

was early obtained by washing in Arrastra Gulch, and this led, in 1870, to the discovery by a party of prospectors sent out by Governor Pile, of New Mexico, of the first mine which was successfully operated, the Little Giant, on the north side of Arrastra Gulch."<sup>41</sup>

However, the real rush into the San Juan districts did not begin until the summer of 1874 when about 2,000 miners came to the districts and more than 1,000 lodes were located.<sup>42</sup> According to the Colorado Mining Directory of 1883 (p. 617) the Bill Young mine was located in 1873 as was the Silver Link mine. The Poughkeepsie mine was located in 1874, as were most of the mines and claims around Mineral Point. However, the order of development and relative importance of such mines as the San Juan Chief, Ben Butler, Polar Star, Red Cloud, Bill Young, Old Lout, Palmyra, and others during the interval of high activity from 1874-1880 is largely without record. The town of Mineral Point was a thriving but short-lived settlement boasting the highest post office in the United States. Mineral Point probably never had a population of over 100, and in addition to the post office there was a general store, a couple of saloons, and a rooming house.<sup>43</sup> The post office was discontinued in 1883.

F. M. Endlich<sup>44</sup> reported as follows in 1874, "at the time of my visit at the San Juan mines, August and September, 1874, but comparatively little work had been done. The greater portion of the miners' time and energy was devoted to prospecting, and but few had developed their lodes to any extent." Endlich<sup>45</sup> also reported that about seventy-five lodes were located on Mineral Point in 1874, and of the activity stated, ". . . several gentlemen, G. W. Kingsbury, J. R. Hanson, A. W. Burrows, C. H. McIntyre, all from Yankton, Dakota Territory, and W. H. Van Gilson, P. Houghton, and S. H. Tuttle, from Whitewater, Wisconsin, were contin-

<sup>41</sup>According to Rickard, opened by Miles T. Johnson in 1871.

<sup>42</sup>History of Nevada, Colorado, and Wyoming (Bancroft), p. 501, 1890.

<sup>43</sup>Merrill Dowd: Oral communication.

<sup>44</sup>Hayden, F. V., Ann. report of the U. S. Geol. and Geog. Survey of the Terr. for 1874, p. 229, 1876.

<sup>45</sup>Idem., p. 232.

uing the prospecting as well as the further developments of the veins already claimed." This last is of exceptional interest owing to the prominence of several of these names as geographic features and claims.

About 1875 Crooke and Co. established a smelter at Lake City, and ore from the Mountain Queen mine was packed over Engineer Pass to the end of the road from Lake City at Rose's cabin. By 1876 Animas Forks had 30 houses and 2 mills, the principal mill treating ores from the Red Cloud mine.

The Old Lout was located in 1876. In 1878 the rich ores of the Palmetto mine were being worked and several carloads were shipped. By 1879 a road was extended up Cement Creek from Gladstone to the head of Poughkeepsie Gulch where the Alaska and other small mines were working. The Bonanza mine on the shore of Lake Como was located in 1879. In 1880 the Palmetto mine was active and in 1881 ore was shipped from the Palmetto and Polar Star mines to the Crooke smelter at Lake City. In 1881 the Frank Hough mine was discovered and by 1882 was being worked through a 250-foot shaft. In 1882<sup>46</sup> the Palmetto was reported to be the best developed mine at the head of Henson Creek, but the Frank Hough mine was rapidly coming into large output. In 1882 Burchard<sup>47</sup> stated that the ores of San Juan County were treated at "other localities exclusively," indicating that the mills built earlier at Animas Forks were probably inadequate or that the output nearby and at Mineral Point was not on a mill scale.

In 1884<sup>48</sup> a large quantity of ore was shipped from the Frank Hough mine. According to Burchard<sup>49</sup> this mine was "one of the main factors in swelling the output of the county."

<sup>46</sup>Burchard, H. C., Report of the Director of the Mint upon the production of precious metals during the calendar year 1882, p. 477, 1883.

<sup>47</sup>Op. cit., p. 545.

<sup>48</sup>Henderson, C. W., Mining in Colorado: U. S. Geol. Survey Prof. Paper 138, p. 51, 1926.

<sup>49</sup>Op. cit. for 1884, p. 219, 1885.

In 1884 the Old Lout mine was credited with an output valued at \$200,000. In 1886 the Old Lout was sold to an English company, and the 1,865-foot tunnel and many hundred feet of drifts and exploratory tunnels were driven. In 1887 the Old Lout was credited with an output valued at \$86,654.

During 1880-1890 the Polar Star mine was reported to have contributed \$125,000 in siliceous gold-silver ore, and is estimated to have contributed as much again in the period without record prior to 1880. During 1888-1891 ore valued at \$50,000 was shipped from the Silver Link mine, and the principal shipments from the Mickey Breen from 1890-1892 were valued at \$105,751.

The period between 1893 and 1900, after the decline in the price of silver, was one of little activity and record of output. During the summers of 1899-1901 the geologic surveys for the Silverton quadrangle were made, and in 1899 and 1900 F. L. Ransome studied the deposits and mines of the quadrangle. Ransome's unfavorable conclusions as to the possibility of ore occurring in depth discouraged exploration for deposits not actually exposed.

