

OUTPUT OF METALS FROM THE EURADES MINES

Year	Tons	Gold (ounces)		Silver (ounces)		Copper		Lead	
		Total	Per Ton	Total	Per Ton	Pounds	Percent	Pounds	Percent
1914 (Benack)	16	0.32	.02	675	42.2	626	1.9	8,000	25.0
1914 (Wewissa)	134	3.09	.02	6,192	46.2	4,550	1.7	82,500	30.8
1916 (Wewissa)	179 ¹	5.96	.03	7,768	43.4	11,367	3.2	31,205	8.7
1917 (B. & W.)	52	1.16	.02	1,114	21.4	3,041	2.9	11,399	11.0
1921 (Benack)	15	0.10	.01	977	65.0	1,339	4.5	640	2.1
	396	10.63		16,726		20,923		133,744	

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

¹Records indicate a part of this shipment came from the Mother Cline mine. The properties have been idle since 1921.

width 100 feet to the north. It shows several stages of mineral filling rather distinctly. The first stage is represented by fine-grained drusy gray quartz and kaolin with a sprinkling of sphalerite, pyrite, chalcopyrite, and galena which filled a sheeted zone in the tuff-breccia. Later the vein was refractured and a white, coarse, coxcomb quartz lined the walls or filled cavities. This was followed by the deposition of octahedral crystals of green fluorite on the quartz comb, and the fluorite in turn was coated by quartz.

The Columbus prospect is located at an altitude of 9,425 feet near the mouth of a prominent tributary canyon on the west side of Red Mountain Creek, opposite Curran Creek. Only a short tunnel has been driven into the vein in the creek bottom and the portal is closed. The vein is a prominent one striking N. 55° W. and dipping 75° S. and lies within the lower part of the San Juan tuff. It ranges from one to several feet in width and, like the Dunmore vein which it roughly parallels, it has many north-north-west branches into its north wall. The main vein dies out westward and upward in the San Juan tuff about 2,000 feet west of the prospect. Similarity in strike and development of branches between the Dunmore and the Columbus veins suggests that the latter also extends downward into the pre-Cambrian rock.

Exploration and Prospecting

In the Upper Uncompahgre area six principal localities are worthy of consideration for future development.

1. The Sutton locality including the fissure veins of Ralston Creek and the lesser ones in the pre-Cambrian rocks around the Natalia and Daniel Bonanza.
2. The Dunmore zone including the lode and its branches from the MacGregor prospect on the west to the Connie on the east.
3. The Columbus zone including the lode and its branches along the Columbus and Davis patented claims.

4. The Guadalupe center including the fissure deposits of the York and Lucky Twenty tunnels and possible pipe-like or massive deposits along the margins of the latite intrusive.
5. The Michael Breen-Mountain Monarch group of veins including the Helen and Royal Consort veins and the Silver Link to the north.
6. The Eurades vein group.

In the Sutton area exploration may be continued on the Sutton vein by additional drifting on the No. 2 and No. 3 levels, but the surface indications do not favor the presence of a strong vein extending much farther southwest than the present breasts of the drifts on the No. 1 and No. 4 levels. However, an extension of the drift on the No. 4 level for one or two hundred feet southwestward would determine whether the ore shoot on No. 1 level rakes at a low angle in this direction.

Other veins of this group may be just as promising as the Sutton or even more so. From the point of view of a long-term, large-scale, mill-grade operation the Sutton vein might be more effectively and cheaply mined from a level near the base of the San Juan tuff, from which there are several veins diverging southwestward and upward. Also, the Denver vein seems to warrant additional exploration which may be done either through the Barber tunnel or at the base of the San Juan tuff, where an entry has already been started toward the bottom of the vein. Another point well worthy of exploration is at the mouth of Ralston Canyon where the Silver Wreath, Jay, and Camel veins focus. There is some suggestion that these veins may join at a fissure that extends down into the pre-Cambrian as well as the Paleozoic rocks. This fissure may be like the Dunmore—a feeder channel along which the ore-forming solutions rose into the volcanic rocks.

The Dunmore zone offers one of the best possibilities in the area on the basis of accessibility, geologic conditions,

and strength of lode. On this basis the part of the vein that cuts pre-Cambrian rocks has the best possibilities. About 1,500 feet west of the portal of the upper tunnel both walls of the fissure in the pre-Cambrian should again be quartzite, a condition more favorable for ore than where one or both walls are slate. Although the breccia of the San Juan tuff lies directly on the pre-Cambrian quartzites at the Dunmore mine, to the west, perhaps 1,500 feet beyond the Dunmore workings, the Ouray limestone may form a westward-dipping wedge between the pre-Cambrian rocks and the overlying breccias of the San Juan tuff. This suggestion is based on the inference that the limestone wedge exposed at the Mineral Farm mine continues southward and maintains its even contact with the pre-Cambrian rocks. If so, the base of the limestone should be from 150 to 300 feet above the upper Dunmore level (see fig. 9). Not only might the ore be better in the fissure adjacent to the limestone but it may spread into the limestone along branch channels or may form replacement deposits in beds adjacent to or near the main lode. The presence or absence of ore in the limestone would obviously depend on local conditions; for example, an open fissure with gouge-lined walls would confine the ore-forming solutions to the fissure and prevent ore deposition in limestone, whereas a tightening of the fissure above the level of the limestone together with a shattering of the walls would favor deposition.

