not as prominent in this area. The interlaced branching connections between the major northeasterly zones, however, are even more complex than around Lake Como, but, though some of the veins are wide, they do not display the almost phenomenal width or the pronounced eastward turns of the Lake Como veins. Most of the northeasterly veins dip 70°-80° SE., but the two major ones, the Sewell and the Hadley, dip 70°-80° NW.

Prospecting was at one time extremely active, but mining has not been continuous nor very productive. In the three and one-half square miles included in this area there are more than 350 pits, cuts, tunnels, and shafts, the shafts being much more common here than in the adjoining areas. The principal mines are the San Juan Chief, Red Cloud, Ben Butler, Bill Young, and London.

Brazillian-Monitor Mine

The Brazillian mine is located west of Mineral Point and about 1,300 feet southeast of the Old Lout mine. The altitude at the Brazillian portal is 11,611 feet and that of the Monitor shaft 11,722 feet. The Brazillian tunnel, which is caved, is connected to the bottom of the Monitor shaft by more than 500 feet of drifts and crosscuts. Most of the work was done around 1910 by the Brazillian-Monitor Mining Co. The claim group includes 12 patented claims laid out in a northeastward-bearing block which covers the ground and lodes southward to Canadian Lake. Included also in the Brazilian mill-site claim located at the junction of the Uncompahgre River and Poughkeepsie Gulch. The Brazillian vein strikes roughly N. 15° E. and dips about 70° E. The Monitor vein, which appears to be a more northeasterly split or branch, dips 75°-80° E. as seen in the inclined shaft.

Some 20 to 30 tons of sorted base-metal ore is piled near the Brazillian dump. The vuggy quartz of the ore contains thin bands of base-metal sulfide ranging from one-sixteenth to one inch wide. Bands of pyrite disseminated in

gray quartz are also common. Judging from large chunks on the dump, some of the base-metal ore shoots must have been at least 18 inches wide. Chalcopyrite is the dominant base-metal sulpfide, followed by sphalerite and galena. Sphalerite occurs in peculiar plate-like shreds in finely vuggy white quartz. The Monitor dump is largely composed of altered rock, quartz, and pyrite, with only a little galena, sphalerite, and chalcopyrite. Merrill Dowd[80] of Silverton reported that some of the quartz crystals from the vein contained liquid and gas inclusions.

The Brazillian and Monitor veins may be continuous with the Port Hope lode on the north side of Canadian Lake.

Forest Queen Mine

The Forest Queen mine is located southwest of Mineral Point between the Brazillian-Monitor and Bonanza King mines. The altitude at the shaft, which is at least 100 feet deep, is 11,825 feet. The shaft has been sunk on a stringer lode some 40 feet wide. The lode strikes roughly N. 20° E. and dips 85°-90° E. It consists of veins 2-12 inches wide, alternating with bands of altered latite 6-18 inches wide. Although the veins are much interlaced, the lode is essentially formed on a sheeted zone. The dump includes some lead-zinc ore, but the quantity is not great for its size. Galena is more abundant than sphalerite, and chalcopyrite is present only sparingly. Chunks of ore on the dump show galena stringers one-fourth to three-fourths inch wide in quartz which contains more or less pyrite. The Forest Queen lode is a prominent northerly extension of the Poughkeepsie vein which is called the White Crow lode just east of Canadian Lake.

Bonanza King Mine

The Bonanza King mine is located about 4,000 feet southwest of Mineral Point at an altitude of 12,015 feet. Its workings consist of a shaft, a drift tunnel, and a crosscut

[80]Oral communication.

tunnel. The shaft lies about 50 feet east and 25 feet above the drift tunnel portal and is 107 feet deep. It is inclined steeply to the south along the vein. The portal of the crosscut tunnel is about 400 feet north of the vein at an altitude of about 11,890 feet, but it was not completed to the vein. The work on the Bonanza King is reported to have been done shortly before World War I.

East of the mine the vein splits. One branch follows the curved steep banding of the latite country rock; the other connects with the Wolverine-Pacific lode. Landslide debris and talus makes it difficult to follow the course and connections of the vein westward.

Between the shaft and the drift portal the vein strikes east, is two to four feet wide, and dips 70° S. Possibly 20 to 30 tons of good base-metal ore are piled on the dump from the drift. Chalcopyrite and galena are more abundant than sphalerite. Some tetrahedrite and very little barite are present, and coarse milky-white quartz veins cut the sulfides.

