26-page Memorandum of Understanding with EPA until August. The cleanup was planned as a partnership between the Department of Lands, DEQ, and Asarco. It was expected to cost \$6-7 million, with Asarco paying half. In March INEL released a study that showed ground-water contamination at Triumph was limited to the immediate area of the mine and waste piles; the study recommended not disturbing the tailings to avoid spreading the contamination. A 26-page report released in September by EPA noted that the high blood lead levels recorded in 1993 could not have come from the mill tailings. In October DEQ announced that it would return control of the site to EPA because DEQ, Asarco, and the citizens of Triumph disagreed over opening a one-person office near Triumph to oversee the cleanup. A compromise was reached in November, and DEQ retained





Figure 16. Main mill tailings pond at the Triumph Mine, 1994 (Idaho Geological Survey photograph by Earl H. Bennett).  
This photograph was taken from almost the same location as Figure 13.

control of the project. The new agreement calls for a full-time worker stationed in Twin Falls to work on the Triumph and other cleanup projects. The current schedule calls for conducting six weeks of testing in 1995 and beginning remediation in 1997. No work at the site is scheduled for 1996. Figures 17, 18, and 19 show the mine in the summer of 1994, when it was visited by Idaho Geological Survey field geologists.

## INDEPENDENCE MINE

The Independence Mine was worked intermittently from 1883 until the mine was taken over by Snyder Mines, Inc., in the late 1930s and operated as part of the Triumph Mine. (Figures 1 and 2 show the location of the mine, Figures 3 and 20 show the geology of the area, and Figures 5 and 6 show the claims and mine workings. Production from the mine is given in Tables 1, 2, and 6. Table 7 lists the companies operating at the mine.)

The Independence installed a new 100-tpd mill in 1908. (Later reports rated the mill variously at 80 to 100 tpd.) The mill was powered by electricity, and a transmission line was run 14 miles to the property from the Cramer Electric Co. plant at Hailey. The Independence had ore reserves of 60,000 tons.

Despite the new mill, the Independence remained idle for most of 1909 because the company was involved in litigation over apex rights. The court battles continued through 1910, 1911, and 1912, with the company resuming production in 1912. The mill equipment consisted of rolls, jigs, and tables, which produced a rich lead sulfide concentrate. In 1912 the Independence veins had been explored to a depth of 300 feet through several long tunnels. The IMIR proposed driving a cross-cut tunnel from the East Fork of the Wood River through the Triumph property to link up with the Independence.

By 1913, the company's legal battles were resolved. In the past, carload shipments from the Independence had averaged 70 percent lead with 1.5 ounces of silver to each unit of lead and \$10.00 of gold (about half an ounce) per ton. During 1913 the company mined 1,000 tons of ore and shipped 114 tons. The average value of the ore was \$60.00 per ton. Total mining costs were \$2.00 per ton, and transportation and treatment costs were \$8.25 per ton. The company listed its milling setup as "Concentration with Gravity. Tramway, Rock Crushers, 3 Sets of Rolls, 4 sets of Trommel Screens, 4 Jigs, 3 Card Concentrating Tables." Cost of treating ore through the mill was \$1.00 per ton, and the company estimated an 88 percent rate of recovery. The workings totalled 10,000 feet, and the mine was developed through four tunnels. (Table 8 shows development work, employment, and operating companies at the mine.) Daily wages were \$3.50 for miners, \$4.00 for millmen, and \$5.00 for mechanics.

In 1914, the company reported mining 200 tons of ore but only shipping 22 tons. According to the 1914 IMIR, the remainder of the ore was held in storage to





Figure 17. Main adit of the Triumph Mine in 1994, showing the acid water problem. This is the first settling pond outside the adit. The adit is dated "1952" (Idaho Geological Survey photograph by Earl H. Bennett).





Figure 18. Main adit level at the Triumph, 1994, looking west at the old compressor building, wooden cooling tower, and other junk (Idaho Geological Survey photograph by Earl H. Bennett).