Westward extension of the drifting is justified on geologic grounds. This part of the lode is perhaps the most attractive objective in the Upper Uncompahgre area. However, mining of the deposit should be undertaken as a mill-grade operation. High-grade ores can only be depended upon as sweeteners for mill-run ore. Although high-grade ores are not in abundance, the mineral composition is complex, including silver-lead-zinc, copper-bismuth, iron, and tungsten ores.

The Dunmore lode can be further developed on the east side of Red Mountain Creek, either from a point along the

highway near the Chrysolite or from the Connie in Uncompahgre Canyon. This section of the lode, however, is not so favorable geologically or in backs of ore as the part to the west of Red Mountain Creek.

The Columbus vein zone is essentially undeveloped, and presumably because the prospecting of its outcrop has produced no attractive samples. This vein, however, although perhaps less extensive, seems to be very similar structurally to the Dunmore fissure and appears likely to continue in depth below the base of the breccias in the San Juan tuff. If so, the Columbus vein zone offers some of the attractions in depth that have been mentioned for the Dunmore. The short prospect tunnel at altitude 9,425 feet is only about 125 feet above the base of the San Juan tuff and possibly not far east of the southward projection of the Ouray limestone wedge beneath the breccias (see fig. 2).

Although very little information based on direct observation can be drawn upon in the offering of suggestions for exploration at the Guadalupe center, the geologic setting is favorable and the opportunities offered by the completion of the Lucky Twenty tunnel are attractive. A short extension of the tunnel is warranted in addition to preliminary testing and drifting on the Guadalupe and on other veins crossed by the tunnel.

Little can be suggested concerning the Michael Breen group of lodes that has not already been brought out in the descriptions of the mines. The cost of the crosscut has been written off and appreciable ore backs have been developed on the Mickey Breen, Royal Consort, and Helen veins. The N. 5° W. vein cut near the Mickey portal and in the west drifts may be continuous into the Silver Link vein. On the Mountain Monarch vein some structural control for the ore shoot is suggested and this and other controls should be watched for and studied during exploration and mining. The vein is probably the east continuation of the Dunmore-Connie fissure and as such probably continues down as a main ore feeder channel into the pre-Cambrian rocks.

In view of the limited observations at the Eurades mines no suggestions can be made in connection with additional exploration.

LOWER POUGHKEEPSIE GULCH AREA

General

The Poughkeepsie Gulch area, as here defined, includes both slopes of Poughkeepsie Gulch from its junction with the Uncompahgre River on the north to the vicinity of Canadian Creek and Canadian Lake on the south. This definition is more for convenience of description than for any geographic reason.

The rocks of the area are chiefly rhyolite and latite flows, flow breccias, and breccias of the Eureka rhyolite and Burns latite. They are pierced locally by plugs or plug-domes of similar rock, and locally by rhyolite dikes or pebble injections (breccia dikes) along fissures. On the high ridges, notably around Canadian Lake, andesite flows, breccias, and water-laid tuffs are common. The volcanic rocks dip very generally about 10° to 15° NNW. The veins are neither so well marked nor so persistent as those of the Mineral Point and Lake Como areas. A prominent set strikes about N. 25° E., another N. 60° E., and one or two fissures strike about east; but locally veins may strike in almost any direction between north and east. Generally the veins dip steeply to the east or south. The Old Lout mine, one of the most productive in the region, is included here.

Bismuth is a common minor constituent of many of the ores of this and the Upper Poughkeepsie Gulch area. It is thought to be present principally in sulfosalts of lead and sometimes silver, notably the mineral alaskaite ($(\text{Pb}, \text{Ag}_2)\text{S} \cdot \text{Bi}_2\text{S}_3$). The two areas essentially constitute a bismuth province in the Silverton region.

Maid of the Mist Mine

The Maid of the Mist mine is located well up the east slope of Poughkeepsie Gulch at an altitude of 11,436 feet and 1,025 feet north-northeast of the Old Lout shaft. The

mine is usually reached by trail from the road to the Old Lout tunnel. The lode was the first to be patented in this area, and the mine work dates back as far as the activity on the Old Lout which was mostly in the early eighties. From available mining records all but very little of the work was done before 1900. There are three entries to the deposit; an inclined shaft on the vein at an altitude of 11,436 feet, a drift at an altitude of 11,379 feet, and a crosscut below a bold cliff west of the mine at an altitude of 11,318 feet. The portal of the drift, which is now caved, is about 160 feet north of the shaft. An old, partly collapsed head frame still stands over the shaft which is open but without ladders. The crosscut tunnel is 320 feet long. It is reported that the workings comprise several levels and that they aggregate more than those of the Old Lout shaft which exceed 4,000 linear feet. Entrance to a small part of the workings can be made through the crosscut tunnel. Old reports mention a small concentrating mill which was operated at the Maid of the Mist mine. At present about 30 tons of base-metal ore are piled on the dump. Sphalerite and chalcopyrite predominate with galena in lesser quantity, and a dense fine-grained intergrowth of sphalerite, chalcopyrite, pyrite, and a little galena is common. Some tetrahedrite, marcasite, and barite are also present. The strike of the vein near the shaft is about N. 30° E. and the dip 70° E. Along the part of the crosscut level examined the strike is N. 20°-35° E. and the dip is 57°-72° E. This level is dry. Ransome⁶⁶ describes the vein in the northeast part of the workings as "a solid vein of quartz 18 inches to 2 feet in width, containing fragments of altered rhyolite country rock and ore which is apparently of low grade." Along the crosscut level the width ranged from two to seven feet, but the vein is not as dense and there is much gouged matter and wall rock. Thirty feet west of the Maid of the Mist vein is a sheeted vein 18 inches to 5 feet in width in which individual stringers are two to eight inches wide. The sheeted zone strikes about N. 30° E.