The only recorded output from the Bonanza King mine was made in 1907, when a shipment of 30 tons of copper ore yielded 4.74 ounces of gold, 721 ounces of silver, and 2,400 pounds of copper.[81]

Adelia Mine

The Adelia mine is located on the high glacial moors[82] south of Mineral Point at an altitude of 12,312 feet. It can be recognized from the high hill south of Mineral Point by the tight-fitting tepee-like housing over the hoist. Entry to the deposits is through a nearly vertical double-compartment shaft, and from the size of the dump the workings probably total several hundred feet.

The vein is not a major one for this area. It strikes N. 43° E. and dips 85°-90° SE. Where exposed the vein is irregular; 30 feet southwest of the shaft it is a stringer lode

[81]Henderson, C. W., U. S. Bur. of Mines, Records of the Mineral Production and Economics Division, Denver, Colo.

[82]Early prospectors termed this area of excellent vein exposures Mineral Flats.

nearly 20 feet wide, most of which consists of barren altered wall rock. Toward the northeast it is offset eastward at two places by small cross faults.

Several tons of lead-zinc and a little copper ore are piled on the dump. Sphalerite and galena are closely associated in the ore. The prevailing dark-gray color of the quartz appears to be caused by finely disseminated pyrite.

Union Mine

The Union mine is located south of Mineral Point about 900 feet west of the Adelia mine at an altitude of 12,358 feet. The workings consist of a shaft and a short tunnel about 100 feet apart. The tunnel level is only about 25 feet below the shaft collar. The shaft is deeper than the tunnel level, below which it is filled with water. The tunnel connects with the shaft. The vein, which strikes S. 65° W. and dips about 85° SE. is a branch from the persistent vein zone that extends from Lake Como to the San Juan Chief mine.

The dumps have been reworked, and lead ore has been partly piled separately from zinc ore. The galena contains minor quantities of chalcopyrite. In some samples a very fine-grained sphalerite is intergrown with coarse-grained galena, but some of the galena is also of the steely variety. Both dark-gray early quartz and coarse white late quartz are present. A very little marcasite and one sample containing brittle silver crystals in small quartz vugs were found.

Bill Young Mine

The Bill Young mine is southeast of Mineral Point at the end of the south road from Animas Forks. Its altitude is about 11,808 feet. It was located in 1873 and was opened by a steeply inclined shaft on the vein to a depth of at least 250 feet. The property has been idle since the eighties. Water normally stands a few tens of feet below the collar. In 1935 Gustavus Sessinghaus unwatered the shaft for inspection to a depth of 160 feet, and in 1936 John R. Drenan had it unwatered to a depth of 202 feet. Levels have been

driven at 20, 60, 90, 120, and 190 feet of depth, and total about 1,000 feet in length, some of them extending both northeastward and southwestward from the shaft. The 20-foot level, an adit with a portal in the creek below the dump, is 265 feet long. The 60-foot level extends northeastward about 100 feet; the 90-foot level extends 120 feet southwestward and 12 feet northeastward. From the southwest drift on the 90-foot level a raise and stopes have been extended nearly to the surface. The extent of the drifts on the 120-foot level is not recorded in reports, but the vein on that level is described as similar to other levels. On the 190-foot level the drift extends 49 feet northeastward and 36 feet southwestward. It is thought that there are still other levels below the deepest discovered in 1936.

The vein strikes about N. 58° E. and dips about 80° SE. It is the most easterly branch of three that extend northward from the prominent Rip Van Winkle lode on Mineral Point knob just south of the mine. The vein matter consists of quartz with much rhodonite, rhodochrosite, or manganosiderite. Sulfides are not very abundant; only a little chalcopyrite and tetrahedrite were seen in the dumps. Many wall-rock fragments are incorporated in the veins and the walls themselves are more or less filled with quartz stringers. Sheeted sections of the lode are filled with thin parallel veins.

At the surface the vein is nearly 15 feet wide. The best ore is reported to have come from a high-grade siliceous gold-silver shoot 10 to 20 inches wide, which lay along the hanging wall. Old records, however, report gray copper and ruby silver in the ore shoot.[83] Many assays of the ore average nearly 2 ounces in gold and 300-400 ounces of silver to the ton. Crosscuts through the vein show it to be 8 to 12 feet wide on the 90-foot level and 12 feet wide on the 190-foot level. The high-grade ore streak on the 90-foot level was 5 to 8 inches wide; on the 190-foot level it was 7 inches wide.

[83]Colorado Mining Directory, p. 617, 1883.

Two small test shipments, the larger of which amounted to 48 tons, were made in 1936; its concentrate ratio was 19:1. The deposit is essentially mill-grade.

Uncompahgre Chief Mine

The Uncompahgre Chief mine is located southeast of Mineral Point above the road between the London and Bill Young mines. Its altitude is 12,017 feet. The workings comprise several shafts and short tunnels near the road, two trenches above these, and several prospect pits still higher and farther north. The principal workings lie along two veins about 25-65 feet apart.