The records of output prior to 1900 are very incomplete or lacking. Many mines in which the results of development and stoping can be seen are entirely without record of output. These include the following mines: Adelia, Amador, Ben Butler, Belcher, Bill Young, Bonanza, British Queen, Brazillian, Chapman, Chrysolite, Forrest, Guadalope, London (shaft), Maid of the Mist, Mother Cline, Ores & Metals, Oyama, Palmyra, Picket, Rollo, Syracuse Pride, Tempest, and Union.

Probably the total value of ores produced from 1874 to 1900 in the Mineral Point, Poughkeepsie, and Upper Uncompahgre districts is almost \$2,000,000. Estimates of the dollar value of output prior to 1900 are as follows:

Alaska .....	\$ 90,000
Engineer .....	50,000
Frank Hough .....	300,000
Mammoth .....	35,000
Michael Breen .....	105,000
Mountain Queen .....	100,000
Old Lout .....	350,000
Palmetto .....	150,000
Polar Star .....	250,000
Poughkeepsie .....	12,000
San Juan Chief .....	75,000
Saxon .....	30,000
Silver Link .....	75,000
Wewissa .....	50,000
Others (individually estimated) .....	250,000
	\$1,922,000

In 1901 the Mountain Queen mine contributed 95 tons of lead ore and there was some activity at the Wyoming mine. In 1902 the Mammoth, Silver Link, Wyoming, and Mountain Queen mines were active and small shipments were made from them. In 1903 shipments of 40 and 60 tons respectively were made from the Mickey Breen and Tempest mines. No output was reported in 1904, otherwise a year of considerable activity for San Juan County as a whole. The Wyoming mine contributed 111 tons during 1905-1906, and the Guadalupe, Mountain Monarch, and Mother Cline mines contributed additional small shipments during 1906. In 1907 the only output was 30 tons from the Bonanza King mine.

In 1908 the Frank Hough mine was reopened and in an 11-year period interrupted only in 1915 contributed 3,100 tons of gold-silver-copper ores. The peak of this last productive period for the Frank Hough mine was in 1909 and

1910, when it contributed 1,370 and 1,055 tons respectively and accounted for two-thirds of the total copper produced from 1901-1941. In 1910 the Vermillion mine and mill were active, contributing 2,763 tons of ore and about 33 percent of the total zinc produced since 1900. In the same year the Thistledown contributed 900 tons of mill-grade lead ore. The districts were relatively inactive during 1911-1912, but in 1913 the Frisco tunnel became productive, its shipments amounting to 5,496 tons. The Mountain Monarch mine contributed 151 tons in 1913. In 1914 the last shipments, amounting to 1,670 tons, were from the Frisco tunnel. In the same year small shipments were made from the Mountain Monarch, Wewissa, Benack, Red Cloud, Poughkeepsie, Hoffman, and Frank Hough mines. In 1916 small shipments of ore were made from the Frank Hough, Mother Cline, Wewissa, and Ben Butler mines.

During 1917-1918 shipments were made from 13 mines, but the total output amounted to only 282 tons. The activity extended to such long dormant mines as the Sunset, Maid of the Mist, and Pactoles, and included initial shipments from the Dunmore, Sutton, and Silver Point mines. In 1919 the principal output was from the Guadaloupe mine, which in a brief period of activity during 1919-1921 contributed 316 tons of argentiferous copper ore. The Early Bird mine was active in a small way during 1919-1922, contributing 39 tons of high-grade gold-silver ore in all. In 1920, 9 tons were shipped from the Wyoming mine, and in 1921, 11 tons of argentiferous copper-lead ore was shipped from the tunnel workings of the London mine. In 1924 the only output was 49 tons of gold-silver ore from the Mountain Queen mine, and in 1925 the Sutton mine contributed 36 tons. In 1926, 67 tons of lead ore were shipped from the Mountain Queen mine to the smelter, and 179 tons of ore were milled. In 1927, 4,452 tons, part of which was from dumps at Red Mountain, were handled at the Sutton mill. During 1930, 80

tons were shipped from the Mountain Monarch mine to the Sutton mill.

The sporadic, scattered, but more or less continuous small output was then interrupted by the longest period of idleness in the history of the region. During 1932-1938 the only shipments were a half ton of high-grade gold ore from the Early Bird mine in 1936 and 16 tons from the Lucky Jack in 1937. In 1939 small shipments were made from the Lucky Jack and Mountain Monarch mines. During 1940-1941 small shipments were made from the Mountain Monarch and Mountain Queen mines. In 1940, 896 tons of dump ore from the Polar Star were treated at the Shenandoah Dives mill.

Since 1900, 23,443 tons of ore valued at nearly \$600,000 have been shipped. The total value of shipments from the three districts has probably amounted to about \$2,500,000.