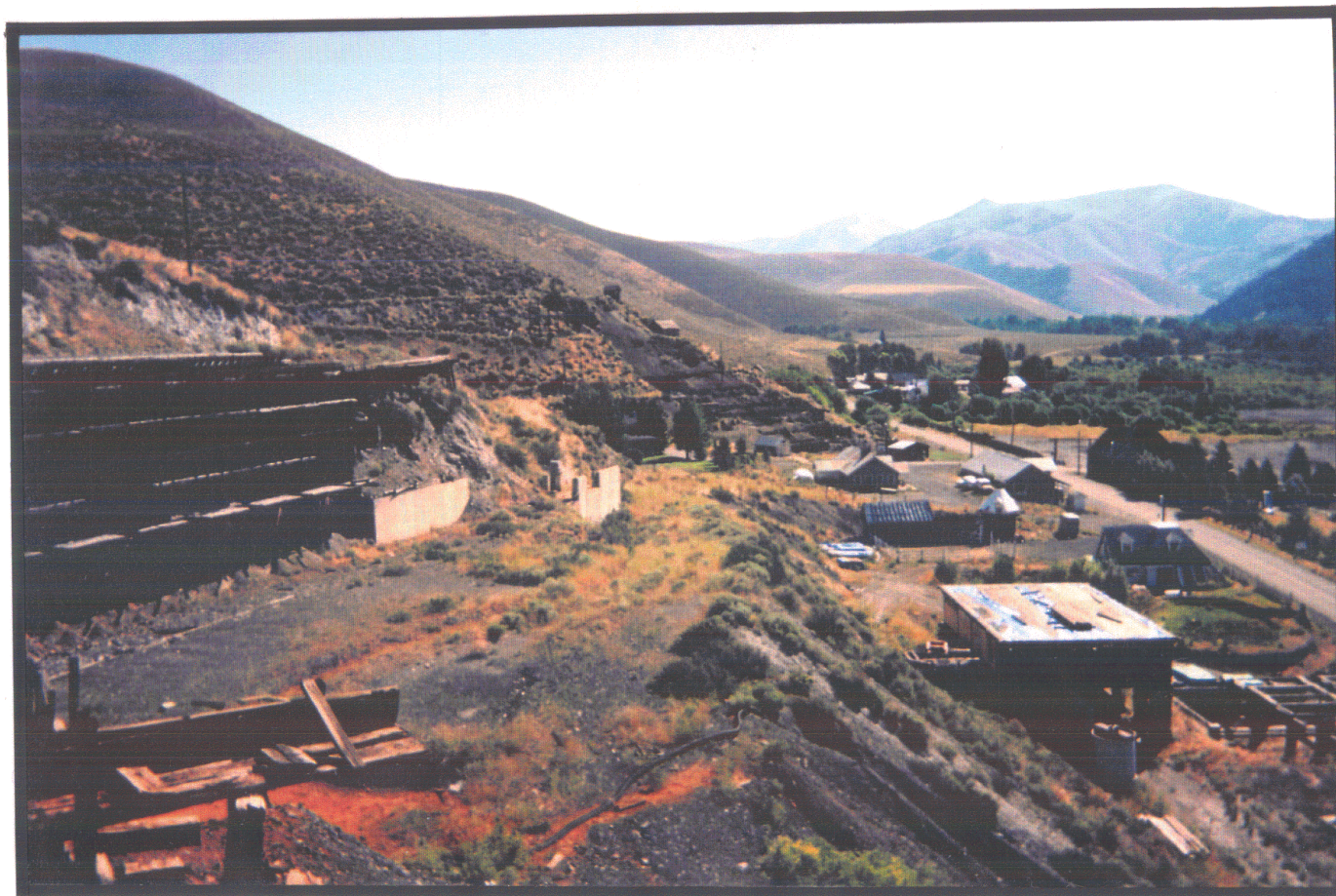
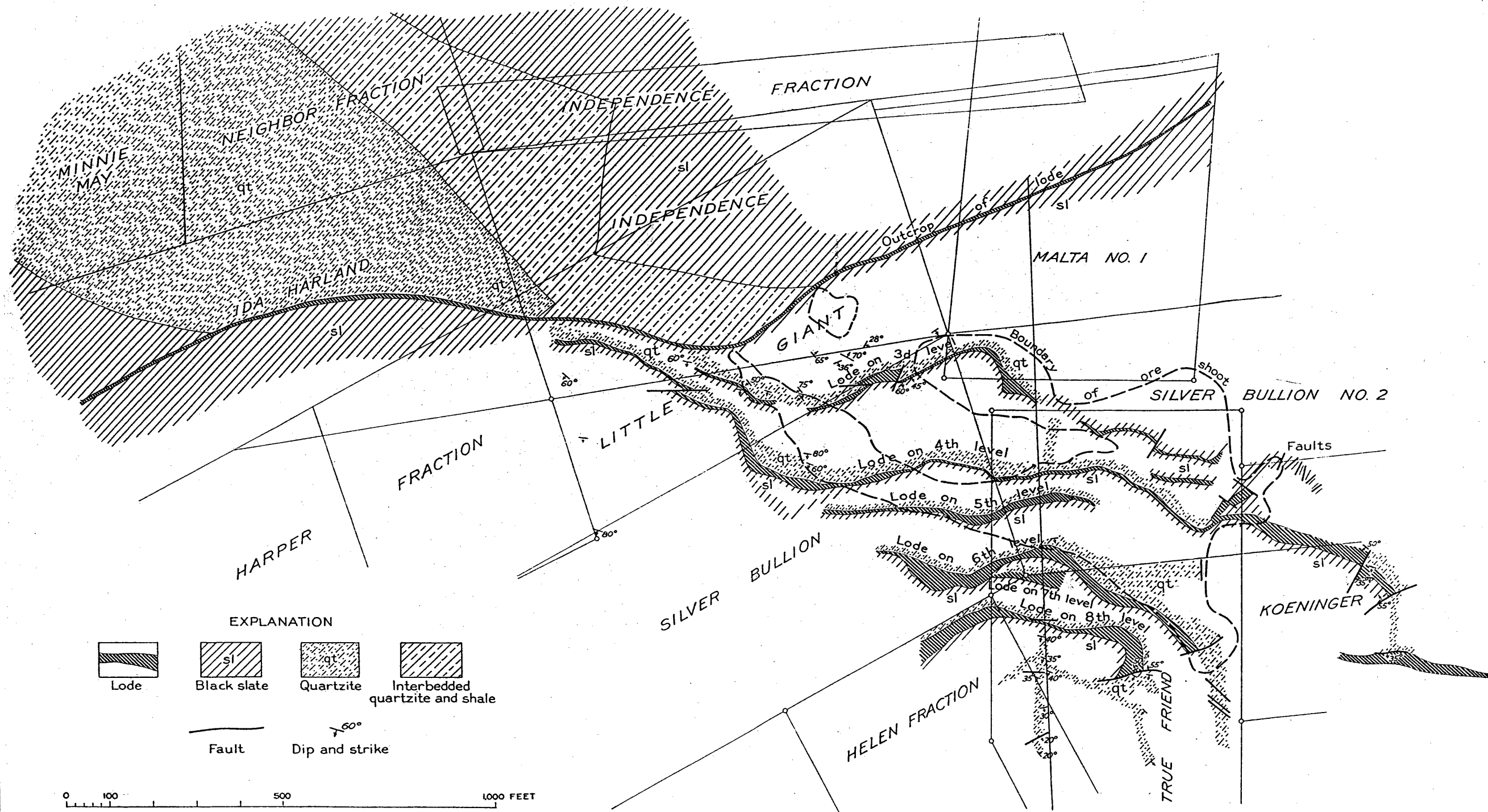


Figure 19. Looking east from the Triumph adit level at the foundations of both of the Triumph mills, 1994. The view is approximately the same as in Figure 12. The tailings pond is at the extreme right of the picture (Idaho Geological Survey by Earl H. Bennett).



GEOLOGIC MAP OF THE INDEPENDENCE MINE

Showing the principal workings, the outlines of ore shoots, and the geology on the surface and underground as interpreted by O. H. Hershey.

Figure 20. Geologic map of the Independence Mine (Plate 21 in U.S. Geological Survey Bulletin 814).

Table 6. Production for the Independence Mine, by year.

Year	Ore	Old Tailings	Gold (ounces)	Silver (ounces)	Copper (pounds)	Lead (pounds)	Zinc (pounds)	Class of ore	Treatment
1884 <sup>1</sup>	1	---	---	202	---	1,447	---	---	---
1885 <sup>2</sup>	24	---	.5	2,235	---	11,072	---	---	---
1886 <sup>2</sup>	35	---	2.03	2,347	---	18,853	---	---	---
1890 <sup>2</sup>	4	---	.36	50	---	3,951	---	---	---
1891 <sup>2</sup>	5	---	.85	568	---	3,942	---	---	---
1892 <sup>2</sup>	7	---	1.2	989	---	6,790	---	---	---
1896 <sup>2</sup>	168	---	20.96	17,104	---	144,958	---	---	---
1897 <sup>2</sup>	9	---	---	1,381	---	10,793	---	---	---
1898 <sup>2</sup>	4	---	.72	351	---	2,947	---	---	---
1899 <sup>2</sup>	9	---	2.7	759	---	7,561	---	---	---
1905 <sup>2</sup>	7	---	1.46	1,444	---	8,702	---	---	---
1908	24	---	3	4,432	---	33,140	---	Pb	?
1909	30	---	5	5,592	453	37,467	---	Pb	U.S. Smelter
1912	441	---	29.19	10,933	448	87,222	---	Pb	U.S. Smelter
1913	200	---	3.44	1,541	104	11,232	5,175	Pb-Zn	U.S. Smelter; O.S.L.
1914	2,200	---	80	34,400	1,820	320,000	---	Pb	U.S. Smelter
1915	2,268	---	55.23	30,548	666	268,892	---	Pb	U.S. Smelter
1916	2,541	---	74.46	27,909	2,072	256,726	---	Pb	U.S. Smelter
1917	6,850	---	159.8	72,486	4,446	576,937	---	Pb	U.S. Smelter
1918	10,342	---	373.6	161,943	---	1,180,023	---	Pb	A.S.&R.-M.

<sup>1</sup>Production from USGS Bulletin 814; U.S. Bureau of Mines lists production as 1,859.24 ounces of silver.

<sup>2</sup>Production from USGS Bulletin 814.



Table 6 (continued). Production for the Independence Mine, by year.