At the upper trench very good zinc ore is exposed and piled on the dump. It consists of masses, bands, and specks of sphalerite in quartz, which is also commonly honeycombed with a boxwork formed by the weathering and leaching of sphalerite and pyrite. Below this trench is a shaft on the eastern vein which at this point is inclined steeply eastward. About two tons of high-grade coarse-grained galena and sphalerite ore are piled on the dump. On the westerly or principal vein along the road there is a shaft in which water stands at a depth of about 50 feet. The dump at this shaft contains scattered, unsorted, small pieces of ore composed mostly of sphalerite, but this material appears to be confined to the top of the dump. Ransome[84] described the deposit at the shaft as follows,—"The ore near the surface consisted of tetrahedrite, presumably argentiferous, and a little galena, in a quartz gangue. The tetrahedrite is erroneously termed 'brittle silver' by the prospectors. Another mineral of bright metallic luster and gray color occurs near the surface. It is usually in small, more or less radially grouped prisms in the quartz and is locally termed 'star silver.' It proves to be a sulphobismuthite of lead and copper, probably argentiferous. The ore in the bottom of the shaft is pyrite in a quartz gangue. A little chal-

[84]Op. cit., p. 187.

copyrite and rhodochrosite in small vugs were also observed."

The Uncompahgre Chief vein is continuous southward with the Del Norte vein, along which the latite-andesite contact is displaced about 40 feet downward on the east side.

San Juan Chief Mine

The San Juan Chief mine is located northeast of Mineral Point on top of a prominent hill south of the Ouray-Mineral Point road. Its altitude is 12,018 feet. A large mill was built beside the Uncompahgre River, northwest of the mine. No ore from the mine was ever treated in this mill, although according to Ransome[85] ore from the Ben Butler was treated in it during 1900.

The workings consist of four shafts with three principal levels on which considerable crosscutting, drifting, and stoping has been done. The workings are not readily accessible and no maps of them have been found. The Main shaft was started on the hanging wall of the main lode (see fig. 23); but was inclined at a lower angle than the dip of the

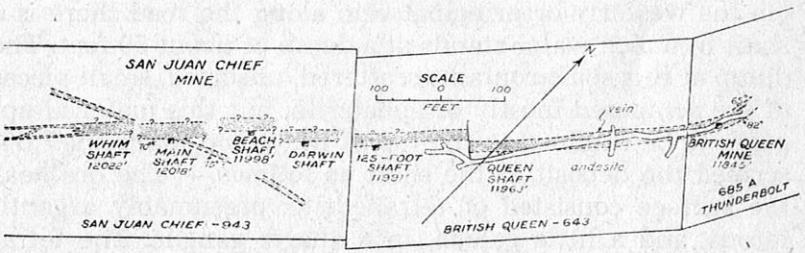

Figure 23. Plan of the lower tunnel level of the San Juan Chief and British Queen mines.

vein and left it at a depth of 100 feet; at the 200-foot level it is 36 feet and at the 300-foot level it is 52 feet east of the vein. Ransome has suggested that the shaft left the intersection in which it was started and continued down in a cross vein which lies above or east of the hanging wall of the main

[85]Op. cit., p. 187.

vein. The Whim, Beach, and Darwin shafts are reported to be about 100 feet deep. The upper part of the deposit has been more or less stoped in the ground intervening between the shafts. In general the early work was described by Ransome as being unsystematic and without accurate surveys.

The lode strikes N. 48° E. and dips 70°-75° SE. and at the Main shaft is crossed by a vein that strikes about N. 67° E. and dips 70°-80° SE. Between the British Queen portal and the Whim shaft the lode consists of a rather dense, siliceous vein 15 to 25 feet wide. Southwest of the Whim shaft it splits into two parts, with several acute connecting veins between them, and becomes essentially a stringer lode. Only certain parts of the lode contained productive ore shoots. Judging from open stopes that can be seen from the surface these shoots were two to eight feet wide, lying at either wall, within the lode, or crossing it acutely. It is reported that offsets of 15 to 20 feet were common, and that, in drifting southward for example, if the shoot were offset to the right the next offset would be to the left. However, if the positions of the shafts indicate the offsets such alternation of offset does not hold true (see fig. 23).

Much sphalerite reject can be found on the dumps, but galena and chalcopyrite are not abundant. It may be inferred, therefore, that sorted ore containing these two minerals was probably shipped; indications that galena was an ore constituent of the shoots is attested by stringers of galena that can still be seen in the ends of some stopes. Marcasite in colloform seams and thin crusts is very common in the dumps around the Main and Whim shafts. A little tetrahedrite was found in some of the dump material. The dominant material of the dump, however, comprises three varieties: (1) altered wall rock which is usually silicified or intricately veined with quartz stringers, (2) a dusty gray quartz gangue with disseminated pyrite, and (3) vuggy barren white quartz. The valuable metals from the lode were principally silver and gold.