The mine output by years from 1901-1941 inclusive is given in the following table:

OUTPUT OF METALS FROM MINES DURING 1901-1941<sup>50</sup>

Year and Mine	Tons <sup>61</sup>	GOLD	SILVER	COPPER	LEAD	ZINC
		Fine Ounces	Fine Ounces	Pounds	Pounds	Pounds
1901						
Mountain Queen .....	95	3.80	2,403	-----	-----	-----
Wyoming .....	8	8.25	1,380	-----	-----	-----
1902						
Early Bird .....	9	11.05	528	-----	-----	-----
Mammoth .....	110	114.15	3,045	-----	-----	-----
Mountain Queen .....	22	-----	294	-----	19,800	-----
Silver Link .....	70	12.00	1,685	44,084	-----	-----
Tempest .....	119	7.17	1,515	-----	28,518	-----
Wyoming .....	16	21.56	1,920	-----	4,800	-----
1903						
Mountain Monarch .....	40	10.00	4,000	-----	-----	-----
Tempest .....	60	36.00	9,000	3,600	7,200	-----
1905						
Wyoming .....	56	61.00	12,040	-----	11,950	-----
1906						
Guadaloupe .....	40	7.98	1,200	8,000	-----	-----
Mountain Monarch .....	51	2.27	227	62	2,123	2,344
Mother Cline .....	34	8.37	4,858	3,347	22,105	10,880
Wyoming .....	55	59.00	12,039	-----	11,947	-----
1907						
Bonanza King .....	30	4.74	721	2,400	-----	-----
1908						
Frank Hough .....	344	34.60	12,923	186,774	30,507	-----
1909						
Frank Hough .....	1,370	185.00	49,640	708,514	88,598	-----

OUTPUT OF METALS FROM MINES DURING 1901-1941<sup>50</sup>

Year and Mine	GOLD		SILVER	COPPER	LEAD	ZINC
	Fine Ounces	Fine Ounces	Fine Ounces	Pounds	Pounds	Pounds
1910						
Frank Hough.....	1,055	219.00	38,657	553,514	97,961	-----
Mountain Monarch.....	19	1.95	314	389	6,280	-----
Thistledown.....	(46 <sup>c</sup> )	4.45	295	-----	108,500	-----
	900 <sup>m</sup>					
Thistledown.....	41	1.21	257	-----	58,722	-----
Vermillion.....	(435 <sup>c</sup> )	27.00	5,250	1,998	217,500	201,873
	2,763 <sup>m</sup>					
1911						
Frank Hough.....	31	6.01	1,144	12,000	-----	-----
Mother Cline.....	10	0.39	114	300	6,514	-----
Thistledown.....	9	-----	33	-----	7,000	-----
1912						
Frank Hough.....	20	3.77	1,008	8,771	-----	-----
1913						
Emperor Wilhelm.....	4	0.46	206	18	640	-----
Frank Hough.....	127	25.58	6,770	71,920	6,198	-----
Frisco.....	6	0.30	310	95	1,886	-----
Frisco.....	{ (549 <sup>c</sup> )	55.58	8,453	8,496	251,470	108,671
	{ 5,490 <sup>m</sup>					
Hoffman.....	6	0.42	168	-----	500	-----
Mountain Monarch.....	151	29.01	1,694	2,598	23,792	74,431
Poughkeepsie.....	31	4.00	582	3,011	-----	-----
1914						
Benack.....	16	0.32	675	626	8,000	-----
Frank Hough.....	65	4.65	1,236	19,830	-----	-----
Frisco.....	20	8.00	812	94	800	-----
Frisco.....	{ (165 <sup>c</sup> )	28.66	3,788	2,492	76,248	37,001
	{ 1,650 <sup>m</sup>					
Mountain Monarch.....	{ 27 <sup>c</sup>	4.39	678	603	4,581	18,246
	{ 200 <sup>m</sup>					
Mountain Monarch.....	29	8.43	968	1,550	8,196	-----
Red Cloud.....	23	4.80	426	117	6,639	-----
Wewissa.....	134	3.09	6,192	4,550	82,500	-----
Poughkeepsie.....	10	1.46	119	2,000	-----	-----
Hoffman.....	10	0.15	114	-----	-----	-----



OUTPUT OF METALS FROM MINES DURING 1901-1941<sup>50</sup>

		GOLD	SILVER	COPPER	LEAD	ZINC
Year and Mine		Fine Ounces	Fine Ounces	Pounds	Pounds	Pounds
1916						
Ben Butler	174 <sup>m</sup>	9.34	1,559	1,203	21,482	-----
Frank Hough	26	1.44	204	3,852	1,691	-----
Wewissa	179	5.96	7,768	11,367	31,205	-----
Wyoming	1	5.15	357	-----	64	-----
1917						
Dunmore	8	0.50	194	509	-----	-----
Frank Hough	23	1.44	291	3,678	570	-----
Guadaloupe	29	0.76	497	6,189	-----	-----
Mountain Monarch	16	1.63	166	244	9,231	-----
Sunset	4	0.04	19	454	325	-----
Sutton	8	0.42	404	352	-----	-----
Wewissa & Benack	52	1.16	1,114	3,041	11,399	-----
Wyoming	7	12.24	865	-----	176	-----
1918						
Frank Hough	18	1.30	298	3,253	950	-----
Maid O'Mist	16	0.80	339	819	7,710	-----
Pactoles	61	20.88	1,329	2,152	46,356	-----
Silver Point	8	0.40	65	807	-----	-----
Mountain Queen	32	0.90	747	602	13,427	-----
1919						
Early Bird	2	1.86	50	32	-----	-----
Guadaloupe	167	0.80	7,809	70,875	-----	-----
Silver Point	6	1.23	25	211	117	-----
1920						
Early Bird	25	16.41	1,373	1,700	96	-----
Frank Hough	2	0.40	53	718	259	-----
Guadaloupe	93	-----	4,672	39,361	-----	-----
Wyoming	9	2.60	384	-----	799	-----

