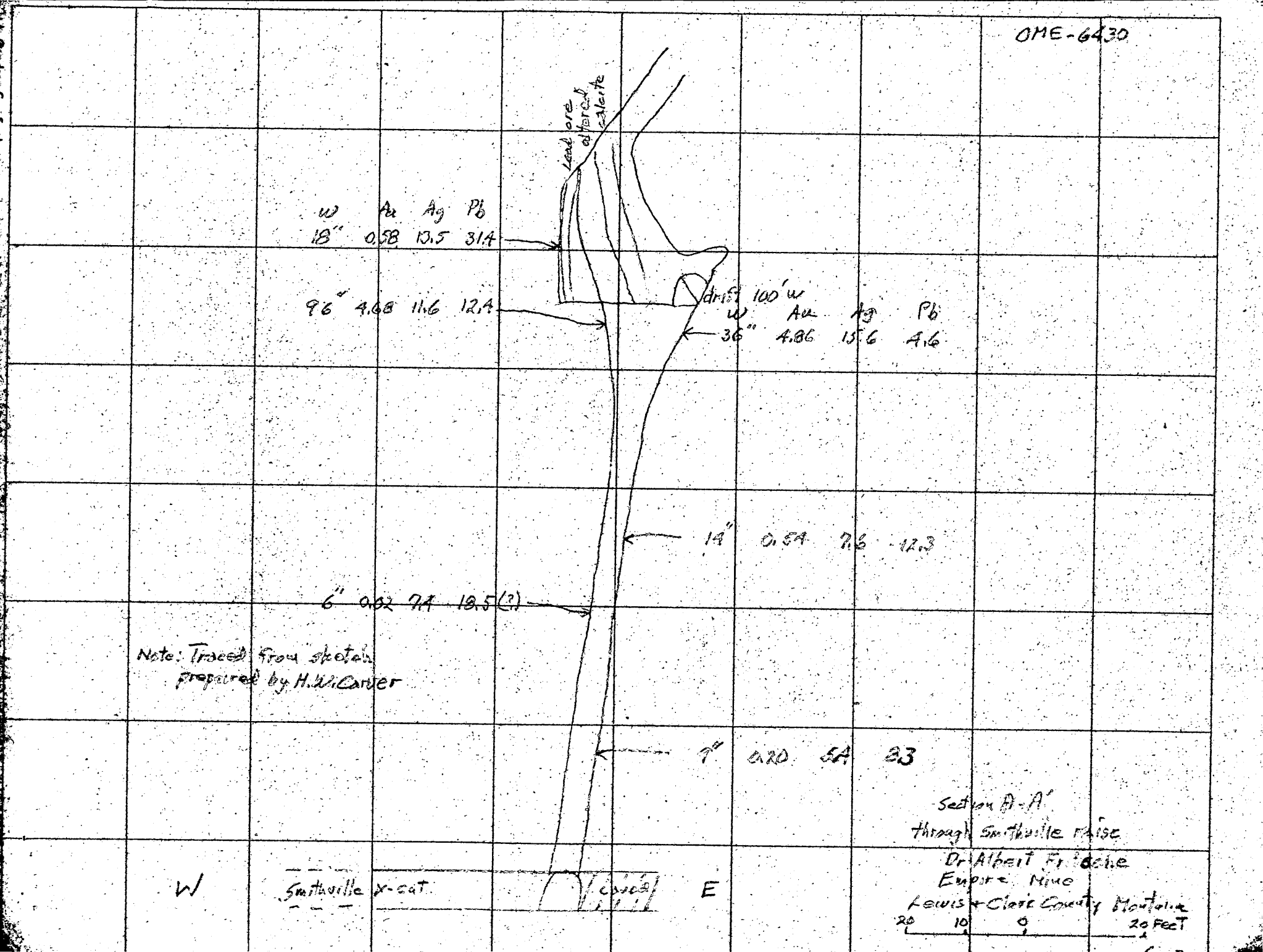
OME-6430



Note: Traced from sketch prepared by H. W. Carver

Section A-A'
through Smithville raise
Dr. Albert Fritche
Empire Mine
Lewis & Clark County Montana

August 4, 1965

Memorandum

To: Chief, Division of Exploration Operations

From: Acting Field Officer, Region I

Subject: Application Examination Report
OME-6430 (Gold-Silver)
Dr. Albert Fritsche
Empire Mine
Lewis and Clark County, Montana

Introduction

The Empire Mine was visited May 17, 1965, accompanied by H. W. Carver, agent for the applicant. About 5 hours were spent looking at outcrops and pits on the Mill, Rainbow, Whipperwill, M. L., Empire, and Smithville veins and inspecting mine workings from the Empire 420 level and the Smithville crosscut level adits. Although there were patches of snow in the higher parts of the property, mostly in the vicinity of the pits on the Rainbow vein, it is believed that enough was seen to make a fair appraisal of the property.

The applicant proposed three projects as follows:

1. From the Smithville crosscut about 550 feet from the portal drift 700 feet southeasterly along a structure believed to be the Empire vein. This should connect with the drift on the Smithville vein, and an additional 1600 feet of drift from these workings along the Empire vein is proposed.

2. Extend the Smithville crosscut 1,100 feet northeasterly to cut the Whipperwill and Rainbow veins, and drift a total of 1,000 feet on these veins.