Year	Ore	Old Tailings	Gold (ounces)	Silver (ounces)	Copper (pounds)	Lead (pounds)	Zinc (pounds)	Class of ore	Treatment
1919	13,386	---	539.6	216,333	---	1,556,600	---	Pb	A.S.&R.-M.
1920	13,048	---	457	226,961	14,023	1,543,580	---	Pb	A.S.&R.-M.; O.S.L.
1921 <sup>3</sup>	37,522	---	968	545,388	23,000	4,392,360	---	Pb	A.S.&R.-M.
1922	44,432	---	802.44	442,437	24,675	3,441,301	---	Pb	A.S.&R.-M.
1923 <sup>3</sup>	26,125	---	458	236,198	14,913	1,719,366	---	Pb	A.S.&R.-Murray
1924 <sup>3</sup>	957	---	120.96	78,907	4,444	579,830	---	Pb	A.S.&R.-Murray
1925	960	---	96.4	78,126	3,968	572,278	---	Pb	A.S.&R.-Murray
1926 <sup>3</sup>	402	---	36.6	35,342	2,535	248,914	---	Pb	A.S.&R.-Murray
1927	345	---	33.4	28,555	2,279	209,333	---	Pb	A.S.&R.-Murray
1928	110	---	7.5	3,573	209	23,477	---	Pb	A.S.&R.-Murray
1929	25	---	2.44	3,178	314	16,809	---	Pb	Murray
1930	84	---	16.79	11,791	782	75,638	---	Pb	O.S.L./Murray
1931	93	---	15.7	9,067	844	70,300	---	Pb	Murray
1933	5	---	24.76	1,183	100	5,697	---	Pb	Murray
1963 <sup>4</sup>	---	2,653	25	6,784	400	80,700	18,600	Ag, Pb	East Helena; B.H.
<b>Total</b>	<b>162,663</b>	<b>2,653</b>	<b>4,419</b>	<b>2,301,037</b>	<b>102,495</b>	<b>17,528,838</b>	<b>23,775</b>	---	---

<sup>3</sup>Includes production from the North Star.<sup>4</sup>Material produced from Independence dump. Figure may include material from other dumps.

Table 7. Companies operating at the Independence Mine.

Company Name	Officer	Date Incorporated	Charter Forfeited	Year(s) at Mine
Independence Mining Co., Ltd.	J.G. Hedrick, Mgr.	Jan. 19, 1917	Dec. 1, 1921	1917
Federal Mining & Smelting Co.	F. H. Brownell, President	Sept. 24, 1903	merged with ASARCO -- May 11, 1953	1918-1938
The Snyder Mines, Inc.	E. H. Snyder, President	Sept. 23, 1936; May 24, 1940	Nov. 30, 1939; Nov. 30, 1941	1938-1944
Triumph Mining Co.	J. W. Swent, President; O. J. Salisbury, Pres. (1977)	Feb. 23, 1940	<sup>1</sup>	1940- <sup>1</sup>
Idaho Pacific Mining Co.	P. M. Tabor, President	Aug. 1, 1962	Nov. 30, 1966	1963

<sup>1</sup>Information not available in IGS's files.

wait for higher metal prices. The USBM records show the entire amount was shipped. Most of the 1914 output for the Warm Springs district was from the Independence. The mine shipped concentrated lead ore and high-grade silver-lead ore.

The Independence made its best year's shipping record to date in 1915. The ore averaged 45 percent lead, 95 ounces of silver, and one-fifth ounce of gold per ton. The company operated its mill for only 80 days during the year because water was unavailable. The Independence was the main producer in the district.

Independence Mining Co. continued to work the property during 1916 and most of 1917. (Figure 21 shows the mine at about this time.) The company shipped a good grade of concentrate during 1916. During 1917, the concentrates, which contained high percentages of both lead and silver and about 20 percent iron, went to the United States Smelter at Midvale, Utah. On November 15, 1917, Federal Mining and Smelting Co. acquired the Independence Mine under lease and bond with an option to purchase. Federal's initial payment on the property was \$25,000.

In 1918, the Independence was producing 25 tpd of high-grade ore and concentrates that contained 30 to 50 percent lead with over 2 ounces of silver per unit of lead. The ore was easy to treat, consisting of coarsely crystalline galena, shattered quartz, and a little pyrite. In contrast to the neighboring North Star and Triumph mines, the ore contained almost no zinc. The main discovery for the year was an 80-foot-long ore shoot which had a maximum width of 30 feet. At the end of the year, the Independence Mine had reserves of 51,600 tons of milling ore (equal to about 7,950 tons of concentrates) and 4,120 tons of first-class ore. The mill was remodeled

Table 8. Development work, employment, and operating companies at the Independence Mine.

Year	No. of Men employed	Tunnels (feet)	Sinking (feet)	Cross-cutting (feet)	Drifting (feet)	Raising (feet)	Operator
1913	12	---	100 <sup>1</sup>	400 <sup>2</sup>	---	---	Independence Mining Co., Ltd.
1914	10	---	20 <sup>1</sup>	580 <sup>2</sup>	---	---	Independence Mining Co., Ltd.
1915	---	2,200 <sup>3</sup>	100 <sup>3</sup>	---	---	---	Independence Mining Co., Ltd.
1916	---	---	100 <sup>3</sup>	---	280 <sup>3</sup>	---	Independence Mining Co., Ltd.
1917	---	300 <sup>4</sup>	100 <sup>1</sup>	40 <sup>2</sup>	---	---	Independence Mining Co., Ltd.
1918	---	400 <sup>5</sup>	---	---	---	---	Independence Mining Co., Ltd.
1919	---	---	---	---	---	---	Federal Mining & Smelting Co.
1920	---	---	---	---	6,000 <sup>6</sup>	530	Federal Mining & Smelting Co.
1921	125 <sup>7</sup>	---	---	---	---	600	Federal Mining & Smelting Co.
1922	105 <sup>8</sup>	---	---	7,125 <sup>9</sup>	---	---	Federal Mining & Smelting Co.
1923	63 <sup>8</sup>	---	---	8,482 <sup>9</sup>	---	---	Federal Mining & Smelting Co.

<sup>1</sup>Combined figure for sinking and raising; footage for each was not reported separately.

<sup>2</sup>Combined figure for cross-cutting and drifting; footage for each was not reported separately.

<sup>3</sup>Development data from U.S. Bureau of Mines.

<sup>4</sup>Figure is total development work for year, undivided into categories.

<sup>5</sup>Figure is total development work for the year; report states most of work was drifting between levels to extract ore.

<sup>6</sup>Development work on the Plummer tunnel was completed in 1920, but much of the work was done in 1919.

<sup>7</sup>Combined figure for North Star and Independence; number may not be exact.

<sup>8</sup>Combined figure for North Star and Independence.

<sup>9</sup>Combined figure for cross-cutting and raising; company did not report footage separately.

to produce a high-grade lead concentrate. During the year, Federal exercised its option to purchase the Independence and the adjoining Malta Group. The purchase price for the Independence was \$135,841.

The Independence was the most important mining operation in Blaine County in 1919. The mine was developed to a depth of 600 feet by adits and a winze. The mill was rebuilt and operated from March to November; it was shut down the rest of the year due to deep snow. Most of the water used in the mill came from a series of small springs, which at times were so muddy that the company had trouble separating out the finer lead ore. The mill handled about 100 tpd; between the mill output and hand-sorted crude ore, the mine yielded a small carload of shipping ore per day while the mill was in operation. The 13,386 tons of ore produced during the year yielded \$82,952 to the company before taxes and deductions for ore depletion, according to Federal's annual report for 1920. Reserves at the Independence on January 1, 1920, were 53,000 tons of ore, which was equivalent to about 7,000 tons of lead concentrates and 4,000 tons of first-class ore. According to the 1919 IMIR, Federal did no "extensive new development" at the Independence during the year, but the company "materially expanded" its reserves with its stoping operations. In addition, the company was driving a long cross-cut from the lower (Plummer) level of the North Star Mine on the opposite slope of the mountain. The tunnel was expected to intercept the Independence vein at a distance of 3,600 feet. Work on the tunnel was done on contract, working 10 men in two shifts and making progress of up to 300 feet a month. By the end of the year, the Plummer tunnel was approaching the Independence vein, and plans were made to connect with the 600 level of the Independence. On the work being done on the Plummer tunnel, the Federal annual report (1919, p. 2) stated, "The lower tunnel to the Independence is nearing completion and will (a) permit steady operation of the mine the year round, instead of a shutdown, as heretofore, during the period of danger from snow slides, and (b) will permit the use of the North Star mill, thus increasing output and reducing cost."