OUTPUT OF METALS FROM MINES DURING 1901-1941<sup>50</sup>

Year and Mine	GOLD		SILVER	COPPER	LEAD	ZINC
		Fine Ounces	Fine Ounces	Pounds	Pounds	Pounds
1921						
Benack.....	15	0.10	977	1,339	640	-----
Early Bird.....	7	5.50	471	455	-----	-----
Guadaloupe.....	56	-----	3,227	31,677	-----	-----
London.....	11	1.00	336	368	1,122	-----
1922						
Early Bird.....	5	3.94	310	-----	-----	-----
1923						
Old Lout.....	7	0.40	987	-----	-----	-----
1924						
Mountain Queen.....	49	0.81	1,020	-----	-----	-----
1925						
Sutton.....	36m	7.46	626	-----	-----	-----
1926						
Mountain Monarch.....	37	1.11	315	-----	-----	-----
Mountain Queen.....	67	0.70	1,294	865	47,209	-----
Mountain Queen.....	179m	2.47	3,313	3,067	94,172	51,570
1927						
Sutton.....	(371 <sup>c</sup> ) 4,452 <sup>m</sup>	101.04	26,053	19,195	-----	-----
1928						
Lucky Jack.....	4	5.30	166	106	35	-----
1930						
Mountain Monarch.....	{ (12 <sup>c</sup> ) 780 <sup>m</sup>	1.10	365	472	12,544	2,160
Guadaloupe.....	21	-----	356	2,426	-----	-----

OUTPUT OF METALS FROM MINES DURING 1901-1941<sup>50</sup>

Year and Mine		GOLD	SILVER	COPPER	LEAD	ZINC
		Fine Ounces	Fine Ounces	Pounds	Pounds	Pounds
1936						
Early Bird.....	½	5.05	3	-----	-----	-----
1937						
Lucky Jack.....	16	1.00	64	64	4,024	3,219
1939						
Lucky Jack.....	52 <sup>m</sup>	2.88	133	259	5,321	1,405
Mountain Monarch.....	21	5.25	149	101	7,890	17,958
1940						
Early Bird.....	36 <sup>m</sup>	3.28	611	209	17,597	-----
Mountain Monarch.....	50 <sup>m</sup>	-----	327	227	13,043	4,883
Mountain Queen.....	711 <sup>m</sup>	16.29	8,013	3,535	137,483	61,151
Polar Star.....	{ (37 <sup>c</sup> ) 896 <sup>m</sup>	9.00	8,268	-----	1,212	2,044
1941						
Mountain Monarch.....	27	-----	167	108	12,241	-----
Mountain Queen.....	284 <sup>m</sup>	7.19	2,365	1,403	45,710	20,162
Mountain Queen.....	8	-----	214	129	9,130	2,456
<b>TOTALS.....</b>	<b>23,443</b>	<b>1,297.55</b>	<b>290,393</b>	<b>1,869,177</b>	<b>1,756,705</b>	<b>620,454</b>

<sup>50</sup>Compiled in cooperation with Charles W. Henderson, Bureau of Mines, Mineral Economics Branch, U. S. Dept. of the Interior, Denver, Colorado.

<sup>51</sup>m=milled ore; c=concentrates; all others, ore smelted.

## UPPER UNCOMPAHGRE AREA

*General*

Included here are mines located along Uncompahgre Canyon from Bear Creek Falls to Mineral Point and Poughkeepsie Gulch and along Red Mountain Creek between Ironton Park and the junction with the Uncompahgre River. The mines and prospects of this area are among the most accessible in the districts. Many of the mines are only a short distance from U. S. highway 550. There is a wider variety in the geological occurrence of the ore deposits in this than in any other area; the only deposits and mines in the pre-Cambrian rocks are here. Great relief, steep slopes, and cliffs are surpassed only in the Canyon Creek area. Large backs of ore may be developed very near the adit portals. Shipments and operations have been sporadic, and the deposits within individual mines have been worked with variable success. The Silver Link is probably the oldest mine in the area, and its claims were among the first to be patented.

*Hayden-Comal Properties*

*Sutton mine.*—The Sutton mine is located on the west side of Uncompahgre Canyon at an altitude of 10,595 feet. It is owned by the Hayden-Comal Corp., as are most of the veins in the immediate vicinity. The mine is reached by road and trail from the old Mineral Farm mine south of Ouray. The property comprises 14 patented and 6 unpatented lode claims in the group. The mine workings consist of four levels as shown in figure 6. The early workings along the No. 1 level furnished most of the ore, which was principally argentiferous. The principal workings now are along the No. 4 level, where a 925-foot crosscut known as the Barber tunnel cuts the vein. An aerial tramway 2,700 feet long leads from the Barber tunnel to a 100-ton mill located at Bear Creek Falls.