3. From the surface, drift 900 feet northerly along the Mill vein.

It is concluded that proposals 1 and 2 will be below the indicated bottom of ore on the Empire and Whipperwill veins, and that there has not been enough work done on the Rainbow vein to justify the proposed deep exploration on that vein. The Mill vein (proposal 3)

has been traced by several trenches and a portal site has been partly prepared. The trenches visited were pretty well filled with debris and the face of the partially prepared portal site was largely covered by sloughed material. The vein appears to be a strong quartz-filled fissure and may warrant further exploration but in view of the lack of specific assay data, the porposed drift cannot be justified except as a long shot venture, more in the nature of prospecting.

Geology

The geology of the area and a partial history of the Empire and adjacent mines are described in one or another of the following papers:

Weed, W.H., 1903, Gold mines of the Maryaville district, Montana in Contributions to economic geology 1902: U. S. Geol. Survey Bull. 213, p. 88-89.

Barrell, Joseph, 1907, Geology of the Maryaville mining district, Montana: U. S. Geol. Survey Prof. Paper 57. 178 p.

Knopf, Adolph, 1913, Ore deposits of the Helena mining region, Montana: U. S. Geol. Survey Bull. 527, p. 61-76.

Sizer, F. L., 1915, The Empire mine: Transactions, Am. Inst. Mining Metall. Engineer, Vol. XLIX, p. 279-283.

Pardee, J.T., and Schrader, F.C., 1933, Metalliferous deposits of the greater Helena mining region, Montana: U. S. Geol. Survey Bull. 842, p. 63-76.

Rocks in the Maryaville district are limey shale, and argillaceous limestone beds of the Belt series, that have been intruded by a quartz diorite batholyth probably related to the Boulder batholyth. Near the batholyth the sedimentary rocks have been metamorphosed to a hard dense hornstone. Dikes of acidic porphyry and dark trap rocks cut the quartz diorite and the hornstone near their contact. At the Drumlummon mine, by far the largest producer in the area, veins occur near the quartz diorite contact with the hornstone and limestone or adjacent to the intrusive dikes. In general the veins carry rich ore shoots within the first 200 feet of the surface but in depth the shoots rapidly decrease in value until they are no longer workable (Weed 1903, p. 88-89; Barrell 1907, Plate I). Since the work done by Weed and Barrell, ore shoots have been found at the Drumlummon mine to extend to a depth of 1200 feet but generally they do not extend below 700 to 800 feet (McMurchy, 1962, private report).

The Drumlummon mine lies on the east side of the intrusive mass; the Empire mine is nearly opposite, on the west side. At the Empire mine metamorphosed Empire shale strikes nearly N-S and dips 10° W. According to Knopf (1913) the Empire vein strikes N. 60° W., dips vertically, and is said to be stoped out above the principal level for a length of 1,500 feet and to an extreme depth of approximately 400 feet. The ore is sugar-textured white quartz full of vugs and devoid of metallic sulfides. The quartz contained considerable lamellar calcite. However, F. L. Sizer (1915) who operated the mine for several years beginning about 1886, says that the quartz in the Empire vein was slightly copper stained but that in only one shipment of concentrates was there enough copper for payment by the smelter. He also says that the Empire vein strikes nearly E-W but that it dips 70° S., and that the ratio of gold to silver is about 1 to 1. The richer portion of the Empire vein was between the surface and the 300 level. He mentions "a slab of galena ore on the hanging-wall, very rich in gold and associated with copper-stained quartz, which extended for a length of 150 feet, a height of 40 to 50 feet, and a thickness of from 2 to 3 inches, on the edges, to a thickness of 10 inches in the middle." This was on and just above the 300 level.

The main crosscut, on the Empire 420-foot level, is at an altitude of 6000 feet. It cuts the Empire vein about 120 feet from the portal and has been driven through the Whipperwill vein which it cut at 1,100 feet. Sizer (1915) gives the most compdete description of this vein. According to him the Whipperwill vein was worked to a depth of 350 feet prior to 1876. It was Sizer who drove the Empire crosscut to the Whipperwill which was cut at a depth of 500 feet. At this depth the vein was 4 to 10 feet wide but was so uniformly low grade as to be unworkable.

The only mention of the Smithville vein is made by Sizer who says it is the westward extension of the Empire vein striking N. 60° W. On the Smithville there is no copper-stained quartz and, although he says that there was a radical change in the character of the quartz, he does not describe it further.

Pardee and Schrader (1933) describe the M. L. vein as being the eastward extension of the Empire vein. It strikes N. 80° W. and dips 70° S. between walls of metamorphosed Empire shale. This vein was developed by a 2-compartment shaft to a depth of 250 feet. From the shaft drifts were driven 150 feet at the 90-foot level and 400 feet at the 250-foot level. The vein was mined to the surface from the 250 level, at least there is an open stope about 300 feet long on the surface. The workings were connected to the Empire main level, some 230 feet below the M. L. 250 level, by a raise from the Empire. On the Empire main level the

M. L. vein was 1 to 20 feet wide with an average width of 6 feet. It consisted mainly of quartz and crushed altered country rock. Much of the quartz was sugary or friable and in general somewhat banded, and was stained by iron and copper oxides. There is no record of any production from this level.