In 1920, Federal completed work on the Plummer tunnel and connected it to the main Independence workings by a 530-foot raise. This increased the depth of the Independence workings to over 1,200 feet. Federal's expenditures on the Plummer tunnel during 1920 were \$127,126.40, which included driving the tunnel and the connecting raises, and equipping the tunnel for electric haulage. Federal operated the mine all year. The Independence mill was operated for only six months, and the North Star mill (idle since September 1918) was reconditioned to handle 200 tpd of silver-lead ore from the Independence. The ore was hauled 6,200 feet through the Plummer tunnel using electric trains and then sent to the North Star mill over a 4,400-foot Riblet aerial tramway, which had a capacity of 20 tons an hour. Ore and concentrates were hauled to the railroad by truck in the summer, which cost about \$2.00 per ton, and by horse-drawn sleds in the winter, which cost about \$4.00 per ton. Operations for the year resulted in a loss of \$40,059, due to the deduction of the

costs of driving the Plummer tunnel. At the end of the year, ore reserves were given at 40,000 tons, which was equivalent to 5,185 tons of concentrate and 2,700 tons of first-class lead ore.

Federal maintained capacity production throughout 1921, operating the mine and the 125-tpd mill continuously. The ore came from the Independence Mine, which was the largest producer in the county. The mine showed satisfactory earnings after writing off the costs of the Plummer tunnel and "other expensive developments." Total workings of the combined Independence and North Star Mines were over 5 miles in length. Reserves at the end of the year were 28,000 tons of ore, equal to about 3,600 tons of lead concentrate and 1,800 tons of shipping ore. Ore minerals included galena, tetrahedrite, chalcopryite, sphalerite, jamesonite, siderite, and pyrite.

The Independence continued to produce at capacity during 1922 and was the largest producer of lead in the county. During the later part of the year, the company exposed new ore which greatly increased the mine's reserves. Underground workings measured almost 6 miles in length. Mine equipment included an English Iron Works 202 single drum hoist, one Lidgerwood 8x10 air hoist, an I-R 420-cubic-foot compressor, and a C-P 765-cubic-foot compressor. Mill equipment included a 350-ton concentrator, jaw and gyratory crushers, rolls, Marcy ball mills, Hancock jigs, Drag classifiers, Wilfley tables, Dorr thickeners, and an Oliver filter. The company mined 43,046 tons of ore, which averaged 6.85 percent lead, 17.28 ounces of silver per ton, and 0.055 ounce of gold per ton (reported to the Idaho Inspector of Mines; numbers given by the USGS are: 44,748 tons of ore averaging 0.036 ounce of gold and 16 ounces of silver to the ton and containing 5.9 percent lead). Mining costs were \$5.10 per ton and milling costs were \$1.55. The company estimated that it recovered 44.5 percent of the gold, 81.8 percent of the silver, and 83.9 percent of the lead. Net profits for the year were \$96,932. The ore was hauled 6,600 feet through the Plummer tunnel to the tramway, which carried it to the North Star mill. Federal's annual report for 1922 (p. 10) stated, "The Independence mine has been somewhat disappointing. The ore is of excellent grade, carrying about 2½ ounces of silver per ton for each unit of lead, but its occurrence is very irregular, and we have found the east end of the mine to be much faulted and broken up, and the ore shoots are smaller and more broken up than ever."

Federal continued to operate the Independence at capacity until August 1, 1923, when the property was shut down and the mine turned over to lessees. The mill and surface plant were mothballed to permit immediately resuming operations. However, the company reported removing all equipment from the mine in August, and the USGS noted that the deposit was nearly worked out. The Independence produced 146,642 tons of ore between 1917 and 1923; the ore contained gold, silver, and lead. Before closing in August 1923, the mine shipped several thousand tons of concentrate and crude ore containing gold and silver, as well as lead, to a smelter at Murray, Utah. The company gave the year's production as 25,706 tons of ore, which



assayed 0.035 ounce of gold and 10.2 ounces of silver per ton, and 3.8 percent lead. This ore grade was much lower than in previous years, and Federal's operations resulted in a \$33,772.05 operating loss for the Independence in 1923. Leasing operations in the latter half of the year yielded \$8,469 in royalties to the company. The Independence accounted for most of the production from Blaine County for the year. The total development for the mine was approximately 35,430 feet of workings (Table 9 and Figure 22), with 725 feet of shafts, 11,349 feet of raises, and 23,356 feet of tunnels, cross-cuts, and drifts (excluding the Plummer tunnel). Daily wages were \$4.25-5.25 for miners and muckers, \$5.25-6.00 for blacksmiths, and \$4.50-5.50 for hoistmen.

Lessees continued to operate the mine from 1924 to 1938. According to Federal, the mine was leased in blocks, with different individuals working in different areas. Very little development work was done. The lessees made a number of "substantial" shipments in 1924, totaling several hundred tons of silver-rich lead ore. In 1925, lessees at the Independence made the largest shipments of ore in the county and discovered "important new disclosures" of ore (IMIR). The ore was shipped to Murray, Utah. Lessees paid Federal \$20,182 in royalties.

Despite the reported ore discoveries in 1925, shipments in 1926 were about half what they had been the previous year. However, shipments from the Independence leases still accounted for most of the first-class silver-lead ore produced in the district, and the lessees paid Federal \$6,835 in royalties. In 1927, the Independence was operated throughout the year by lessees who marketed "a large tonnage of high-grade hand-sorted ore" (IMIR).

Production decreased in 1928 and again in 1929, despite the company's reports of substantial production by lessees. A few carloads of first-class lead sulfide ore for smelting were shipped by lessees in 1928, and several carloads of ore were produced in 1929. Production in 1930 and 1931 was small, but greater than 1929 levels. The ore produced in 1930 was described by the USBM as "first-class ore of smelting grade." Most of the output for the Warm Springs district in 1931 came from lead-silver ore produced from the Independence Mine by lessees. In 1932, a year marked by all-time record low metal prices, lessees performed a little development work on the Independence and North Star mines, and stockpiled a small amount of ore to wait for higher metal prices. Lessees apparently did minor amounts of work during 1933, 1934, and 1935, although the USBM production records show no ore was shipped after 1933. The USBM Yearbook reported that lead ore from the Independence was shipped to a smelter in 1933, and that a lessee shipped a small lot of silver-lead ore in 1934.

In 1936, Snyder Mines, Inc., (operator of the adjacent Triumph Mine) took over the North Star Mine from Federal and connected it with the Triumph through the Plummer tunnel. Lessees continued to work parts of the Independence and North Star for the rest of 1936 and 1937. In 1938, Federal leased both the Independence and

Table 9. Lengths of and vertical distances between main levels at the Independence Mine on May 31, 1923.