⁶⁶Op. cit., p. 193.

and dips 62° - 73° E. The Maid of the Mist mine is undoubtedly on the same vein as the Old Lout mine. The Maid of the Mist claim turns sharply east-northeastward at the drift-tunnel portal because of what has been described as a change in the course of the vein owing to topography. This feature, however, appears to be a cross vein between the Maid of the Mist vein and the Atlantic vein to the east. The reason for laying the claim out in this manner accords with the fact that the vein does not continue as a strong vein along its northeasterly strike. The manner in which the Atlantic vein (see pl. 1) ends at this cross vein may suggest that it is cut off by a fault, but no further evidence of such a fault was found.

Ransome reported in 1901 that the Maid of the Mist mine had been idle for many years. Since then the only record of output is for 1918 when 16 tons of lead ore was shipped, yielding 0.80 ounces of gold, 339 ounces of silver, 819 pounds of copper, and 7,710 pounds of lead.

Forrest Mine

The Forrest mine is located at an altitude of 11,635 feet, about 230 feet east of the Old Lout shaft. The deposit was entered along an inclined shaft which is not now readily accessible. The extent of the working was not learned, although Ransome⁶⁷ mentions examining the upper level 200 feet below the surface. At the shaft the lode strikes N. 63° E. and dips about 70° SE. On the 200-foot level the strike is N. 70° E. and the dip about 70° SE. The side lines of the patented claim run N. 69° E. Southwest of the shaft on the flats back of the Old Lout mine, the strike is locally N. 80° E. and the vein consists of stringers along sheeting in the rhyolite country rock. Ransome described the lode on the 200-foot level as consisting of "stringers of ore, without much quartz, traversing altered rock. These stringers are irregular, sometimes expanding to two or three feet of nearly solid ore with included fragments of country rock,

⁶⁷Op. cit., p. 198.

and again contracting to narrow veinlets. The ore is adherent to the country rock and the lode is without regular walls". Nearly two carloads of base-metal ore are piled around on the dump. Coarsely speckled ore composed of sphalerite, galena, and chalcopryrite in quartz is common, as are dense lumps of fine-grained intergrowths of galena, sphalerite, and a little chalcopryrite. Very little barite and tetrahedrite was seen, although Ransome mentioned the latter as part of the ore on the 200-foot level. Heavy pyritic vein matter is common. To the east the Forrest vein appears to swing nearly due east in strike and to continue through the Morning Star and John claims. To the southwest the Old Lout vein probably terminates against the Forrest vein; even though the Old Lout workings were not accessible, one cannot help but speculate that the southwesterly ends of levels 3, 4, and 5 of the Old Lout were along the Forrest vein (see fig. 16). It seems probable that the vein stoped at the end of the Old Lout tunnel is the Forrest, as will be suggested under the description of the Old Lout tunnel.

Old Lout Mine

The Old Lout inclined shaft is located at an altitude of 11,557 feet, or 992 feet above the Old Lout tunnel from which the shaft may be reached by trail. The mine was entered through the shaft and through a crosscut tunnel below the main dumps at an altitude of 11,501 feet. The tunnel is now caved and the shaft was not entered because of its poor condition. The shaft is 495 feet in length on the incline and has a vertical depth of 473 feet. Six levels were turned from this shaft and stoping was especially extensive between the No. 1 and No. 3 levels (see fig. 16). The vein has been worked along its strike for about 400 feet on these levels. Near the top of the shaft the vein strikes N. 22° E. and dips 70° E. Practically no surface indication of the vein can be seen on the south bank of the stream only about 30 feet south of the shaft. On the south drift of the No. 1 level, however, the vein extends at least 75 feet south, and on the No.

3 level at least 115 feet south. On the No. 3, No. 4, and No. 5 levels the working plans indicate changes of strike at short intervals. The dip of the vein between the No. 2 and No. 5 level steepens to 75° and decreases to 70° below the No. 5 level.

The Old Lout mine, located about 1876, was famous as a source of high-grade ore. In a private report by Maurice Clark (1917) the following statement is made—"A copy of shipments made from August 1884 to November 1887 shows the net production to be \$245,707.31 from 1,590 tons of ore." Although the ore is described as rich in silver and containing bismuth by Ransome⁶⁸ in 1901, little is said in available reports on the mineral composition of the lode or its width. Ransome also stated that the Old Lout had produced rich silver ore worth between \$300,000 and \$400,000. Since then the only recorded output is one of 7 tons, smelted in 1923, which yielded 0.40 ounces of gold and 987 ounces of silver. In contrast to the Forrest mine, little base-metal ore is on the dump. Most of the material is dense pyrite or quartz with disseminated pyrite. Dark weathered streaks and tiny veinlets of fine-grained chalcopyrite, galena, or sphalerite are fairly common in the pyrite, and this sort of material may be partly the source of the silver values. All the massive base-metal sulfides, however, may have been carefully sorted and shipped because of their high silver tenor. Two individual small shipments in 1891 and 1893 contained 19.6 percent and 14.0 percent copper.