The first part of the examination consisted of a drive over the surface in a jeep following the road that passes the 2 mine portals then loops back to the northwest (see applicant's map). The 2 stopes shown near the west end of the Empire claim, one on each side of the road, were caved and inaccessible for sampling, as was the Smithville shaft about 700 feet farther west. Although not shown on the map a trail leaves the road near the west end of the St. Lawrence claim. This was followed westerly to 3 closely spaced, shallow, debris-filled pits at or near the indicated junction of the Mill and Mill No. 2 veins. Some white quartz vein material was exposed in the pits but the width, strike, and dip of the veins were not determinable. The surface was clear of timber and several other dumps could be seen more or less along the trace of the Mill vein as shown on the applicant's map, but were not visited as Carver stated that samples did not sho w any values to speak of; the quartz inspected in the pits was also said to contain negligible values and was not sampled. Returning to the road Y on the St. Lawrence claim, we followed the right fork across the St. Lawrence and Whipperwill claims, taking the left fork shown on the latter claim to the vicinity of the old Shannon tram line, thence to the south east a few hundred yards so Carver could point out the Homestake workings. Carver's primary purpose in this drive was to indicate the continuity of the veins as indicated by croppings and dumps of shallow trenches.

Following the trip over the surface the Empire 420-foot or main level was visited (fig. 1). The crosscut is in good condition to the Whipperwill vein and the drift east on that vein is open to the face. However, the west drift on the Whipperwill is caved a few feet from the crosscut. The Empire vein was open and accessible for about 80 feet to the east and about 70 feet to the west of the crosscut; all other workings on this level were caved and the shaft was without ladders. Both drifts on the Empire vein were timbered and for the most part tightly lagged back and sides. However, just west of the shaft a stope 6 to 8 feet wide filled with large slabs and blocks of black dense metamorphosed shale could be seen above the drift and one zone of irregular blocky quartz could be seen. The quartz was more or less porcelainic and contained a few vugs lined with small quartz crystals. As nearly as could be determined this zone was 2 to 3 feet wide and had a strike of N. 40° W. and dipped 80° S. It should be noted that Knopf (1913) records a strike of N. 60° W. and Sizer

records a strike of E-W for what they both call the Empire vein, and that Sizer records a strike of N. 60° W. for what he calls the Smithville vein and says is the westward extension of the Empire. Because of the difficulty of taking a strike due to the small exposure, my N. 40° W. could easily be 20° off from the strike of the vein as a whole. About 40 feet east of the crosscut a quartz stringer along the south wall of the drift had an apparent strike of N. 55° W. and a vertical dip. This is not greatly different from Knopf's N. 60° W. and vertical dip which he records for the Empire vein. However, I could find no evidence of this strand in the crosscut although on projection it should be between 10 and 20 feet south of the drift, where the crosscut is not tightly lagged.

In the crosscut near the drift east on the Whipperwill vein, 8 to 10 inches of vugy quartz strikes N. 45° W. and dips 73° N. On projection this should have been picked up in the drift about 200 feet east of the crosscut but it was not. No quartz or other definite vein material was seen in this drift. About 200 feet from the crosscut a short crosscut was driven about 60 feet northeasterly from the east Whipperwill drift. The last few feet were caved but over the cave could be seen openings to the northwest and southeast. These suggest that there may have been an old drift beyond the present one that has caved since it was driven. According to Carver the last ore from the Whipperwill vein was milled prior to 1890. This would have been during Sizer's time as operator and he reports that the ore at this level was too low grade to be profitable.

About 10 feet south of the Whipperwill drift a raise was driven from the crosscut for about 20 feet. Carver took a sample of a vein found in the raise which assayed 0.36 ounce gold and 47.5 ounces silver per ton, 6.8 percent lead and 18.1 percent copper over a width of 12 inches. Converted to dollars per ton the values are:

Gold at $35.00 =	$12.60	Lead at $0.13 =	$ 17.68
Silver at $ 1.29 =	61.28	Copper at 0.30 =	108.60
	$73.88		$126.28

Material of this grade will not qualify as a gold-silver project.

About 1300 feet N. 60° W. of the portal of the Empire 420 level and 200 feet lower in altitude is the portal of the Smithville crosscut (fig. 1). This crosscut has been driven about 950 feet, the final 840 feet at a bearing of S. 89° E. The first 30 feet from the portal needs retimbering but otherwise the crosscut is open and in good condition to the Smithville vein which was cut at about 900 feet. Here, the Smithville vein strikes N. 65° W. and dips about 80° S. A drift westerly from the crosscut was caved at the crosscut and one easterly was caved about 50 to 60 feet from the crosscut.

At the intersection of the crosscut and the Smithville vein is a raise from which, according to Carver about 300 tons of ore were shipped. Carver is not sure when this ore was shipped other than during the period 1937-1941. The shipments are included with the 870 tons accounted for in the photostat records of shipments which accompany the application. Presumably all of the 870 tons came from this end of the Smithville vein. Carver prepared a section through the raise on which he shows assays of 6 samples which indicate an average grade of 3.6 ounces of gold and 11.83 ounces silver per ton and 12.73% lead (fig. 2). Although an average grade for the entire 870 tons shipped was not made, averages were computed for 3 shipping periods as follows:

Period	Tons	Ounces/Ton		Percent	
		Au	Ag	Pb	Cu
8/28/37 - 11/28/38	53.57	6.5	19.2	32.3	2.69
12/22/38 - 3/13/39	70.68	5.4	15.9	39.9	2.35
7/23/40 - 5/31/41	100.08	1.6	9.7	35.9	1.83