Level No.	Vertical Distance Between Levels	Vert. Dist. (feet)	Length (feet)	Elevation (feet)
Surface	Surface to #1	?	---	---
#1	#1 to #2	?	260	---
#2	#2 to #3	?	585	---
#3	#3 to #4-17 and #4-19	38	2,114	7445
#4-17	#4-17 and #4-19 to #4	55	250	7407
#4-19	---	---	177	7407
#4	#4 to #5	80	3,371	7342
#4	#4 to #6-30	30	---	---
#5 East	---	---	669	7262
#5 West	---	---	95	7262
#6-30 East	#6-30 to #6	121	1,001.5	7312
#6-30 West	---	---	262	7312
#6	#6 to #7	6	1,382	7191
#7 East	#7 to #8	33	43	7185
#7 West	---	---	146	7185
#8 East	#8 to #10	124	1,164	7158
#8 West	---	---	361	7158
#10	#10 to Plummer	305	---	7034
Plummer	---	---	---	6729

**NOTES:**

Levels 1, 2, 3, 4 based from portals  
 Levels 4-17 and 4-19 based from 4-5 raise  
 Levels 5 and 6 from Independence Shaft  
 Level 6-30 from 6-25 raise  
 Levels 7, 8, and 10 from Plummer Raise

Independence Shaft 195 feet deep, 2 compartments; vertical depth 151 feet and connects 4, 5, and 6 levels.

Plummer Raise 530 feet long, 4 compartments; vertical depth 462 feet and connects 6, 7, 8, 10, and Plummer Level Tunnels.

Source: Federal Mining & Smelting Co. annual report to Idaho Inspector of Mines for 1923.

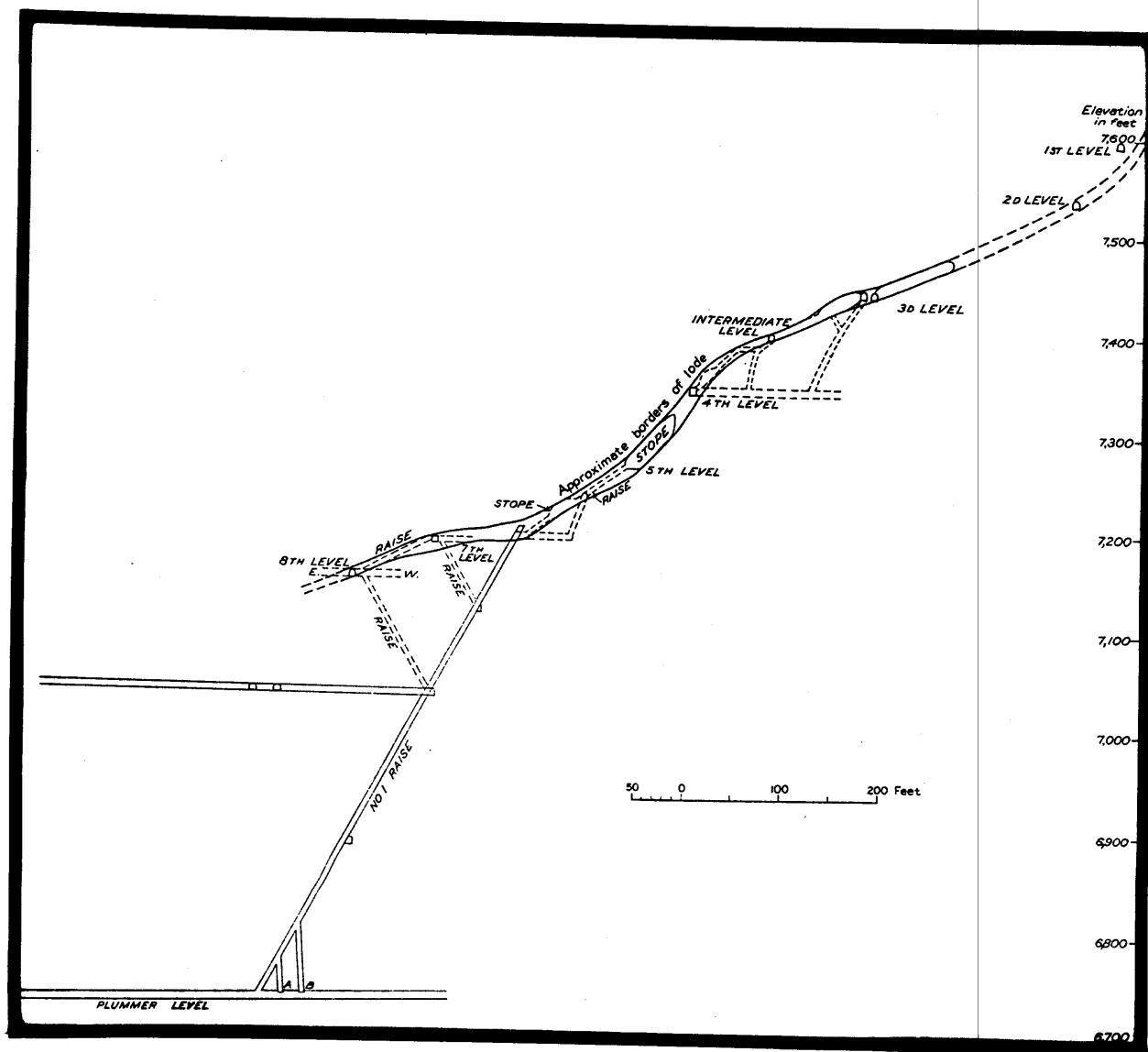


Figure 22. Cross section through the No. 1 raise, Independence Mine (Plate 23 in U.S. Geological Survey Bulletin 814).

North Star to the Triumph Development Co. By 1939, Snyder was developing the Independence, North Star, and Triumph mines as a single operating unit. From then on, the Independence workings were integrated with those of the Triumph. Triumph Mining Co. acquired control of the property in 1940. By the late 1940s, most of the workings were inaccessible.

Total recorded production for the Independence Mine between 1884 and 1963 was 163,663 tons of ore and 2,653 tons of old tailings. This material yielded 4,419 ounces of gold, 2,301,037 ounces of silver, 102,495 pounds of copper, 17,528,838 pounds of lead, and 23,775 pounds of zinc.

## NORTH STAR MINE

The North Star (Figures 1, 2, 3, 5, and 6) was actively worked during the decade following 1883, and much of the ore that could be treated by the methods then available was removed at that time. Lindgren (1900) credited the mine with producing \$800,000 worth of ore between 1883 and 1894. (Production from the North Star is given in Tables 1, 2, and 10). In October 1885, J.W. Ballentine moved a tram and mining equipment to the North Star from an unsuccessful mining venture at Muldoon (Wells, 1983). (Table 11 lists individuals and companies operating at the mine.) Lessees operated the mine in 1898. Total development at that time was an 1,800-foot tunnel and a shaft sunk 200 feet below the tunnel level.

Umpleby and others (1930) noted that the mine contained over 20,000 tons of refractory ore that could be mined when a suitable method was developed to treat it. The ore was a complex mixture of minerals whose distribution varied widely in different parts of the mine. The ores that were mined first were rich in silver-lead and contained variable amounts of gold; the ore was generally found in elongated lenses. The refractory ores mined after 1915 were high in zinc and, in some places, antimony.

The North Star was active in 1905, 1907, 1909, and 1910. In 1909, the North Star produced lead and zinc ore; however, the 1909 IMIR stated that the North Star was inactive, despite large reserves. (The USBM production records show 44 tons of ore was produced during the year.) The North Star ore was "an intimate mixture of iron, zinc, and lead sulphides in such close association that a commercial product can not be made therefrom" (IMIR).