The principal ore shoot at the surface, especially near

the Main and Whim shafts, was at the hanging wall. This ore shoot is reported to cross to the footwall with depth, but the evidence is not clear as to whether this is actually a diagonal crossing of the lode or whether the hanging-wall ore shoot ended and another on the footwall was cut and developed. On the 300-foot level good ore six feet wide was found along the footwall. In the Whim shaft, which is 100 feet deep, some ore was followed all the way down, but it is reported that the best ore went into footwall of the shaft about 58 feet below the collar.

In 1901 Ransome credited the mine with output valued at $75,000 from surface cuts and pits.

British Queen Mine

The British Queen mine is located about 900 feet north of the San Juan Chief mine and on the same lode at an altitude of 11,845 feet. Its tunnel portal, which is 173 feet lower than the collar at the Main shaft of the San Juan Chief, was accessible for about 350 feet in 1942. The tunnel follows an altered and gougy zone in the lode close to the hanging wall; no stoping had been done in the part observed.

The lode strikes generally N. 40° E. and dips 80°-90° SE. Locally, however, opposite dips may be found where late veins cut across the main lode. It ranges from 17 to 25 feet in width. Just west of the portal a vein in the lode dips 65° NW. (see fig. 23). Very little or no base-metal ore was encountered in the British Queen drift. Near the southwest end of the tunnel the lode is offset nearly 30 feet to the west. The ore shipped, according to Ransome, was chiefly valuable for its gold, which occurred in finely disseminated pyrite in quartz.

The northward continuation of the San Juan Chief vein is uncertain, as shown on plate 1. It may turn eastward and join the Mammoth vein near the junction of the Mammoth and Humboldt veins, but it quite as likely dies out a short distance north of the Thunderbolt shaft.

Lucky Jack Mine

The Lucky Jack mine is located near the head of the North Fork of the Animas River and northeast of Denver Hill. Its lower tunnel, at an altitude of 11,992 feet, is about 500 feet long. Its upper tunnel, about 300 feet northeast of and 52 feet above the lower tunnel, is branched but its aggregate length is only about 100 feet (see fig. 24).

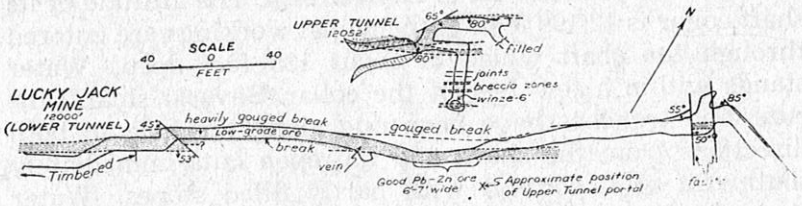

Figure 24. Plan of the Lucky Jack mine.

The vein strikes about N. 61° E. and dips mostly vertical although local dips of 53° SE. and 80° NW. have been noted. The width ranges from 3 to 20 feet. The lower tunnel deviates from the course of the vein, as can be seen from figure 24, but this deviation may have been deliberate in an attempt to avoid the harder rock of the vein. Although off the solid quartz sulfide vein, the tunnel does for the most part follow a strongly gouged northwest wall of the vein. About 320 feet from the portal the tunnel turned left from the vein and never got back on it again except for a stretch of about 15 feet where a section of the vein was faulted, quite by chance, back into the course of the tunnel. About half way to the breast the tunnel jogged east and followed the vein for about 80 feet where it disclosed a shoot of fair lead-zinc ore 6 or 7 feet wide. The upper workings are roughly over this section and in them the vein is nearly 25 feet wide, but the base-metal content is not high. Some of the vein material of the lower tunnel is very intricately banded and cross-banded as the result of repeated opening and filling of fractures. Thin dark and light bands of quartz make up striking veins incorporating earlier vein and rock

fragments. The Lucky Jack fissure is the northeastward continuation of the Burrows-Sewell vein.

The output given on page 431 is recorded from the Lucky Jack mine.[68]

Ben Butler Mine

The Ben Butler mine is located east of Mineral Point and about 1,200 feet west of Denver Hill. The altitude of its shaft collar is 12,199 feet. Its principal workings are entered through the shaft which is about 125 feet deep. Water stands within a few feet of the collar. Several small pits, cuts, and trenches have been dug along the lode in both directions from the shaft, and the open cuts immediately southwest of it connect with partly filled stopes. Water stands in some of these open cuts.