Old Lout Tunnel

The Old Lout crosscut tunnel is located in Poughkeepsie Gulch at an altitude of 10,565 feet and about one mile south of the Mineral Point road. It can be reached by road. It is 1,865 feet long and leads to more than 1,700 feet of drifts, crosscuts, and raises. The objective of this tunnel, of course, was the Old Lout vein (see fig. 16).

In 1886, the Old Lout mine was sold by Ed Richards to

⁶⁸Op. cit., p. 192.

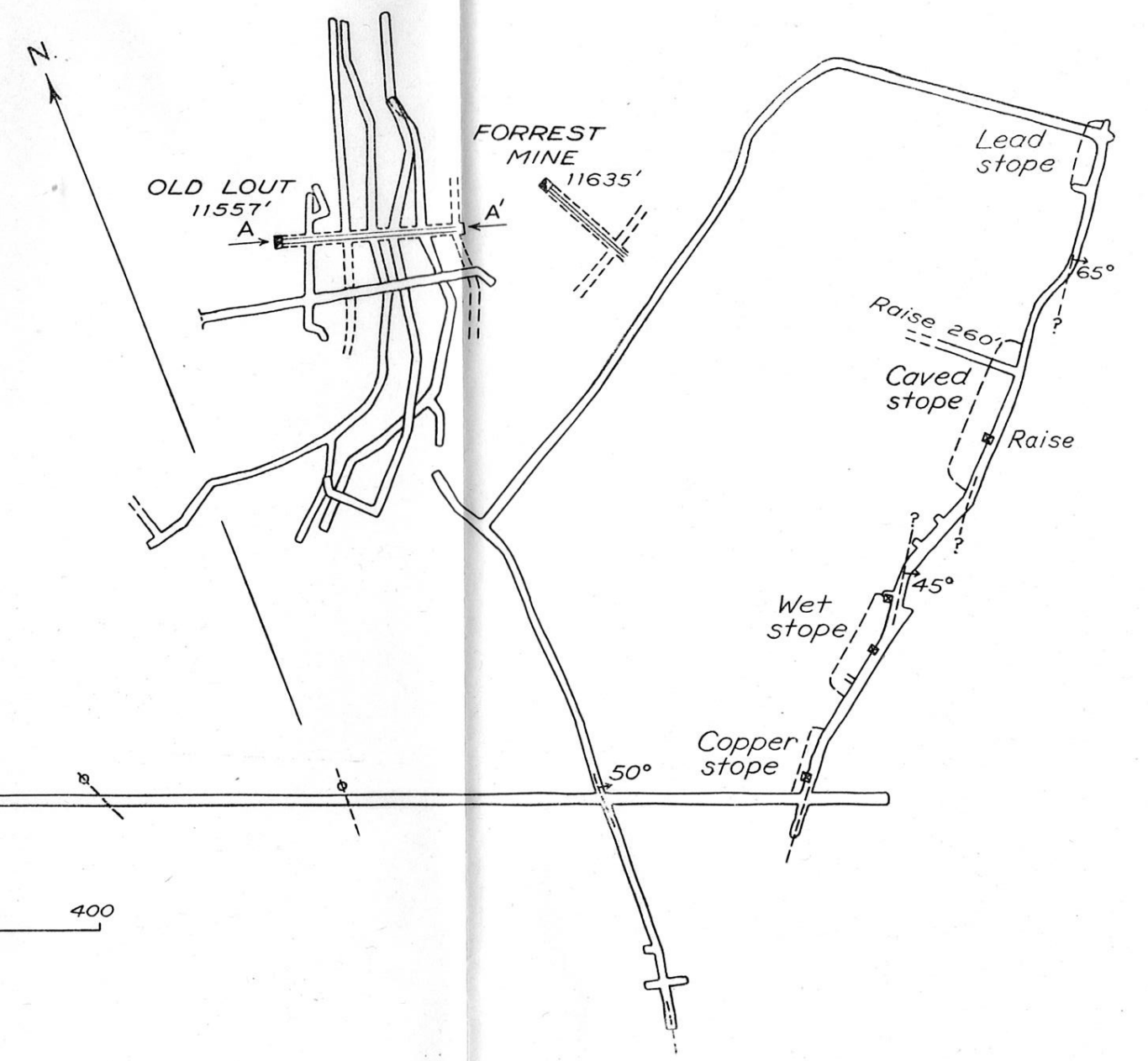
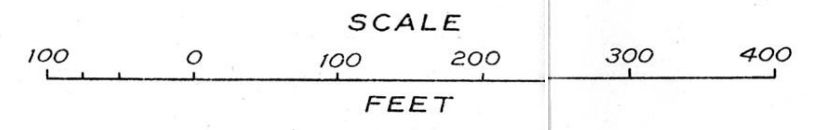
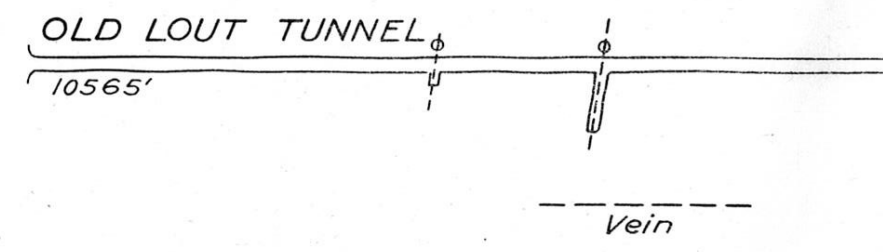
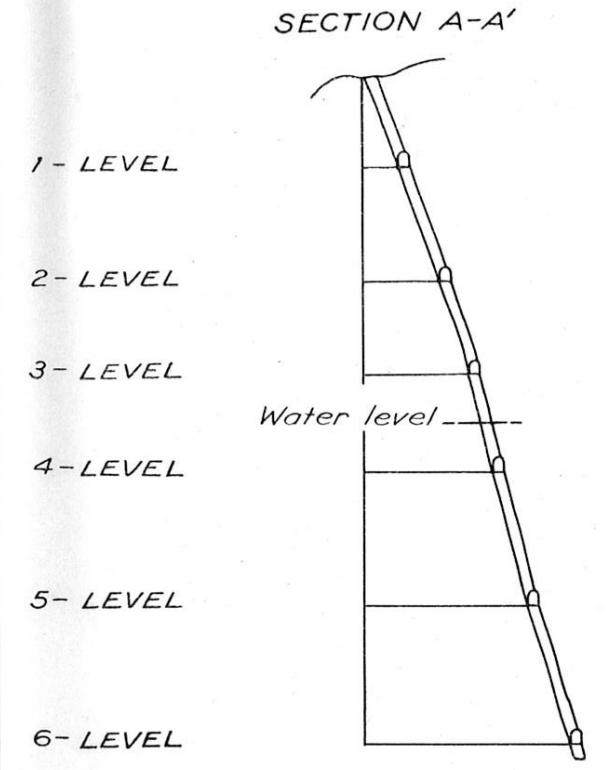
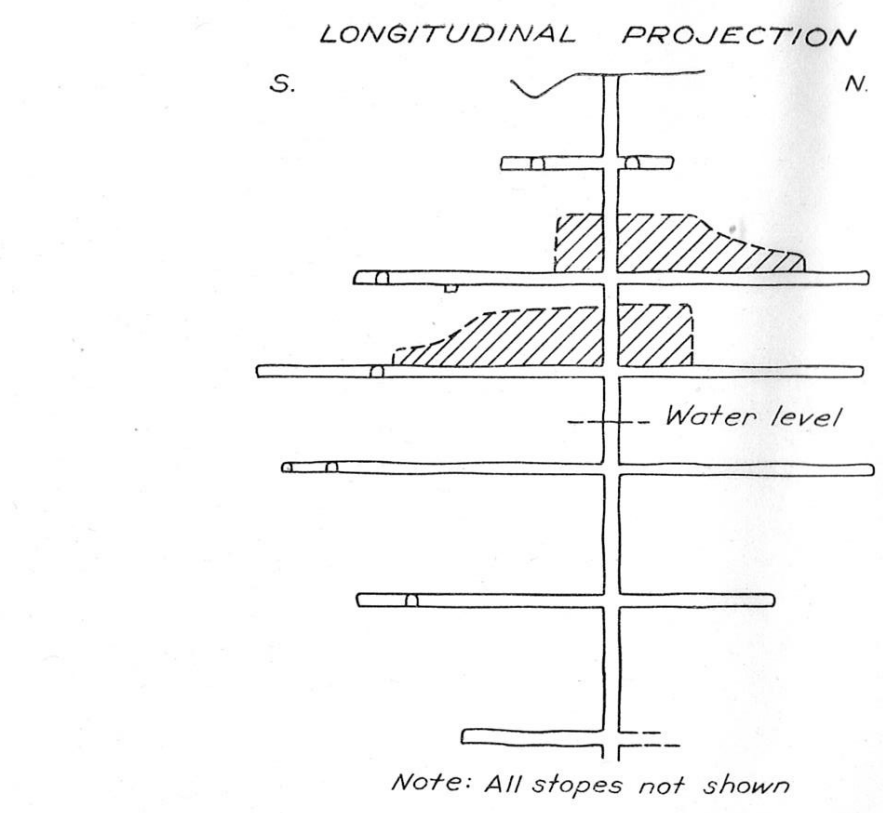