In 1912, the Mine Inspector suggested the idea of consolidating the idle Triumph and North Star groups to form a mine with "a million ton resource of 15 to 20 dollar ore" (p. 81). He described the North Star ore as consisting of "an amorphous mass of arsenical pyrite, carrying 6 to 8 per cent lead and 6 to 8 ounces per ton in silver, together with 10 to 15 per cent zinc and a little gold" (p. 81) and suggested some of the "present" methods of flotation could be used to separate the

Table 10. Production from the North Star Mine, by year.

Year	Ore	Old Tailings	Gold (ounces)	Silver (ounces)	Copper (pounds)	Lead (pounds)	Zinc (pounds)	Class of ore	Treatment
1883 <sup>1</sup>	6	---	.01	353	---	8,048	---	---	---
1884	---	---	---	9,681	---	---	---	---	---
1885 <sup>1</sup>	660	---	3.91	39,720	---	772,128	---	---	---
1886 <sup>1</sup>	307	---	15,578.41	3,598	---	---	---	---	---
1890 <sup>1</sup>	424	---	34.09	25,289	---	473,989	---	---	---
1891 <sup>1</sup>	559	---	81.91	30,691	---	611,019	---	---	---
1892 <sup>1</sup>	104	---	68.38	2,822	---	71,245	---	---	---
1893 <sup>1</sup>	61	---	13.14	2,802	---	60,307	---	---	---
1894 <sup>1</sup>	18	---	3.89	976	---	16,378	---	---	---
1895 <sup>1</sup>	9	---	1.64	462	---	8,527	---	---	---
1896 <sup>1</sup>	437	---	54.64	18,774	---	403,250	---	---	---
1899 <sup>1</sup>	13	---	62.37	144	---	3,556	2,018	---	---
1901 <sup>1</sup>	45	---	6.13	1,862	---	42,475	4,665	---	---
1902 <sup>1</sup>	3	---	---	216	---	3,912	---	---	---
1903 <sup>1</sup>	15	---	---	621	---	13,479	---	---	---
1905	20	---	---	1,200	---	28,000	---	Pb	---
1907	46	---	5	672	470	10,704	---	Pb	A.S.&R.
1908	27	---	2	909	---	15,746	---	Pb	---
1909	44	---	---	317	---	4,578	16,368	Zn-Pb	A.S.&R.; Bartdesville?
1910	43	---	1	344	---	---	29,385	Zn	A. Mer. Met. Co.; Lanyon

<sup>1</sup>Production from USGS Bulletin 814.

Table 10 (continued). Production from the North Star Mine, by year.

Year	Ore	Old Tailings	Gold (ounces)	Silver (ounces)	Copper (pounds)	Lead (pounds)	Zinc (pounds)	Class of ore	Treatment
1916	621	---	7.24	446	---	7,321	27,440	Pb-Zn	Western Mt.
1917	7,095	3,361	303.00	43,060	---	659,500	1,949,866	Pb-Zn	Kusa Spelter Co.; U.S. Zinc; A.S.&R.-M.; O.S.L.
1918	9,400	---	133.00	25,335	---	445,459	858,923	Pb Zn	A.S.&R.-C.; A.S.&R.-M.; U.S. Zinc; U.S. Zinc-SP
1921-1924 <sup>2</sup>	---	---	---	---	---	---	---	---	---
1928	174	---	29.07	4,432	---	---	---	Pb-Zn	U.S.S.
1929	408	---	64.82	6,651	1,940	123,181	139,309	Pb Zn	U.S.S./O.S.L. Ry
1930	108	---	11.49	2,705	1,023	50,354	48,143	Pb Zn	O.S.L. Ry/U.S.S.
1934	5	---	.72	248	17	2,081	---	---	---
1935	28	---	3.38	1,029	---	8,830	---	---	---
1936	5,670	---	94.63	36,350	14,400	616,200	1,188,834	---	---
1937	6,795	---	247	50,794	17,124	668,964	1,298,656	---	---
1938	6,208	---	298	54,075	---	670,243	1,220,000	Zn-Pb, Zn-Pb-Fe	---
1940	91,638	---	8,811	847,482	249,350	10,058,900	14,149,400	Zn-Pb, Zn-Pb-Fe	---
1941	97,267	---	5,545	744,541	211,120	10,592,768	16,984,680	Zn-Pb, Zn-Pb-Fe	---
1942	110,660	---	4,200	635,290	331,938	7,522,935	12,520,620	Zn-Pb, Pb-Zn-Fe	---
Total	338,918	3,361	35,664.87	2,593,891	827,382	33,974,077	50,438,307	---	---

<sup>2</sup>Production for these years included with the Independence.

Table 11. Companies and individuals operating at the North Star Mine.

Company Name	Officer	Date Incorporated	Charter Forfeited	Year(s) at Mine
J.W. Ballentine	---	---	---	1885-?
lessees	---	---	---	1898
Idaho North Star Mining & Milling Co.	1	1	1	1909-1910
Federal Mining & Milling Co.	F.H. Brownell, President	Sept. 24, 1903	merged with ASARCO -- May 11, 1953	1916-1940
The Snyder Mines, Inc.	E.H. Snyder, President	Sept. 23, 1936; May 24, 1940	Nov. 30, 1939; Nov. 30, 1941	1936-1942
Triumph Mining Co.	J.W. Swent, Pres.; O.J. Salisbury, Pres. (1977)	Feb. 23, 1940	1	1940- <sup>1</sup>

<sup>1</sup>Information not available in IGS's files.

various ore minerals. The main tunnel of the North Star was 1,500 feet in length and passed through a body of ore 200 feet long and over 10 feet wide (Figure 23); the face of the tunnel extended into a second large orebody whose length was unknown at the time. The Mine Inspector's report for 1913 credited the Triumph and North Star veins with a combined output of high-grade lead-silver ore worth \$750,000.

According to the 1915 IMIR, the Triumph and North Star mines were under consideration by "one of the ablest mining engineers of the country" and work was being done to solve the "knotty" metallurgical problem of separating the zinc from the lead. Bell mentioned recent advances in electro-chemical treatment of zinc values that showed promise of allowing these ores to be treated profitably.

On May 1, 1916, Federal Mining & Smelting acquired a bond and option on the North Star Mine. The total purchase price was to be \$150,000, of which \$29,000 was paid in 1916. The mine had been idle for over 25 years and the lower levels were flooded. Past production of the mine was given at \$600,000 of lead-zinc ore. Between May and December, Federal spent \$314,924 on new equipment, construction, and development work at the mine. The company erected a 150-tpd mill, equipped the mine with air compressors and "other mechanical devices for deeper development," and drove a deeper level tunnel to drain the lower levels of the mine. A vein of very rich lead-zinc sulfide ore was discovered after the lower levels were drained. This ore