The lode strikes N. 45° E. and dips 70°-75° SE. At the shaft and in the cut immediately southwest of it the lode is nearly 20 feet wide, and the stoping at this point is in an ore shoot about eight feet wide along the hanging wall. This shoot lies above a dense quartz rib that lies along the footwall. About two feet from the footwall there is a small galena streak three to four inches wide. To the north, the main ore shoot and the stope cut diagonally across to the footwall side of the lode. In general the lode is lenticular; it narrows to one or two feet and splits into stringers about 200 feet in either direction from the shaft. The principal channels for the ore-forming solutions were probably close to the shaft. Although they probably had ready access and moved vigorously upward around this point, they entered and moved only weakly into the tighter parts of the fissure in either direction from the channel. At the narrow ends of the ore shoot only thin seams or stringers of galena with no sphalerite are found, a fact that indicates a more restricted deposition of sphalerite with respect to the solution channelway.

[68] Henderson, C. W., U. S. Bur. of Mines, Records of the Mineral Production and Economics Division, Denver, Colo.

OUTPUT OF METALS FROM THE LUCKY JACK MINE

Year	Tons	Gold (ounces)		Silver (ounces)		Copper		Lead		Zinc	
		Total	Per Ton	Total	Per Ton	Pounds	Percent	Pounds	Percent	Pounds	Percent
1928	4	5.30	1.32	166	41.5	106	1.3	35	.4	------	------
1937	16	1.00	.06	64	4.0	64	.2	4,024	12.6	3,219	10.1
1939	52[1]	2.88[1]	.06	133[1]	2.6	259[1]	.2	5,321[1]	5.1	1,405[1]	1.4
	72	9.18		363		429		9,380		4.624	

[1]From mill heads. 9 tons concentrated.

Many cars of mill-grade lead-zinc ore are on the dumps east of the shaft and cuts. According to Ransome,[87] "The best ore is the very finely crystallized galena and ruby silver (proustite) in a quartz gangue. This galena, minutely disseminated through the quartz, is called 'brittle silver' by the miners, but chemical examination shows that this name is erroneously applied. These two minerals are practically confined to two streaks four to eight inches wide." Pyrite occurs irregularly through the lode and a very little marcasite is formed in thin seams. The shipping ore of the early activity was said to have contained about 40 ounces of silver to the ton, 40 percent of lead, and some of it as much as 4 ounces of gold to the ton.

The Ben Butler vein is along the same vein zone as the Red Cloud, but it is not possible to trace an uninterrupted or perfectly continuous connection between the two. The Ben Butler ore shoot would probably be most economically mined in the future through the London tunnel, although that tunnel, at an altitude of only 11,910 feet, would yield slightly less than 200 feet of ore backs.

It is reported that during 1894-1895 shipments totaling 480 tons of ore averaged about 0.11 ounces in gold and 140 ounces in silver to the ton; 1,038 sacks of high-grade ore sent to Public Sampling Works at Silverton averaged 0.38 ounces in gold and 168 ounces in silver to the ton. Most of the work was done prior to 1900, although some work was still in progress then. In 1916 ore totaling 174 tons was milled, and the resulting concentrates contained 9.34 ounces of gold, 1,559 ounces of silver, 1,203 pounds of copper, and 21,482 pounds of lead.

London Mine

The London mine is located east of Mineral Point along the west branch of the road from Animas Forks. The altitude at the mine is 11,910 feet. The mine comprises two sets of workings, each with different objectives and veins. It was

[87] Op. cit., p. 186.

located in 1877,[88] and prior to 1900 was operated through a shaft on a vein of about N. 30° W. strike. This vein has been prospected some above the road, has been followed for a short distance at the entrance of the London tunnel, and has been cut again in the drifts where it dips 85° E. The shaft is reported to be about 180 feet deep and to have 100-foot and 200-foot levels. On the 100-foot level drifting extended about 200 feet south and 100 feet north. The drifts at the 200-foot level were short. Some of the ore contained as much as three ounces of gold per ton. The shaft vein is reported to have been about eight feet wide with a pay streak up to two feet wide. Sometime between 1900 and World War I the London tunnel was driven, and at the latter time some ore was shipped to the Silver Wing mill.