Figure 16.
Plans and sections of the Old Lout mine and tunnel.

an English company for \$200,000. This company drove the tunnel at an estimated cost of around \$100,000 and mined to some extent from the shaft workings as well as along the drift at the end of the tunnel. In the early nineties, because of a disastrous snowslide and fire together with the drop in the price of silver, the operations were abandoned. During World War I the tunnel workings were examined and extensively sampled. Some additional work was done following this stimulated interest, but during the recent survey bad air in the tunnel prevented the drifts from being reached. A strong flow of water issues from the tunnel.

Seven or eight small northward-trending veins are crossed by the tunnel. The vein that is so extensively worked at the end of the tunnel is as much as five feet wide and averages about 30 inches. The drift along the vein is about 700 feet long. Old reports express some doubt as to whether the drifting was partly along one vein and partly on another parallel vein or whether the vein was displaced by a fault for a short distance (see fig. 16). Southwest of the supposed fault the vein dips about 45° SE., and northeast of the fault 63° SE. The strike ranges from N. 40° to 52° E.

The dumps show a great diversity of vein structure, minerals, and altered rock. The ore minerals are chalcopyrite, galena, sphalerite, and tetrahedrite given in their apparent order of abundance. The gangue minerals are quartz, pyrite, chlorite, sericite, barite, and a very little lilac-colored fluorite. An average tenor of ore in this vein, according to assays of some 50 samples averaging 30 inches in vein width, was given in one report as 0.05 ounces of gold and 10.0 ounces of silver to the ton, 1.0 percent of copper, 4.0 percent of lead, and 2.0 percent of zinc.