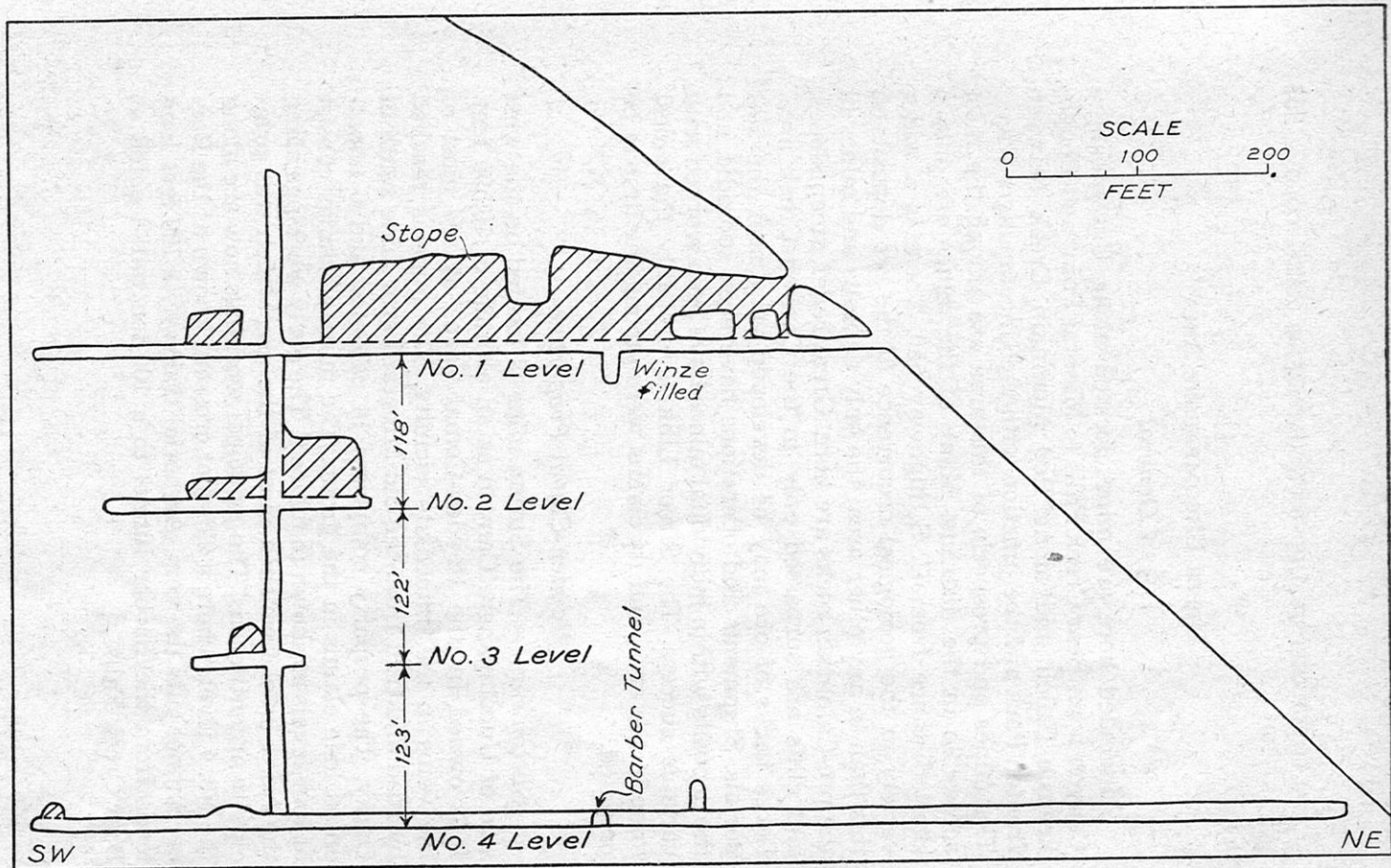


Figure 6. Longitudinal section of the Sutton mine. Adapted from a compass survey by T. P. Walsham.

The Sutton vein dips roughly  $70^{\circ}$  SE. in the vicinity of the mine workings. The strike of the vein is about  $N. 40^{\circ} E.$  on the No. 1 level and about  $N. 30^{\circ} E.$  on the No. 4 level. The thickness ranges from a few inches to four feet, but averages about two feet. In the few places where it was observed the vein is highly siliceous with a low sulfide content that appears to be principally pyrite. Mill returns, however, indicate that the ore must have contained at least locally some galena and a little copper sulfide. The Sutton vein bottoms at the basement of pre-Cambrian quartzite, at an altitude of about 9,700 feet. Near the base of the San Juan tuff about 200 feet of drifts have been driven along the vein and short branches from it. The vein here strikes  $N. 25^{\circ}-35^{\circ} E.$  and dips  $75^{\circ} S.$  and is a few inches to four feet thick.

The course of the Sutton vein in the steep cliffs below the No. 4 level can be seen from the base of the cliffs or from the highway on the opposite side of the canyon. At least locally the dip of the vein steepens and, as it fills a normal fault, this steeper part may contain better ore.

The portal of the Barber tunnel is on the Denver vein. The direction of the first few feet of the tunnel follows the Denver vein, which locally strikes  $N. 40^{\circ}-50^{\circ} E.$  and dips about  $65^{\circ} NW.$  The inclination of the Sutton and Denver veins upward toward each other causes them to converge in course up the slopes to the west; also the middle lines of the two patented claims converge westward. This situation has led to the suggestion that a drift be driven along the Denver vein at the Barber-tunnel level or some other level to reach an intersection with the Sutton vein. Such a recommendation results from mistaking the course of a vein on the surface for its strike, which is in the direction of drifting. Drifting along the Denver vein would actually diverge from the Sutton vein.

The high silver and gold content of ore mined from the upper levels were not duplicated generally at the Barber level. If an ore shoot is horizontal, one level may be in ore

and the next below not, or vice versa. Because of the bot-toming of the Sutton fissure vein the ore-forming solution must have entered laterally from some such trunk channel as the Dunmore or the Natalia fissures in the pre-Cambrian rocks.