In the interval between 520 and 550 feet from the portal three shears cross the crosscut. From west to east they strike and dip respectively S. 62° E. -70°SW, S. 45° E. -70° SW, and S. 35° E. -80°SW. Carver has taken several samples of this zone and the three structures but none showed any values. There was no visual evidence of any mineral deposition. Bedding here strikes N. 25° E. and dips 12° NW. For most of the height of the crosscut the rocks are massive black altered shale but where the back has sloughed the rocks above appear to be thinner bedded. Carver believes the three shears, which converge to the southeast, represent the Empire vein at this level and that above the massive beds the vein will become mineralized. It is true that the general trend of the shear zone is not far from the projected position of the Empire vein from where it was seen near the winze on the 420 level, but there was no place on the 420 level where the vein could be seen to leave the drift. Apparently Steve Giulio, whose report and map was forwarded to you July 28, 1965, found no evidence to change the reports of Sizer and Knopf that the Smithville vein is the western continuation of the Empire.

Conclusions and Recommendations

From the report by Sizer, Giulio's map, and what was seen by the examiner, it is concluded that the Smithville vein is the westerly extension of the Empire vein, although the reported change in the character of the quartz tends to suggest otherwise. Carver may be correct in his belief that the shears between 520 and 550 feet from the portal represent the extension of the Empire vein in the Smithville

crosscut but it is concluded that the basis of his belief is tenuous and the complete lack of mineralization whould make a raise or drift from the crosscut in this zone pure prospecting. It is also concluded that mineralization on the Whipperwill vein has become so weak at the 420 level that its continuation to the level of the Smithville crosscut, 200 feet deeper, is highly doubtful. And finally it is concluded that the observed and reported lack of mineral values on the Mill vein would make the proposed drift on that structure pure prospecting.

It is therefore recommended that the application be denied. The applicant might be advised that diamond drilling from the surface to the level of the Smithville crosscut in the proposed areas of exploration of the Whipperwill vein, the Mill vein, the Rainbow vein, and the Empire vein, as a Stage I, to be followed if successful, by a Stage II of crosscutting and drifting, could be considered. Carver was not too receptive to this suggestion during the examination.

D. R. MacLaren

Attachments

Distribution:

CME
Docket
SRO
MacLaren

3. PHYSICAL DESCRIPTION

(a) The search for ore, whether conducted in the library or underground, can be fascinating and frustrating, but it is always challenging. If one searches for new ore bodies, an excellent place to seek is in the vicinity where other ore bodies have been found. The magnitude of past discoveries may be a measure of what might again be discovered.

For more than seventy-five years the phenomenally great and rich ore bodies of Marysville, and its Drumlummon, have been legend to the mining fraternity.

Such men as W. H. Weed, Joseph Barrell, and Adolph Knopf of the U.S.G.S., Dr. Richard Pearce (for whom pearceite was named, Dr. Wm. B. Frue (inventor of the Frue Vanner), C. W. Merrill (co-inventor of the Crowe-Merrill precipitation process) are only some of the great names that come to mind who were associated with spectacular Marysville. The fever of production--rocks in the box--left little time for the recording of the operators' observations. After all, what had posterity done for the miner.

In August, 1914, at the Salt Lake meeting of the A.I.M.E. (and published in T.A.I.M.E., 1915, Vol. 49, pp. 258-283), Charles W. Goodale, Walter McDermott and F. L. Sizer joined in the presentation of a paper on the Drumlummon and other mines of the Marysville area. As an introduction to the paper, Mr. Goodale made the plea for the necessity of making and preserving maps and assays of all mines. Mr. Sizer, who had been in charge of the initial development of the Empire Mine almost 30 years previous to the 1914 meeting, gave his portion of the paper on that property. Sizer admitted his scattered notes did not permit giving a detailed account of the property's development

3. Physical Description (Cont.)

under his management. Nevertheless, Sizer's observations are probably the most reliable source of information available regarding the Empire. It is thought his observations should be accepted, but his conclusions should be viewed in light of the advancements made in the art of geology and ore finding as practiced today.

The Marysville District has been credited with a production of 1.5 million ounces of gold. Possibly the same amount of silver has been produced. (U.S.G.S. Bulletin 842, p. 63) Most of this production was made prior to 1910. Since that period a few leasers, from time to time, jumped from property to property, gophering in the old workings to eke out a living. An occasional and usually ill-conceived mining promotion attempted operations at some of the old camps. With one exception, no work of a constructive, ore seeking nature has been conducted in the Marysville area for 25 years.

Old records indicate that more than 6,500 feet of sillwork has been driven at the Empire, together with about 360 feet of shaft. Gross production estimates range from $2.5 million to $3.5 million (at $20 gold).

The major development of the Empire Mine consists of a crosscut north from the surface 1,100 feet long, which intersected the Empire vein 120 feet from the portal, and the Whippoorwill vein at 1,050 feet from the portal. Sizer stated that the crosscut intersected the Empire vein 420 feet below the outcrop, and that the richest ore of the mine was found between the surface and the 300 feet level. Sizer also stated that a winze was sunk for a distance of 130 feet below the crosscut level, that no pay ore was found in the drifting, and ". . . the vein showing for the most part as a fissure filled with crushed slate, devoid of value, and what quartz there was tending to spangle out into the slate walls as insignificant

3. Physical Description (Cont.)

seams. . . ."

The 1,100 foot crosscut to the Whippoorwill is open and in excellent condition at this time. The winze below the crosscut level is also open, but inaccessible. Most of the levels above the crosscut and to the surface are stoped out and otherwise inaccessible.