Since the completion of the tunnel the question as to whether the vein worked on the tunnel level is the Old Lout vein has been much debated. Certainly the high-grade ores of the Old Lout shaft were not found in the tunnel. It is also reported that the lower levels of the Old Lout were not in

rich ore. This fact plus the expense of pumping water which stood between the No. 3 and No. 4 levels led to the abandonment of mining. The strikes of the Old Lout and Forrest veins are respectively N. 22° E. and N. 67° E. The tunnel vein is parallel to neither, but instead is N. 45° E. or about half-way between the two. It appears that the direction of the Old Lout tunnel was poorly chosen in the first place, if its objective was directly down the dip of the Old Lout vein (see fig. 16). The tunnel course is about 450 feet south of the shaft; as pointed out in the description of the Old Lout mine, there is little surface indication of the vein that far to the south. The surface exposures indicate more strongly that the Forrest vein extends across the tunnel course cutting off or terminating the Old Lout vein. If this be true, the tunnel-level drifts are probably on the Forrest vein. On the basis of present information, however, the problem cannot be satisfactorily solved in any strict analysis. The curving, branching, and splitting characteristic of the veins in this area are such that certainty of identification may not be made until raises and connections are put through to the shaft workings. If mining is carried on from the tunnel level it should be on the basis of profitable output from the vein exposed on that level, especially in view of the reports that the bottom of the Old Lout upper workings were not especially high grade.

Alabama Mine

The Alabama mine is located on the east side of the bottom of Poughkeepsie Gulch at an altitude of 11,046 feet. It is reached by trail up the gulch from the end of the road at the Old Lout tunnel. The workings consist of a 228-foot crosscut tunnel to the vein and a drift thereon of about 150 feet. Although there are a few short exploratory crosscuts and two winzes from the drift, there has been little or no stopping on the vein (see fig. 17).

The vein is irregular, narrow, and faulted in several places near the mine. The sulfide-bearing vein in the work-

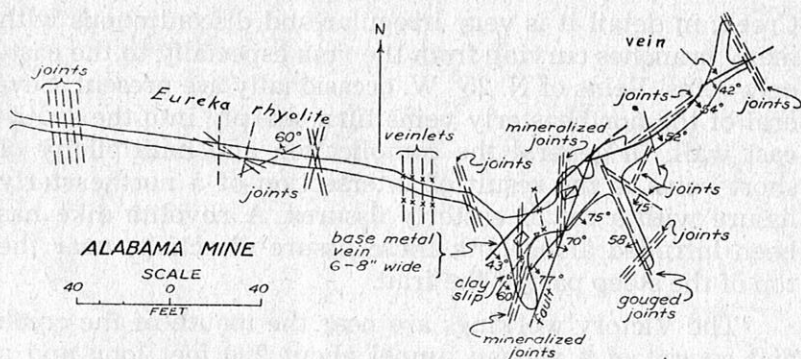


Figure 17. Plan of the Alabama mine.

ings is six to eight inches wide, dips 34° - 52° SE., and strikes N. 44° - 60° E. The rhyolite flow breccias adjoining the vein are considerably altered, jointed, and cut by gouge seams, and the joints nearby are filled with regular veinlets. A few rounded pebbles of altered volcanic rock occur in the vein. The ore minerals are chiefly galena and chalcopyrite with sphalerite in subordinate quantity. The gangue minerals are quartz, pyrite, sericite, and barite.

The vein probably is continuous with the Victory lode on the west side of the gulch and probably is more or less continuous northeastward with the Brazillian vein and not with the Old Lout vein as was suggested by Ransome.⁶⁹

There is no record of output from the mine since 1900, and it was probably idle many years before Ransome reported on it.

Victory-Silver Monarch Prospects

The Victory-Silver Monarch prospects and deposits are located along the northwest side of Silver Creek and along the trail to the Alaska mine and Ross Basin which leaves Poughkeepsie Gulch opposite the Alabama mine. The deposits are opened up by numerous prospects, short cross-cuts, and drifts as shown on plate 1. Although the vein zone in which the deposits occur more or less parallels Silver

⁶⁹Op. cit., p. 194.

Creek, in detail it is very irregular and discontinuous with many branches curving from the vein especially to the easterly veins. Veins of N. 25° W. occasionally are present. Several of the northeasterly veins turn sharply into the southeast wall. In general the complication and multiplicity of short veins is the result of intersection of a northeasterly fissure with a set of easterly fissures. A rhyolite dike has been intruded along both these fissure directions near the top of the steep part of the trail.

The Victory workings are near the mouth of the creek and consist of a zig-zag tunnel about 200 feet long and a shaft of unknown depth located on the dump near the tunnel portal (see fig. 18B). The altitude is about 11,090 feet.