The London tunnel workings (see fig. 25) consist of a

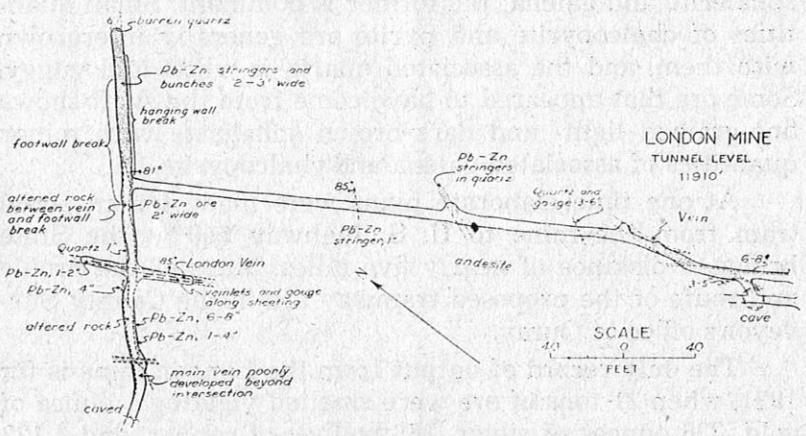

Figure 25. Plan of the London tunnel mine.

380-foot crosscut to drifts aggregating over 300 linear feet. The principal drifting is on the Washington vein, a southwest continuation of the Ben Butler vein. This vein strikes about N. 50° E., dips 80°-90° SE., and is thought to apex on the Washington claim. Over 100 feet of a fairly good lead-zinc ore ranging from one to three feet in width is exposed

[88]Colorado Mining Directory, p. 380, 1879.

in this drift. No stoping has been done. Toward the southwest end of the drift the lead-zinc streak pinches to a few inches and in the London vein, which was drifted on for about 70 feet (see fig. 25), only one to two inches of lead-zinc ore is present. On the main (Washington) vein the lead- zinc ore shoot lies along the hanging wall; it is separated from a prominent footwall break by one to four feet of altered andesite. The northeast end of the London drift is about 1,000 feet from the Ben Butler shaft. The vein at the breast of this drift consists of barren quartz about six feet wide. Along the northeast drift on the Washington vein ten samples 5-6 feet across the vein are reported to have averaged about 0.02 ounces in gold, 3.5 ounces in silver, 3 percent in lead, and 6.5 percent in zinc.

Ore on the dump consists of coarse-grained greenish sphalerite and galena; the former is dominant. Small quantities of chalcopyrite and pyrite are generally intergrown with them, and the associated quartz is white and vuggy. Some ore that appeared to have come from the shaft shows fine-grained light- and dark-brown sphalerite with minor quantities of associated galena and chalcopyrite.

At one time elaborate plans were made for an aerial tram from the mine to U. S. highway 550 at the State bridge, a distance of nearly five miles. Maps of the profile and route of the proposed tramway are in the County Surveyor's office at Ouray.

The only record of output from the London mine is for 1921, when 11 tons of ore were smelted yielding 1 ounce of gold, 336 ounces of silver, 368 pounds of copper, and 1,122 pounds of lead.

Early Bird Mine

The Early Bird mine is situated on the north side of Houghton Mountain opposite the London mine. The workings consist of short tunnels on the vein at small vertical intervals. The lower or main tunnel, at which an old cabin and shop still stand, is at an altitude of 12,126 feet. Tunnels

at altitudes of 12,210 feet and 12,265 feet are caved. A crosscut tunnel from the east at an altitude of 12,030 feet was started but never completed. The workings at the lower or main level are over 400 feet long, and considerable stoping has been done where they follow the vein (see fig. 26).