Sometime later, at a point about 1,300 feet west of and 200 feet lower than the Empire crosscut, another crosscut was run into the mountain to intersect the Smithville vein, which, Sizer assumed, was the westward extension of the Empire vein. The Smithville crosscut intersected the vein about 900 feet from the portal. Thereafter, drifting on the Smithville vein for a distance of 400 feet to the northwest and about 600 feet to the southeast was conducted. The southeast drift is approximately under and connected with the bottom of the winze which was sunk below the Empire crosscut.

Subsequent development and mining of the Smithville vein above the crosscut did produce substantial quantities of ore, but complete figures of production are not available. However, applicant acquired the property in 1936, and until 1940, operating under the name of the Rex Mining Company, produced about

Tons ~~23,000~~ 872 cons tons of ore which contained 4,879 oz. gold, 11,719 oz. silver, 40,800 # copper and 732,000 # lead. Even during this period of time the operator was handicapped by insufficient records concerning the exploration, development and mining which had been conducted during the earlier years.

(b) See last paragraph, 3 (a) above.

(c) As mentioned previously, little reliable information exists regarding the total production from the Empire mine.

Summarized below are allusions regarding the amount and grade/or value of the ore produced:

SHIPMENTS FROM EMPIRE MINE TO AMERICAN SMELTING AND REFINING COMPANY DURING PERIOD AUGUST 28, 1937, TO MAY 31, 1941, WHILE OPERATED BY THE REX MINING CO.,

Lot	Date	Lbs. Dry Weight	Ozs. Gold Per Ton		Ozs. Silver Per Ton		% Lead	% Copper	Pb	Cu
1	8-28-37	4929	1.43	7048	22.20	109424	42.60	2.60	209,975	12,815
2	9-10-37	2784	4.15	11554	7.75	21576	48.50	1.50	135,024	4,176
3	9-10-37	2988	2.55	7619	15.80	47210	42.80	1.75	127,886	5,229
4	10-13-37	6417	2.14	13732	18.20	116788	30.50	.95	195,718	6,096
1	5-27-38	5996	11.09	66496	15.74	94377	52.20	1.45	312,991	8,694
2	5-27-38	7742	3.77	29187	34.40	266325	33.30	4.95	215,909	38,328
3	6- 6-38	7904	8.37	66156	9.80	77495	18.10	1.35	143,062	10,670
4	6- 6-38	4151	5.98	24823	48.45	201,116	30.70	2.95	127,436	12,245
5	6-23-38	10,574	10.88	115,045	9.65	102,039	11.40	1.00	120,540	10,574
6	6-23-38	5744	6.12	35153	54.20	311,325	45.65	4.55	262,204	26,133
7	11- 1-38	3298	45.42	149,795	26.05	85,913	57.80	1.80	190,624	5,936
8	11- 1-38	5948	6.85	40,724	26.60	158,217	46.25	4.50	275,095	26,766
9	11-15-38	20,417	.77	15,721	6.75	137,815	17.50	3.40	357,297	69,498
10	11-17-38	6915	4.30	29,734	21.40	147,981	52.20	4.10	360,963	28,352
11	11-17-38	3236	18.88	61,096	16.94	54,818	57.10	.70	148,776	2,263
12	11-28-38	5401	4.69	25,331	23.20	125,303	51.40	3.75	277,611	20,254
13	11-28-38	10,743	3740	29.87	597,234	22.00	2,057,723	63.40	1.45	3,461,021 / 32.3	289,948 / 2.69%
14	11-28-38		1648	18.87	6.5 oz	11.00	19.23	22.20	.30		
15	12- 6-38		5601	3.45		21.45		54.40	3.70		
16	12- 6-38		4476	12.54		15.28		59.60	1.60		
17	12-12-38		12,740	2.93		19.50		59.40	3.30		
18	12-13-38		5094	4.12		12.38		68.40	1.15		
19	12-13-38		1615	14.78		9.55		25.20	.60		
20	12-16-38		7750	2.14		6.30		19.90	1.65		
21	12-19-38		9539	1.70		14.80		59.60	2.45		
22	12-22-38		4393	2.65		17.70		53.60	3.40		
23	12-22-38		5427	4.73		12.45		68.10	1.00		
24	1- 4-39		17,113	1.76	30119	17.00	290921	56.00	2.90	958,320	49,627
25	1- 4-39		6666	5.81	38729	12.95	86325	66.30	1.15	441,958	7,666
1	1- 9-39		6143	1.70	10443	18.10	111188	58.30	2.35	358,137	14,438
2	1- 9-39		3880	5.30	20564	13.32	51682	60.10	1.25	233,188	4,850
3	1-16-39		7778	2.19	17034	21.60	168005	59.10	3.40	459,680	26,445
4	1-19-39		6736	8.01	53955	12.69	85480	64.70	1.40	435,519	9,430
5	1-31-39		9442	13.89	131149	11.46	108205	63.40	1.35	598,328	12,747
6	1-31-39		1863	13.96	26007	9.20	17140	30.20	1.15	56,263	2,142
7	1-31-39		11,994	3.07	36822	21.30	255472	61.80	3.65	741,229	43,778
8	2- 6-39		8266	6.87	56787	11.91	98448	58.40	2.10	482,734	17,359
9	2-22-39		13,991	9.06	126,758	12.02	168172	56.20	1.50	786,294	20,986
10	2-22-39		18,982	2.31	43846	21.40	406215	62.30	3.23	1,182,577	61,312
11	3- 7-39		12,567	6.21	78041	11.82	148542	64.60	1.33	811,828	16,714
12	3- 7-39		8497	2.20	18693	22.00	186934	58.90	4.28	500,473	36,367
13	3-13-39		2613	6.42	16776	6.70	17507	32.40	1.13	84,661	2,953
14	3-13-39		4830	12.14	58636	10.37	50087	70.40	.98	340,032	4,733
		304,928	141,361							8,471,524	331,545
		152.214T			764369		2,250,323			59.92	2.35
					5.4 oz		15.9 oz				