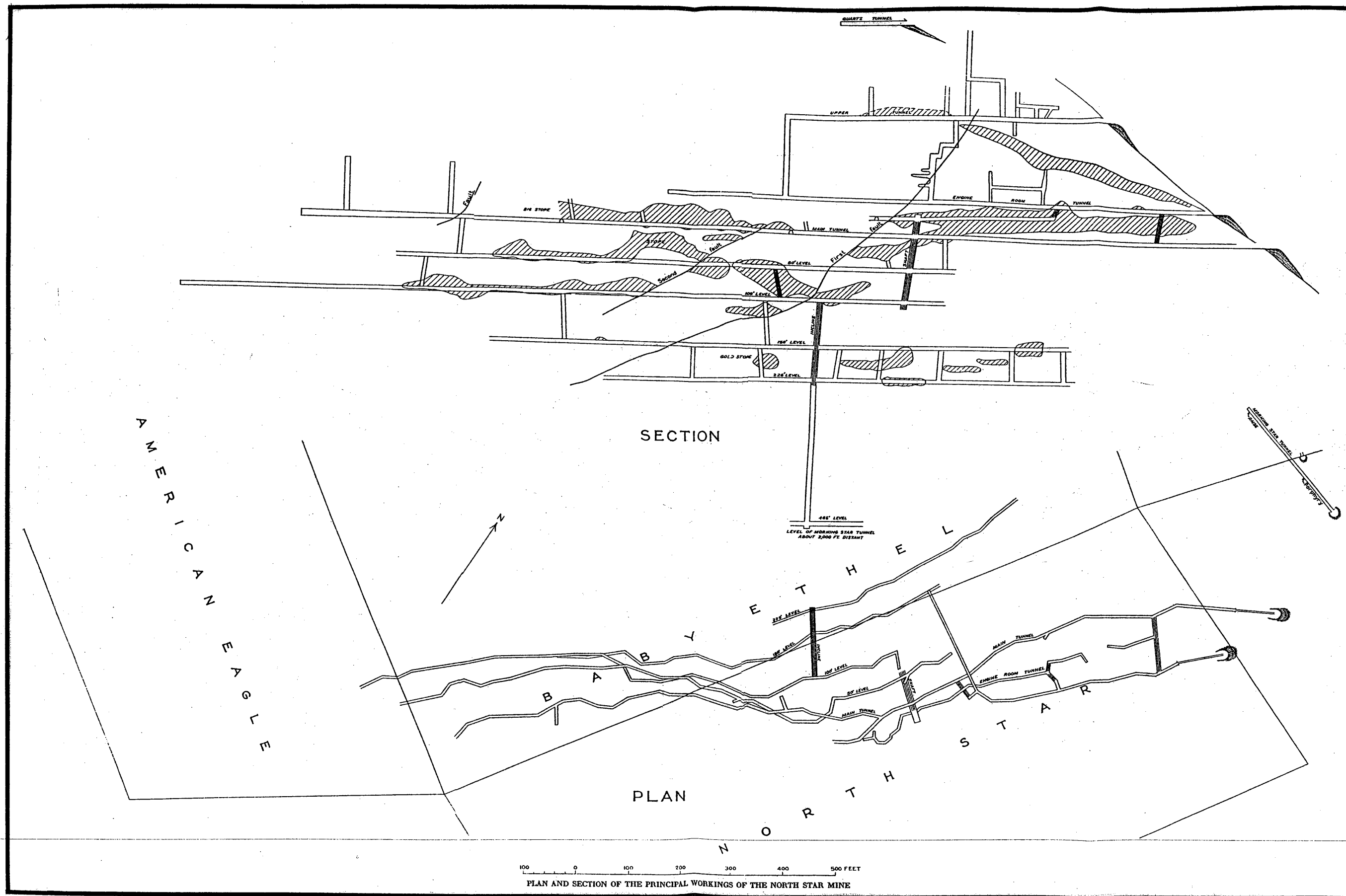


Figure 23. Plan and section of the principal workings of the North Star Mine (Plate 24 in U.S. Geological Survey Bulletin 814).



was less complex than most of the ore in the mine, and the orebody was large enough to keep the mill operating at capacity. The reserves of the North Star and the adjoining Triumph were estimated at a million tons of proven and probable ore containing between 15 and 20 percent zinc, 8 percent lead, and 8 ounces of silver per ton. Excess iron in the ore caused difficulties in treatment by standard concentration methods; the IMIR again speculated that an electro-chemical process would be required for complete separation of the ore. The North Star mill began operating on an experimental basis in October, and testing continued for the rest of the year. The mill was equipped with a crusher, Marcy mill, Wilfley tables, flotation cells, magnetic separator, and Dorr thickener. According to the USGS Yearbook, it was heavily damaged by a snowslide in December. Federal's annual report gives the date of the snowslide as February 1917. Eleven men were killed and several others were injured. Several lawsuits, totalling about \$485,000, were filed against the company, but they were settled the following year for \$55,000.

The North Star was the most important lead producer in Blaine County during 1917. Both lead-zinc ore and old tailings were processed to make a lead concentrate and a lead-zinc concentrate. The mill was operated for nine months out of the year, with many interruptions to readjust the equipment and improve the separation of the ore. (Figure 24 shows the mine and mill.) The plant's capacity was 120 tpd; the ore was concentrated on Wilfley tables, followed by oil flotation. Sulfides of iron, arsenic, and antimony, mixed with the zinc, lead, and silver minerals, made separating the silver-lead and the zinc concentrates an ongoing problem for Federal. The arsenic content of the North Star ores was high enough to provide a potential source of by-product arsenic for war use. In addition, considerable carbon associated with the lead and zinc minerals made it impossible to achieve a clean separation of the minerals by flotation. The USBM production records show development work during the year of 3,565 feet on four tunnels and 3,255 feet of drifts. Federal's operating loss on the property for 1917 was \$96,858.30. The money was spent on development work, on the mill, and on construction. Federal employed 88 men on the North Star and the Independence and produced 7,360 tons of ore.

During 1918, the North Star mill was "working to a favorable point" and producing zinc concentrates with up to 40 percent zinc. The ore contained around 14 percent zinc, 8 percent lead, and 8 ounces of silver per ton. However, a decline in metal prices (particularly zinc) forced Federal to suspend operations at the North Star in September. According to Federal's annual report for 1918, "The operations on this property disclosed a considerable body of ore, but the metallurgical difficulties are so great at present costs and prices that a satisfactory profit could not be made." Federal operated the North Star only during May, June, July, and August, producing 9,700 tons of ore. The company spent considerable effort rearranging the mill during the year.

The North Star Mine was idle during 1919 because the ore could not be mined profitably, but contract workers were driving the Plummer tunnel from the North Star