In 1917 eight tons of ore were shipped to the smelter which grossed 0.42 ounces of gold, 404 ounces of silver, and 352 pounds of copper. In 1925, 36 tons of lead ore were milled and yielded 7.46 ounces of gold and 626 ounces of silver. The Sutton mill was built in 1926-1927 for a capacity of 100 tons daily. In 1927, 4,452 tons of dry siliceous ore were milled to 371 tons of concentrates which contained 101.04 ounces of gold, 26,053 ounces of silver, and 19,195 pounds of copper.<sup>52</sup> This mill output, however, is reported to be from ore shipped from the Yankee Girl dumps in the Red Mountain district.

*Daniel Bonanza mine.*—The Daniel Bonanza mine is located at an altitude of 9,483 feet along the trail to the Sutton mine. It is one of the Hayden-Comal group. The workings consist of a 275-foot tunnel which connects with a 91-foot shaft, as shown in figure 7. The deposit is a narrow vein, averaging about nine inches in thickness, in pre-Cambrian quartzite. It strikes N. 30°-40°W. and dips 75°-80°SW. It is mostly frozen to the walls and consists of quartz, pyrite, and some rhodochrosite or rhodonite. The ores shipped in

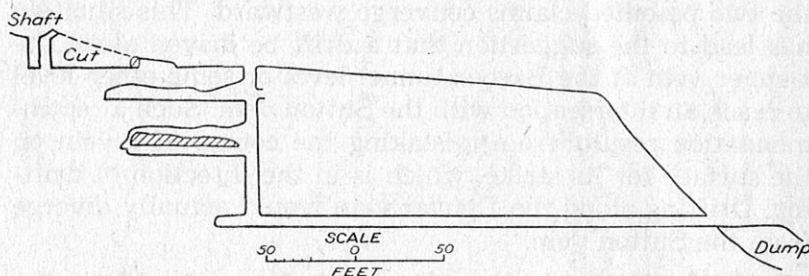


Figure 7. Longitudinal section of the Daniel Bonanza mine.

<sup>52</sup>Henderson, C. W., U. S. Bur. of Mines, Records of the Mineral Production and Economics Division, Denver, Colo.

1890 were principally valuable for their silver, gold, and lead.

*Natalia mine and neighboring prospects.*—The Natalia mine is located on the unpatented Natalia claim at an altitude of 8,811 feet. It is opened through the Natalia crosscut tunnel, 635 feet long, which is designed to intersect what is now called the Medina-Roy Neal veins. The Medina-Roy Neal veins were earlier owned and largely developed by Dr. E. C. Weatherly under the names of Combright and Comright. The main work on the vein is along a drift tunnel, the portal of which is almost directly on the bearing of the Natalia crosscut tunnel and about 365 feet above it (see fig. 8). These workings and this section of the Medina-Roy

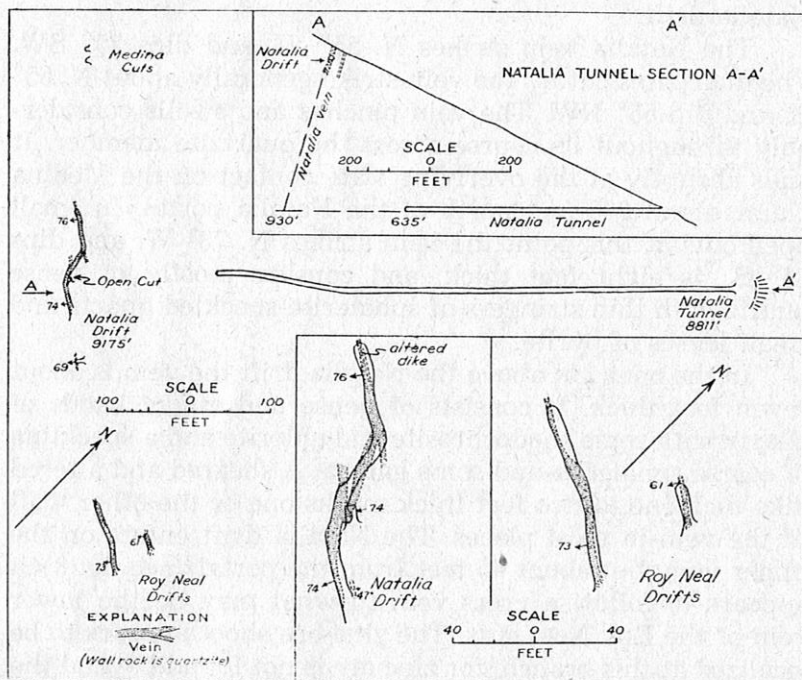


Figure 8. Plan and section of the Natalia and Roy Neal mines, Modified from map by F. E. Melzer.



Neal veins are in the Natalia claim which parallels the crosscut tunnel and the very narrow seam that it follows. Thus, the side lines of the Natalia claim are the end lines with respect to the Medina-Roy Neal vein and the vein is held in this manner along 600 feet intervening between the end line of the Medina to the northwest and the end line of the Roy Neal to the southwest.

As can be seen in figure 8, the workings expose two nearly parallel veins about 50 feet apart; however, these veins are not everywhere distinct along the length shown. They are distinct, however, on the Roy Neal claim, where a drift about 85 feet long has been driven on the upper vein and one 20 feet long on the lower vein. The upper Roy Neal vein appears to be continuous with the vein followed by the Natalia drift.