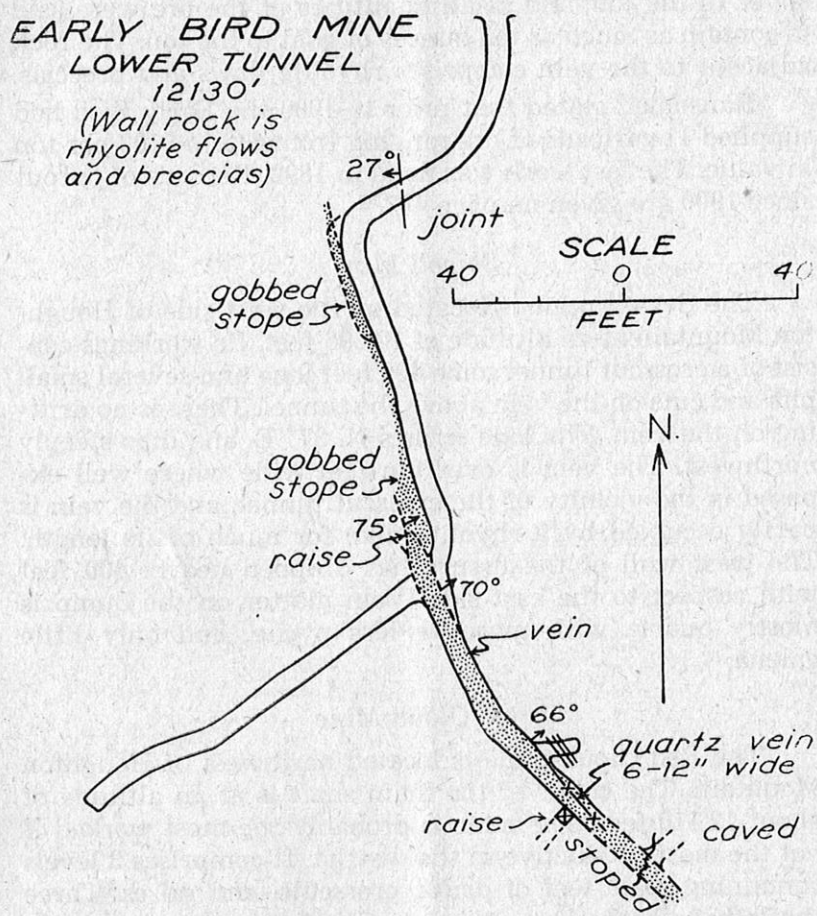

Figure 26. Plan of the main level of the Early Bird mine.

In the lower tunnel the vein strikes N. 17° W. and dips 66°-75° E. It ranges from one to five feet in width, although

in the stoped parts it is mostly four or five feet wide. Although the base-metal sulfides are not generally abundant in the vein, the shipping ore is reported to have contained tetrahedrite with a little galena in a gangue of quartz. The tetrahedrite was said to contain as much as 300 ounces of silver to the ton, and small quantities of the ore were said to contain as much as ten ounces of gold to the ton. The rock adjacent to the vein comprises rhyolite flows and breccias.

Ransome[89] stated that prior to 1900 the Early Bird had supplied 11 carloads of ore ranging from $19 to $100 per ton in value. The last work was done in 1892. Records of output since 1900 are given on page 437.[90]

Sewell Mine

The Sewell mine is located on the west side of Houghton Mountain at an altitude of 12,296 feet. Its workings consist of a crosscut tunnel some 400 feet long and several small pits and cuts on the vein above the tunnel. There is no drifting on the vein. The lode strikes N. 37° E. and dips steeply northwest. The vein is over ten feet wide where well exposed in the vicinity of the crosscut tunnel, and the vein is partly occupied by a rhyolite dike for much of its length. The west wall of the fissure has dropped nearly 400 feet with respect to the east side. Vein matter on the dump is mostly quartz with more or less pyrite, and only little galena.

Red Cloud Mine

The Red Cloud mine is located northwest of Houghton Mountain. The collar of the main shaft is at an altitude of about 12,110 feet. The mine is probably the most worked if not the most productive in the district. It comprises 3 levels containing 2,000 feet of drifts, crosscuts, and raises. Three shafts have been sunk: a main or lower one at the altitude given above, one at 12,195 feet, and one on the westward

[89] Op. cit., p.189.
[90] Henderson, C. W., U. S. Bureau of Mines, Records of the Mineral Production and Economics Division, Denver, Colorado.

OUTPUT OF METALS FROM THE EARLY BIRD MINE

Year	Tons	Gold (ounces)		Silver (ounces)		Copper		Lead	
		Total	Per Ton	Total	Per Ton	Pounds	Percent	Pounds	Percent
1902	9	11.05	1.23	528	58.7	-------	------	------	------
1919	2	1.86	.93	50	25.0	32	.8	------	------
1920	25	16.41	.66	1,373	54.9	1,700	3.4	96	.2
1921	7	5.50	.78	471	67.3	455	3.2	------	------
1922	5	3.94	.79	310	62.0	-------	------	------	------
1936	½	5.05	10.01	3	6.0	------	------	------	------
	49	43.81		2,735		2,187		96	

curve or branch in the vein at 12,241 feet. A tunnel whose portal is just inside of the northeast end line of the claim connects with all of these shafts on what is known as the No. 1 level. Its portal is caved and none of the shafts can be entered either from the surface or from the Red Cloud drift in the Frisco-tunnel level. This level, about 665 feet below the collar of the main shaft, is connected by a raise to the Red Cloud No. 3 level. Maps of the workings shown in figure 27 were furnished by the Sunnyside Mining and Milling Co.; the geologic mapping shown on the inaccessible Red Cloud levels was done by Dr. Carlton D. Hulin.