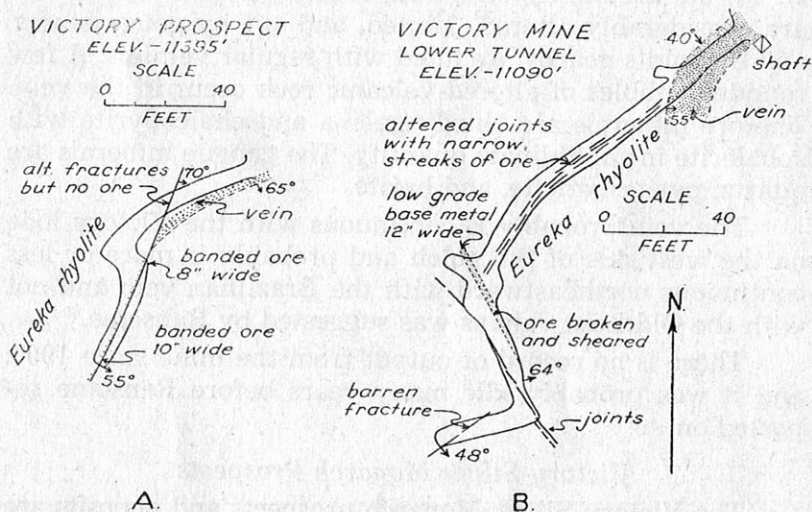


Figure 18. Plans of the Victory mine (B) and upper prospect (A).

The tunnel enters on a vein six feet wide which strikes N. 40° E. and dips 70° SE. Within very few feet the vein curves into the southeast side of the tunnel and the rest of the tunnel explores minor branch veins. On the dump is considerable fine-grained galena and sphalerite ore which con-

tains a little chalcopyrite and barite. The ore seemingly came mostly from the shaft.

At the first switchback on the trail at an altitude of 11,265 feet is a prominent dump adjoining a caved tunnel. Several tons of base-metal ore nearly of shipping-grade are piled on the dump. Sphalerite and chalcopyrite appear as coarse specks in white vuggy quartz bands. Galena is mostly in separate bands with some pyrite and fine-grained sphalerite. The vein material as a whole shows striking crustified banding in which sulfide-bearing bands are six to eight inches wide.

At an altitude of 11,395 feet along the trail is a prospect with about 100 feet of tunnel exposing another vein similar to the one just described (see fig. 18A). On the dump are about ten tons of remarkably banded but not shipping-grade ore. Sphalerite is the principal ore mineral with subordinate chalcopyrite and galena. A few tiny barite crystals occur in coarse quartz vugs. Symmetrical banding from sharp walls to the center is as follows: (1) quartz and pyrite, (2) quartz, sphalerite, chalcopyrite, and galena, and (3) quartz with coxcomb center. In general, individual bands range up to ten inches in width. Some of the bands are not symmetrical or are made up of intersecting and crossing symmetrical seams. The latite walls are impregnated with fine-grained quartz and pyrite and are locally cut by reticulating veinlets of quartz speckled with sphalerite.

The principal tunnels of exploration and development should be maintained southwestward; the principal mining and stoping, however, may prove to be on the east and west spurs for short distances away from the main southwesterly fracture zone.

Along the Dexter vein (see pl. 1) at an altitude of about 11,500 feet very complex and interesting relations between crustification banding and crosscutting veins are shown (see fig. 19).

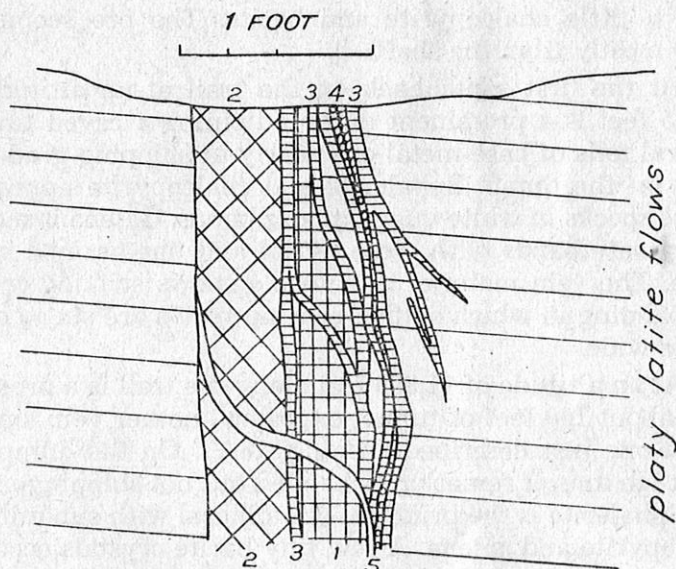


Figure 19. Banding in the Dexter vein, showing a symmetrical crustification and filling of cross fractures in successive stages: (1) fine-grained galena with stellate pellets of marcasite, (2) galena and quartz with scattered sphalerite, pyrite, and barite; (3) comb quartz, (4) sphalerite, (5) chalcopyrite and quartz with scattered pyrite.

Poughkeepsie Mine

The Poughkeepsie mine is located along the east side of the gulch at an altitude of 11,330 feet and about 1,500 feet south-southeast of the Alabama mine. The vein was worked mostly from a lower tunnel at an altitude of about 11,240 feet. The deposit was stoped only from the lower level, and these workings came to the surface only a short distance below the upper tunnel. The claim location in 1874 was the first in the gulch, but it was not patented until much later.

The lower tunnel crosscuts to the vein and is caved 68 feet from the portal where it enters the lode. At the open stopes between the tunnels the lode is 12-15 feet wide, but the stope width is only six to eight feet. The dip in these stopes is 80°-90° N. The vein strikes roughly N. 60°-65° E.

The productive ore is said to have been mostly silver-bearing, and to have contained some bismuth. The pyritic ore also contained an appreciable quantity of silver and gold. A very little chalcopyrite and tetrahedrite was noted on the lower dump as reported by Ransome.⁷⁰

The latite flow breccias for a width of 50 feet on the north or hanging-wall side of the lode are much shattered, locally brecciated, much altered, and cut by many small branch veins.