The Natalia vein strikes N. 55° W. and dips 75° SW. The quartzites cut by the vein strike generally about N. 65° E. and dip 55° NW. The vein pinches and swells considerably throughout its course across the quartzite member. It ends abruptly at the overlying slate contact on the Medina claim, about 900 feet north of the Natalia portal. In small open cuts at this point the vein strikes N. 78° W. and dips 85° S., is eight feet thick, and consists mostly of dense quartz with thin stringers of sphalerite-speckled quartz and small lenses of pyrite.

In the open cut above the Natalia drift the vein is about seven feet thick. It consists of dense and vuggy bands of quartz with some rhodochrosite and chlorite and a speckling of coarse sphalerite and some galena. A sheared and altered dike rock one to two feet thick marks one or the other wall of the vein in most places. The Natalia drift enters on the upper vein, but about 45 feet from the portal (see fig. 8) it appears to follow a cross vein to what may be the lower vein of the Roy Neal cuts. The zinc-ore shoot appears to be localized at this branch, for zinc ore is not found beyond the turn in the tunnel and also ends abruptly northwest of the face of the open cut directly above the turn. It is extremely

doubtful whether the showings on this vein warranted the long Natalia crosscut tunnel or would even warrant its extension nearly 300 feet in the hope of intersecting the small shoot shown at the surface.

Many other veins (see fig. 9) and prospects thereon occur within the Hayden-Comal group. Notable among these is the Silver Wreath-Boulder vein which follows Ralston

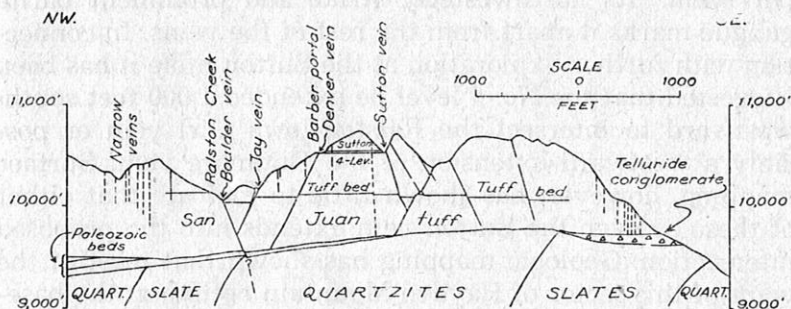


Figure 9. Cross section of the Sutton vein group. Section trends N. 45° W. through the Barber tunnel portal and shows the bottoming of most of the Tertiary veins (see pl. 1) at the base of the San Juan tuff.

Creek in the San Juan tuff. This is roughly parallel to the Sutton vein in strike and dip and closely comparable in width and strength. Lying between the Silver Wreath-Boulder and the Denver veins are several lesser veins including the Annie Marden, Jay, Gem, Essex, and Camel which are more northerly in strike and dip westerly similar to the Denver vein. The Jay and the Camel veins intersect with the Silver Wreath vein near the base of the San Juan tuff in Ralston Creek, and the vein union is exposed for a short distance in the underlying beds of the Molas formation. These veins and especially the junction area near the base of the San Juan tuff in Ralston Creek are deserving of additional prospecting.

South of the Sutton vein is a conjugate set comprising three or four prominent veins. These strike northward and northeastward with dips locally as low as 45 degrees. All

these veins either end abruptly or are offset at the Sutton vein, and their identity and outcrops, like those of the Sutton vein, are less clear high in the Sneffels member of the San Juan tuff. Some of them appear to be continuous with north branches from the Dunmore vein, such as the MacGregor.

Near the head of Ralston Creek is the Ralston-Iowa Girl vein. Its northwesterly strike and prominent barite gangue marks it apart from the rest of the veins. In connection with further exploration at the Sutton mine it has been suggested that the No. 4 level be extended 1,000 feet southwestward to intersect the Ralston-Iowa Girl vein or possibly a westward extension of the Dunmore vein. Surface mapping, however, has shown little to indicate that either of these or even the Sutton vein extends into the proposed intersection. Geologic mapping has shown that most of the veins of this sector of Hayden Mountain bottom at the base-ment of the pre-Cambrian rocks (see pl. 1).

### Dunmore Mine

The Dunmore mine is located on Silver Creek about one-fourth mile southwest of the junction of Red Mountain Creek with the Uncompahgre River. There are two or three small buildings, an ore bin, and tram station at the lower level. An aerial tramway 900 feet long connects the lower workings with an ore hopper on U. S. highway 550.