The strike of the Red Cloud vein near the main shaft is about N. 50° E. and the dip 70° SE. This vein is only one of a multiple set forming a zone about 500 feet wide. It is the middle of three prominent veins of the set, which converge northeastward on the Dewitt claim. About 250 feet southwest of the main shaft the western (Deposite) vein converges with and probably crosses the Red Cloud vein to join the eastern (Vermillion) vein farther south. The upper shaft and the southwestern end of the drift on the No. 1 level appear to be on a prominent westerly branch which may represent the Dakota vein. The intervening ground between these three principal veins is interlaced by many smaller veins some of which widen considerably in a few places. The entire 500-foot zone may be regarded as a wide stringer lode. Smaller stringer lodes six to eight feet wide occasionally change abruptly into more or less dense quartz lodes as much as 12 or 15 feet wide. The country rock is strongly banded Burns latite, the banding striking northwestward and dipping 35°-70° SW. Locally the quartz of the veins is filled with angular fragments of the wall rocks, which themselves may be more or less silicified or otherwise impregnated and altered. The black weathered surfaces of many fragments suggest impregnation by manganiferous carbonates.

Proustite was reported in some of the best ores. The tunnel dump contains some rejected sphalerite ore in which

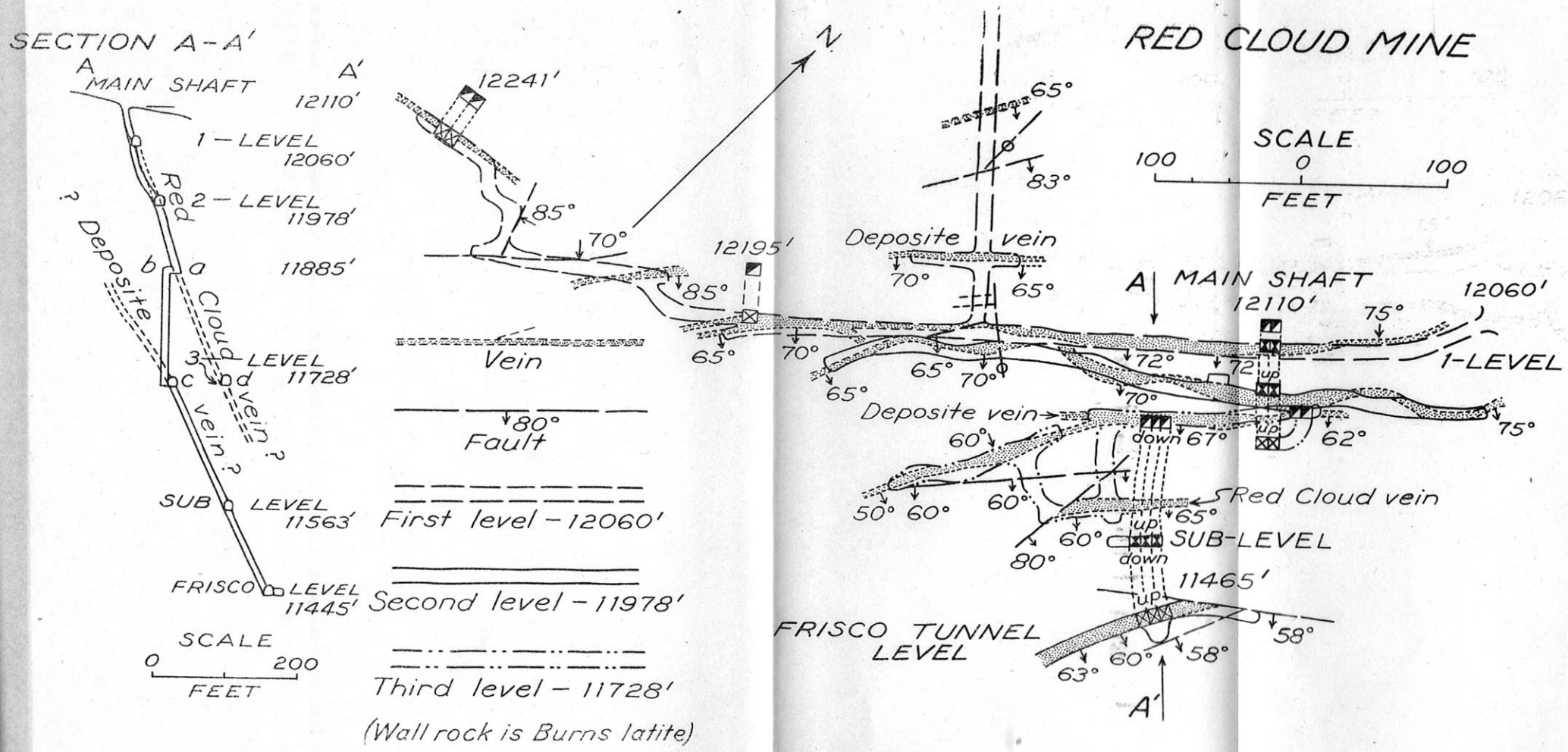

Figure 27. Plan and section of the Red Cloud mine (after geology by C. D. Hulin).