Tel 870

lbs				
248,504	1,463,603	4,308,046	11,732,545	659,473
	5.9 oz	17.3 oz		2.48%
	206.50	22.32	153.60	14.94

SHIPMENTS FROM EMPIRE MINE—(continued)

Lot	Date	Lbs. Dry Weight	Ozs. Gold Per Ton	Ozs. Silver Per Ton	% Lead	% Copper
15	3-13-39	7252	2.06	21.40	57.80	5.43
16	3-20-39	6218	1.54	24.90	59.20	5.23
17	3-20-39	7443	5.12	8.80	69.50	1.10
18	3-29-39	40,887	.34	7.00	56.10	1.60
19	3-29-39	6824	1.68	26.80	63.20	4.90
20	3-29-39	9887	4.68	13.38	72.20	.98
21	3-29-39	3205	4.23	6.40	39.10	1.45
22	4-10-39	15,214	7.03	10.76	65.30	1.30
23	4-10-39	6511	3.05	37.00	63.30	5.03
24	4-18-39	13,041	6.13	9.84	47.10	1.65
25	4-27-39	8740	4.97	7.47	36.20	1.28
26	4-27-39	6287	3.81	36.00	53.80	5.57
27	4-27-39	4352	7.02	7.70	35.60	1.23
28	5- 4-39	36,168	.19	7.25	49.10	1.95
29	5- 8-39	5339	7.90	8.57	40.00	1.33
30	5-15-39	7259	7.21	9.71	44.00	1.39
31	5-22-39	7483	6.03	7.86	35.80	1.13
32	6- 1-39	30,363	.23	5.30	27.90	1.65
33	6- 1-39	7598	6.12	34.50	47.00	7.22
34	6- 1-39	4546	10.44	7.30	26.80	.83
35	6- 1-39	9926	10.10	8.60	36.30	1.05
36	6- 8-39	6162	11.39	8.61	35.50	1.20
37	6-14-39	6101	8.84	7.52	29.60	1.10
38	6-20-39	5039	12.81	9.42	34.90	1.30
39	6-27-39	38,800	.34	4.90	24.80	1.70
40	6-28-39	7775	12.85	36.95	52.50	5.85
41	6-28-39	3244	23.12	9.60	26.70	1.00
42	6-28-39	10,761	9.86	8.00	41.20	1.25
43	7- 6-39	7368	8.53	7.56	46.30	1.22
44	7-17-39	7400	6.59	7.01	32.40	1.10
45	7-24-39	6717	8.14	33.30	46.60	4.69
46	7-24-39	3352	17.91	9.85	29.50	.92
47	7-24-39	5196	7.20	7.72	36.20	1.30
48	7-27-39	38,086	.39	4.90	26.30	1.74
49	7-31-39	10,177	7.99	11.35	38.00	1.91
50	8- 9-39	10,357	6.51	10.25	42.30	1.65
51	8-14-39	10,459	4.86	9.47	33.80	1.05
52	8-22-39	14,695	6.67	11.34	36.20	1.60
53	8-25-39	44,978	.53	5.10	28.00	1.55
54	8-28-39	14,346	6.49	11.31	35.20	1.74
55	9- 6-39	12,466	5.42	11.45	36.30	1.55
56	9-11-39	10,664	5.11	10.50	29.40	1.46
57	9-18-39	6945	11.83	14.41	34.00	1.51
58	9-21-39	42,994	.42	4.50	22.90	1.80
59	9-25-39	11,766	10.98	12.90	32.70	1.37
60	10- 2-39	7520	11.25	12.47	22.60	1.41

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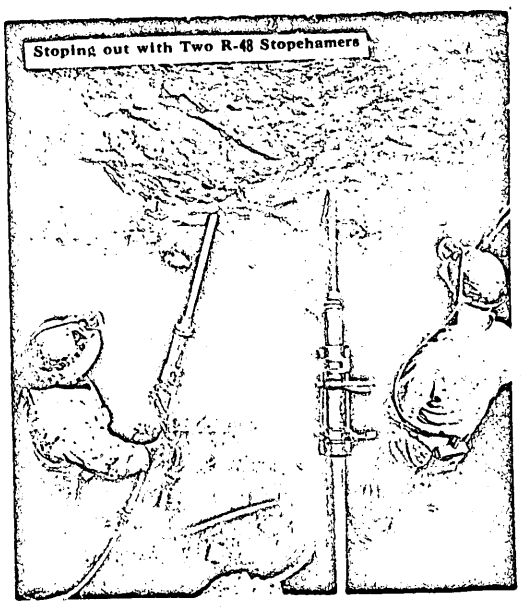
SHIPMENTS FROM EMPIRE MINE—(continued)