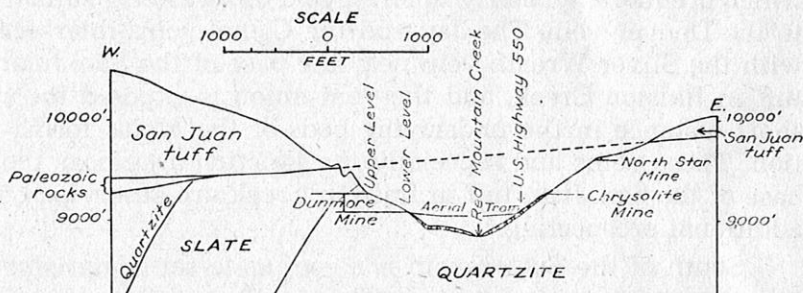
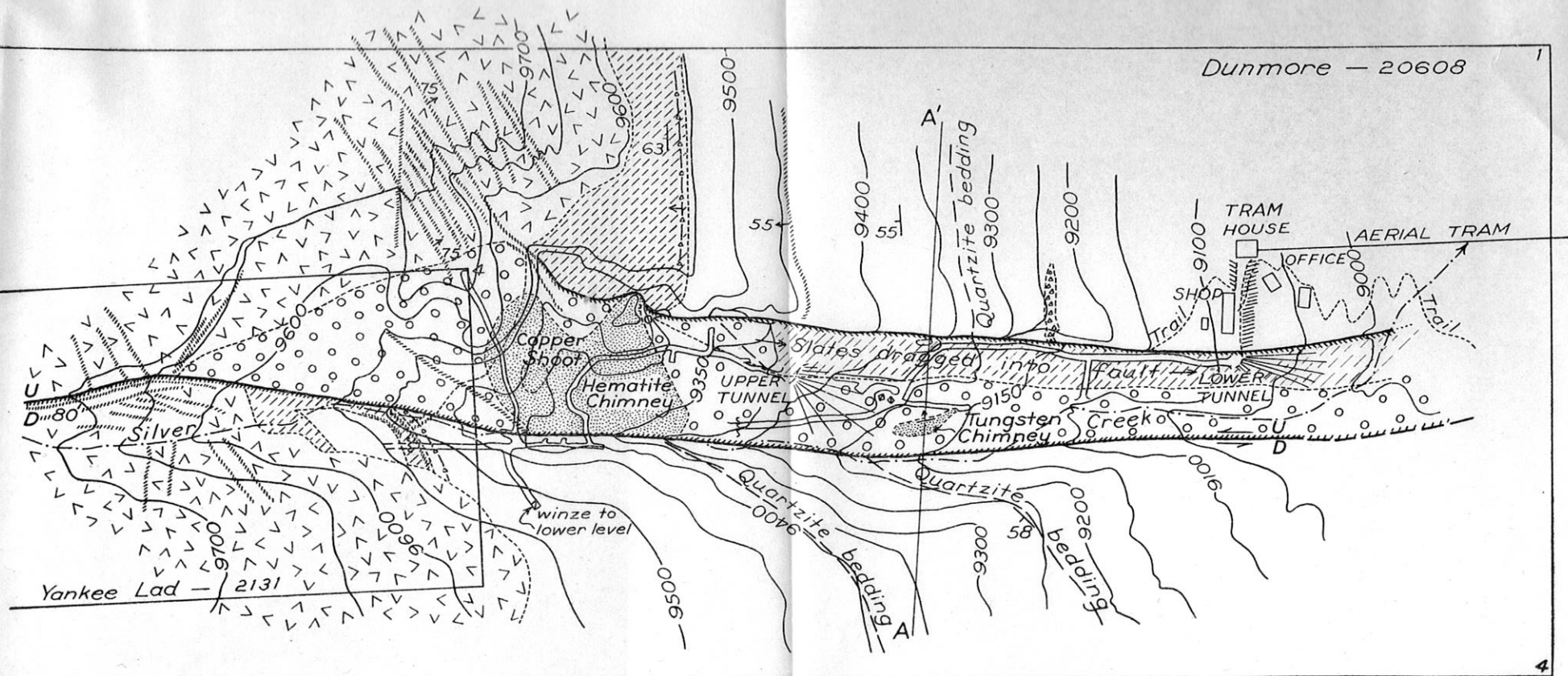


Figure 10. Longitudinal section along the Dunmore-North Star vein.



**LEGEND**

- San Juan tuff (Miocene?)
- Slate, Uncompahgre formation (pre-Cambrian)
- Quartzite, Uncompahgre formation (pre-Cambrian)
- Silicified Lode
- Mineral Chimney
- Breccia or Pebble Dike
- Fissure Vein
- Fault (showing displacement)
- Contact
- Dip and Strike of Bedding
- Stream
- Dump and Mine Portal



Geology and Topography  
By  
Caswell Silver and V. C. Kelley  
1940  
Contour interval 50 feet

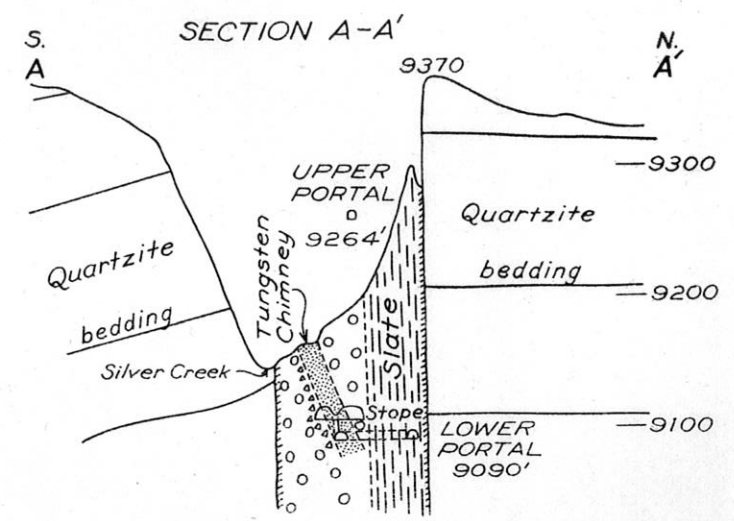


Figure 11. Geologic map and cross section of the Dunmore lode.