In the short upper tunnel the lode is 12-15 feet wide, strikes N. 65° E., and dips 76° N. The vein matter exposed consists of pyrite and quartz stained with green secondary copper minerals; base-metal minerals are essentially absent.

Eastward from the mine toward Canadian Lake, the lode shows much branching into stringers and in places has many included wall-rock fragments. In many outcrops the lode is more or less a coordinate network of stringers which follow joints, and locally a zig-zag course is formed by alternately following N. 60° E. and N. 80° W. breaks. The Poughkeepsie ore shoot seems to have formed at the intersection of the Poughkeepsie vein with a northward extension of the Saxon vein.

During 1875 the ore mined in the Poughkeepsie mine was reported to have come from a five-foot gray copper ore shoot which contained as much as 223 ounces in silver to the ton. On the whole, however, its output has been small and the mine appears to have been idle since 1891. Ransome,⁷¹ however, reported a total output amounting to \$12,000 up to 1900. In a period of productivity during 1913-1914, 41 tons of ore were shipped containing 5.46 ounces of gold, 701 ounces of silver, and 5,011 pounds of copper. A letter from the operator in 1912 to C. W. Henderson mentioned 7 sacks of ore containing 51 percent of bismuth and 1,100 ounces of silver to the ton. This quantity of bismuth would imply the

⁷⁰Op. cit., p. 194.

⁷¹Op. cit., p. 194.

presence of bismuthinite or native bismuth in the ore an unlikely possibility.

Tempest Mine

The Tempest mine is located at the head of Canadian Basin at an altitude of 12,638 feet. It is reached by a trail that leaves Poughkeepsie Gulch near the Alabama mine. The Tempest tunnel is a crosscut 1,050 feet long which seems to have had as its objective the ore uncovered in shallow pits along the saddle northeast of Mount Tuttle. The tunnel was caved and it was not possible to see the nature and extent of the veins that were cut. The tunnel should have intersected one of the most persistent veins of the Lake Como-Mineral Point zone. A little galena and coarse-grained brown sphalerite ore was seen on the dump. These minerals are accompanied by quartz, pyrite, and some barite. Although most of the work and output at the Tempest mine took place before 1900, shipments in 1902 aggregated 119 tons of ore yielding 7.17 ounces of gold, 1,515 ounces of silver, and 28,518 pounds of lead. In 1903 a smaller shipment of 60 tons yielded 36 ounces of gold, 9,000 ounces of silver, 3,600 pounds of copper, and 7,200 pounds of lead. The mine has been idle since 1903.

Other Mines

The Grand View mine is located on the west side of Poughkeepsie Gulch at an altitude of about 10,750 feet and at the east base of Mount Abrams. The workings consist of a crosscut tunnel 315 feet long and a 62-foot drift on the Grand View vein 228 feet from the portal (see fig. 20). The vein strikes north and is vertical. Along the first part of the drift the vein is principally quartz six to twelve inches wide. Along the west side of the vein is a pebble dike whose matrix consists of pyrite, quartz, and locally enargite. About 15 feet from the north end of the drift a northeasterly vein causes some widening at an intersection and on the north side of the intersection joints in highly altered rhyolite are filled with seams of enargite one-eighth to one-quarter inch

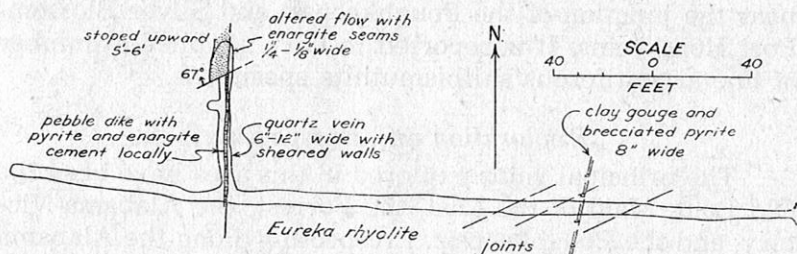


Figure 20. Plan of the Grand View mine.

wide. The minerals of the deposit consist of quartz, pyrite, enargite, fluorite, barite, and a little chalcopyrite. The enargite is coarsely prismatic and radiates in the plane of the seams with blades up to one and one-half inches long.

The enargite is of interest, since heretofore its occurrence has been thought to be confined to the pipe deposits of Red Mountain. Its intergrowth with octahedral pyrite is almost identical to that of the Guston and National Belle ores.

The Free Gold mine is located at an altitude of 10,868 feet on the west side of Poughkeepsie Gulch opposite the Old Lout tunnel. The workings consist of two or three short prospect tunnels on a northeasterly vein located along the north edge of a wide silicified area which lies to the south. The ore matter is quartz imbedded with euhedral pyrite. The pyrite is coated and more or less replaced by a light-gray metallic mineral which, although not identified as yet, appears to be one of the sulphbismuthites of lead that have been widely present in the ores of Poughkeepsie Gulch. The prospects were being developed during 1941.

The Fourteen prospect is located on the west side of Poughkeepsie Gulch at an altitude of 11,175 feet. The vein, which strikes about N. 25° E., is banded and contains some galena and sphalerite in a gangue of quartz, pyrite, barite, and fluorite.

The White Crow prospect is located on the slope north of Canadian Lake. It is near the wide silicified lode formed