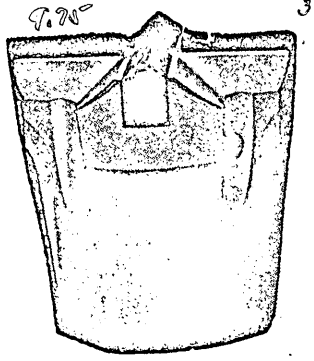
Lot	Date	Lbs. Dry Weight	Ozs. Gold Per Ton	Ozs. Silver Per Ton	% Lead	% Copper
61	10- 9-39	8914	8.58	12.97	21.00	1.45
62	10-16-39	6598	11.36	23.52	32.70	2.00
63	10-19-39	37,648	.21	2.60	10.90	1.15
64	10-23-39	6835	14.71	30.53	37.00	2.30
65	11- 1-39	8020	15.42	28.59	36.70	2.04
66	11- 8-39	8939	8.55	16.77	41.90	1.68
67	11-15-39	8986	9.32	22.08	48.20	1.66
68	11-20-39	40,484	.29	4.40	18.20	1.48
69	11-22-39	7731	8.83	19.81	29.00	1.41
70	12- 1-39	13,314	6.00	12.17	23.10	1.42
71	12- 9-39	10,852	5.33	10.52	29.70	1.42
72	12-15-39	13,784	5.73	10.27	32.00	.35
73	12-22-39	15,624	2.88	8.90	39.40	.75
74	1- 1-40	41,290	.21	4.30	33.40	.90
75	1- 2-40	16,119	2.16	9.20	34.20	.50
1	1- 9-40	7867	5.04	11.84	34.10	1.40
2	1-15-40	9353	2.72	7.38	20.60	1.60
3	1-25-40	9476	4.00	14.72	39.20	1.45
4	2- 1-40	6673	5.26	10.49	23.20	1.40
5	2- 7-40	27,247	.24	4.60	26.30	1.40
6	2- 8-40	8997	9.47	13.31	28.00	1.20
7	2-15-40	11,237	6.58	13.40	28.20	1.75
8	2-23-40	12,777	5.69	13.20	37.30	1.30
9	3- 1-40	12,037	4.30	13.55	41.80	2.60
10	3- 8-40	14,435	2.83	12.20	47.00	1.90
11	3-16-40	14,047	5.94	10.63	37.10	1.60
12	3-26-40	12,975	4.57	10.73	31.20	1.35
13	3-28-40	38,845	.18	5.40	33.20	2.35
14	4- 8-40	12,690	4.41	5.02	22.20	1.10
15	4-23-40	10,700	3.33	31.40	49.40	3.50
16	4-23-40	4049	8.32	6.09	20.30	.85
17	4-23-40	13,954	2.67	5.26	19.00	1.05
18	5- 1-40	10,649	6.13	15.08	34.90	2.00
19	5- 8-40	10,108	3.99	11.69	37.10	.90
20	5-15-40	7894	4.80	11.88	35.60	1.80
21	5-21-40	39,759	.18	4.90	26.30	1.90
22	5-24-40	11,581	3.78	9.85	29.00	1.73
23	6- 1-40	7620	2.59	7.07	30.90	1.43
24	6-10-40	8479	2.39	5.52	28.50	1.65
25	6-10-40	2713	4.53	42.40	39.20	3.38
26	6-19-40	7484	2.98	6.98	37.20	1.75
27	6-26-40	4862	3.72	7.34	42.10	1.82
28	6-26-40	5665	3.27	37.70	35.60	3.25
39	7- 9-40	36,258	.16	6.30	30.30	2.60
30	7-11-40	7174	2.16	7.48	36.80	2.02
31	7-25-40	15,379	.54	6.03	37.20	1.68

648 122.
324.062

SHIPMENTS FROM EMPIRE MINE—(continued)

Lot	Date	Lbs. Dry Weight	Ozs. Gold Per Ton	Ozs. Silver Per Ton	% Lead	% Copper		
32	7-25-40	7229	1.24 8964	50.00 361450	42.00	3.98	303,688	28 771
33	8- 3-40	2295	1.11 2527	43.30 99374	46.70	3.00	107176	6 885
34	8- 3-40	8592	1.29 11084	5.64 48459	31.70	1.50	272386	12 888
35	8- 7-40	30,322	.33 10006	7.20 218318	32.20	2.35	976368	71 257
36	10-21-40	1812	9.70 17576	12.04 21816	31.20	1.80	56534	3262
37	12- 9-40	10,843	4.93 53456	11.78 127730	24.40	2.10	264569	22770
38	12-28-40	7094	1.21 8584	6.16 43689	18.60	1.98	131948	14046
39	1- 4-41	19,468	2.80 54510	4.45 86633	46.80	1.20	911102	23362
40	1- 4-41	7612	1.11 8449	10.30 78404	35.50	2.40	270226	18269
41	1-21-41	25,025	.21 5255	8.67 216,967	43.10	2.20	1078578	55055
42	1-27-41	17,737	.48 8514	9.29 164777	44.20	2.20	783975	39021
43	1-27-41	11,631	.91 10584	8.17 95025	65.20	.70	758341	8142
44	2-24-41	10,453	1.14 11916	9.70 101374	31.90	2.05	333451	21429
45	2-28-41	11,285	6.17 69628	7.76 87572	40.40	1.02	455914	11511
46	3- 5-41	11,973	2.89 34600	10.48 125477	26.80	1.67	320876	19995
47	4- 7-41	1420	2.88 4090	9.70 13774	30.70	1.40	43594	1988
48	5-31-41	15,389	.58 8926	3.90 60017	7.30	.50	112340	7694
		200,153	3 328682	1,951,841			7,180,974	366,345
		100.076	1.6	9.75			35.88%	1.83%





For efficient mining operation we MUST purchase Stopers and Carset Bits for Shoulder Drive Rods—same as shown here.