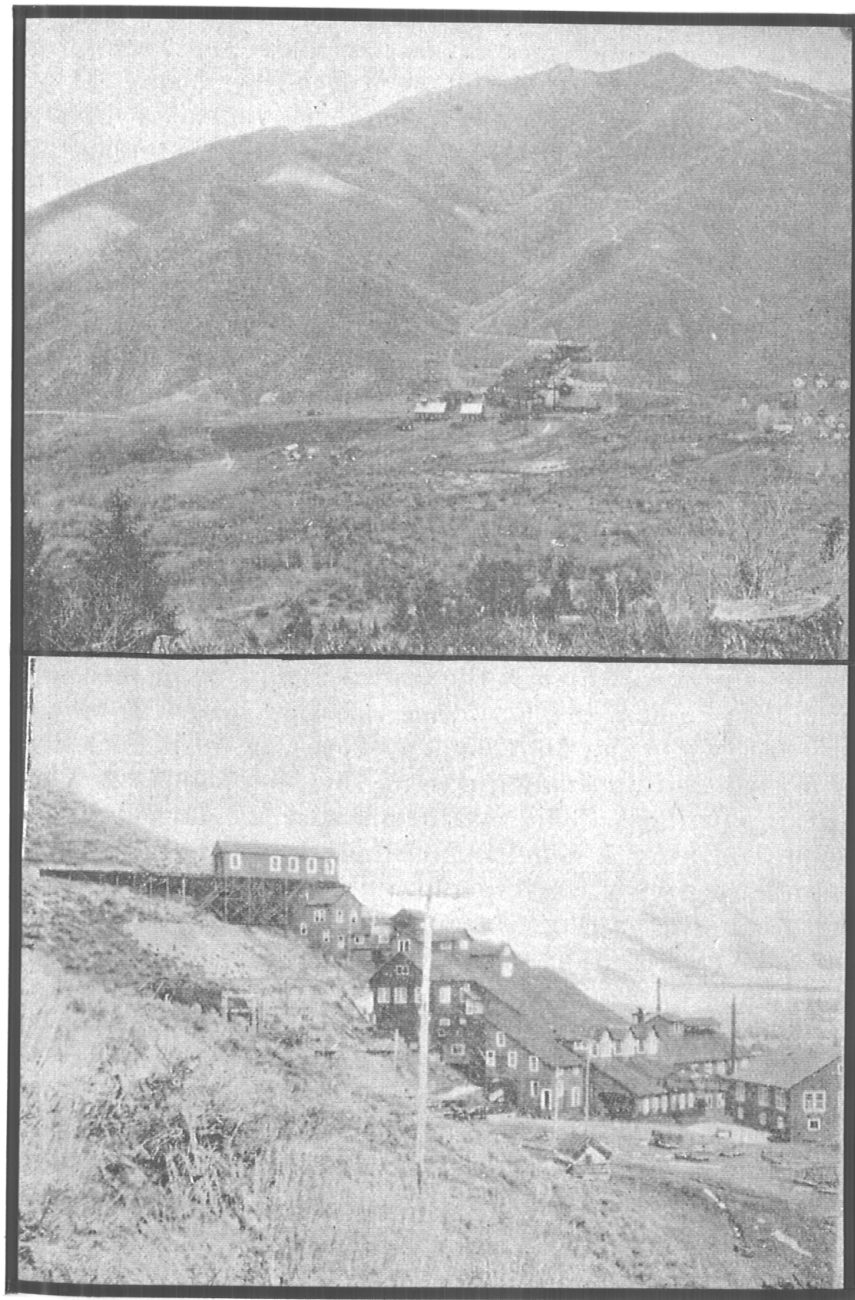


Figure 24. North Star Mine and mill (page 65 in Bell, Robert N., 1920, Twenty-first annual report of the mining industry of Idaho for 1919).

workings through the mountain to connect with the Independence Mine. When the Plummer tunnel reached the Independence vein in 1920, the North Star mill was readjusted to handle 200 tpd of silver-lead ore from the Independence.

During 1921 and 1922, Federal concentrated its efforts on the Independence workings, although the USBM included minor production from the North Star in the ore credited to the Independence. The property was shut down in August 1923, and the workings (mostly in the Independence) were leased in blocks to various individuals. Minor amounts of ore were removed from the mine for most years during the next decade. In 1928, lessees shipped several carloads of lead-zinc ore to the flotation mill at Midvale, Utah. Lessees also worked the mine in 1929. (Figure 25 shows the mill in 1929.) In 1930, lessees shipped one carload of ore to a smelter and two carloads of lead-zinc ore to Midvale.

In 1936, Snyder Mines, Inc., took over operation of the North Star and connected the North Star workings with those of the Triumph. Lessees continued to operate parts of the North Star and Independence at least through 1937. Snyder's operation in the Triumph and North Star workings accounted for most of the production from the Warm Springs district during 1937 and 1938; 1939 production was credited entirely to the Triumph. The Triumph Mining Company acquired ownership of the property in 1940. Development work for 1941 included 300 feet of shafts, 2,900 feet of drifts, and 2,300 feet of tunnels. After 1942, production from the North Star workings was not reported separately from ore mined from the Triumph Mine.

Total recorded production for the North Star between 1883 and 1942 was 338,918 tons of ore and 3,361 tons of old tailings. This material yielded 35,665 ounces of gold, 2,593,891 ounces of silver, 827,382 pounds of copper, 33,974,077 pounds of lead, and 50,385,871 pounds of zinc.

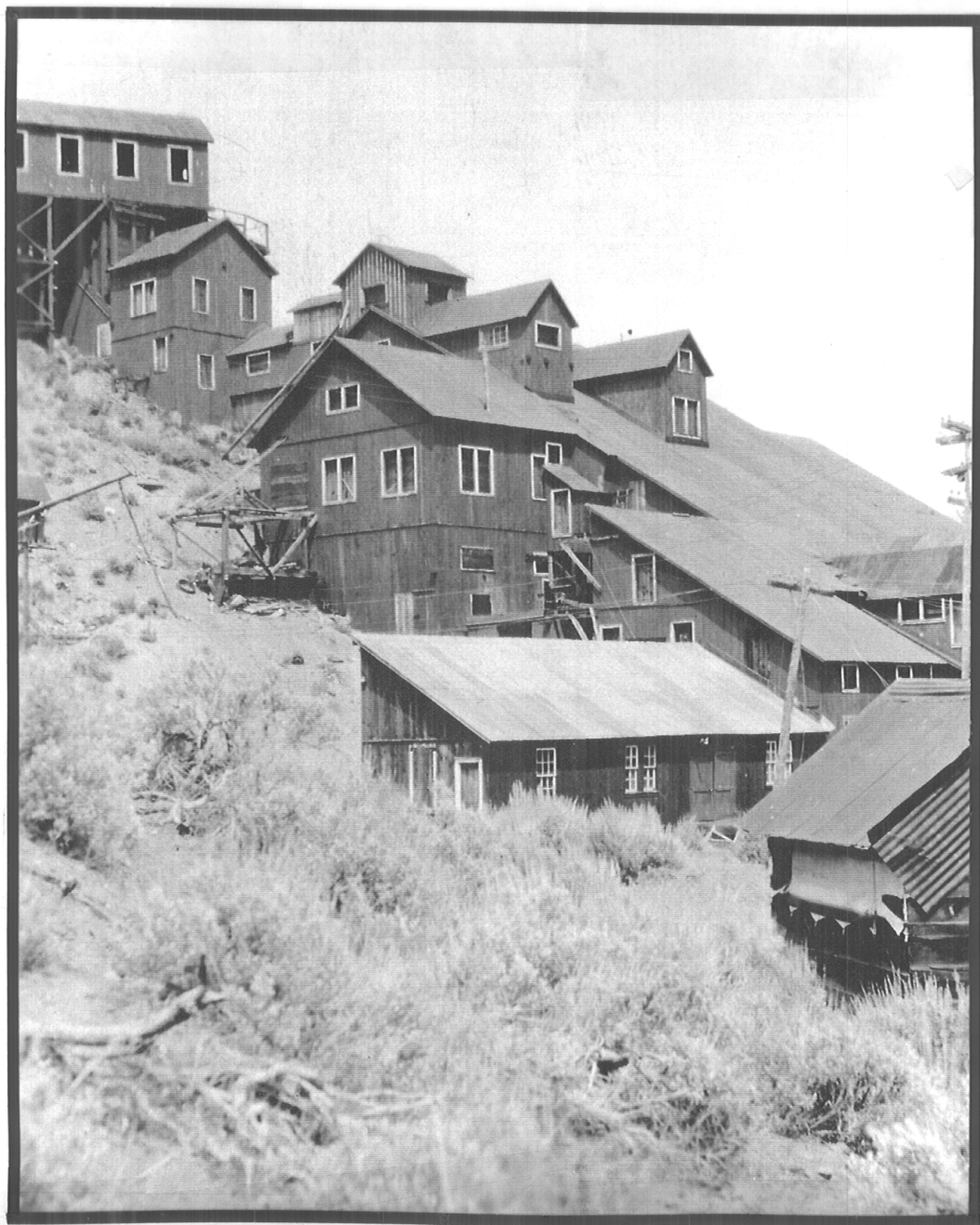


Figure 25. North Star mill, June 6, 1929 (ASARCO photograph).

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