3. Physical Description (Cont.)

1924 transactions of the A.I.M.E., by Sizer, who stated that, in the first two years of his management of the mine (1886-88) the total output was a little over a half million dollars. He completed a mill with a monthly crushing capacity averaging 5,000 to 6,000 tons, and thereafter terminated his connections with the property.

In 1918, an estimate was made of the tailings which were impounded below Sizer's mill. At that time it was estimated that 175,000 tons were impounded, averaging $2.00 a ton. If 70% of the gold values were recovered, this would suggest that the average value of the ore milled was $6.65 per ton and the gross production was about $814,000. To this figure should be added the $500,000 Sizer produced in the first two years of operation, and the $334,504 produced by the Rex Mining Company in 1936-40.

U.S.G.S. Bulletin #842, Pardee and Schrader, mentions that the ore on the M & L probably did not average as rich as the Empire ground but, ". . .There is evidently a large ore reserve in the M & L ground . . ." (In explanation, the M & L claim is on the eastward extension of the Empire vein, and it is noted that the vein is stoped continuously from the M & L through the Empire claim. However, production figures are entirely lacking.)

Applicant regrets that specific data is not available regarding past production.

(d) There are no known ore reserves in the Empire holdings.

(e) & (f) Applicant is reluctant to attempt summarization of Joseph Barrell's masterful description of the geology of the Marysville Mining District (U.S.G.S., p. 57); or "to the point" comments of Adolph Knopf (U.S.G.S. Bull. 527), on the ore occurrences at Marysville; or to the magnificent reconnaissance type report by Pardee and Schrader on the Marysville section of "Metalliferous

3. Physical Description (Cont.)

Deposits of the Greater Helena Mining Region (U.S.G.S. Bull. 842); or to the observations recorded by W. H. Weed in "Gold Mines of the Marysville District", written in 1903 (U.S.G.S. Bull. 213).

It is generally agreed that flat-lying sediments of the Belt Series, (consisting of great thicknesses of sandstone, shale, and, in this area, capped by impure limestone) were intruded and elevated by a small stock of quartz diorite. Many believe this stock is an outlier of the Main Boulder Batholith. In any event, surrounding the stock, and halo in form, for a distance of 1/2 to 2 miles, is an intensely metamorphosed zone of hard, tough, dense rocks, locally called "slate".

Vein fractures are situated in the marginal part of the stock exposure and in the surrounding metamorphic zone. Gold and silver were the valuable minerals in the veins, but frequently appreciable quantities of lead and/or copper also were mined. Zinc, if present at all, was observed only in extremely minor amounts. Quartz and/or calcite was the gangue usually accompanying the ore, but at times fluorspar also has been seen. A small amount of pyrite or its oxidized equivalents is generally noted, and from time to time some oxidized manganese minerals have been observed.

With the exception of the Drumlummon that contained some commercial ore at least 1,600 feet below the outcrop, most of the explored veins "pooped out" a few hundred feet below the surface.

Qualified students of the area are in sharp disagreement as to whether or not there was one period of mineralization, or two, or even more. There is also sharp disagreement as to why, in most cases, the veins lost their identity and values so near the present surface. In any event, there is no concensus among

3. Physical Description (Cont.)

the competent observers as to these points.

The Empire-Smithville vein is a persistent structure which has been explored and mined throughout a horizontal distance of more than 3,000 feet. Along this strike-length, mining has been conducted through a vertical range of about 700 feet. The M & L ground, at the east end of the property, topographically, is the highest point on the vein. All of the workings are in hornfel type rock, locally called "slate". The metamorphosed rocks, (called the Empire Shale in the literature) strike northerly and dip at a low angle (less than 20 degrees) to the west.

The Empire-Smithville vein crosscuts the sedimentary formations. Although ore has been mined throughout the explored extent of the vein, it well can be that production all was derived from an upper 400 foot section of the formation. Walcott suspects that the Empire shale is 600 feet thick or more. The Empire shale is underlain by great thicknesses of red shales and sandstones--the Spokane formation of the Belt; and is overlain by a buff to blue limestone, the Helena Limestone, also part of the Belt series.

No investigation has been made in the area to study whether or not ore shoots developed selectively in certain of the intercalated beds. There is a distinct suggestion, however, that such selectivity exists, because, it appears that most of the ore shoots rake down to the west at a flat angle.

Megascopically, most of the rock exposed underground is almost identical in appearance with any other rock of the area. A thin section is necessary to determine the constituent minerals, which have been found to include an entire suite of contact metamorphic minerals. However, in the vicinity of the major veins the host rock is distinctly harder, denser and more abrasive than similar rock more distant from the veins. It is suggested that hydrothermal alteration superimposed further alteration, silicification,

3. Physical Description (Cont.)

on the metamorphosed shale host rock.

Sizer (private communication, 1918) described the Empire vein as follows:

> "The Empire vein is a great fissure opening in places to 15 and 17 feet in width, but with a general width of five feet, and dipping to the south at an angle of 72 to 74 degrees. The vein has heavy gouge and slickensides throughout the greater part of its course, separating the quartz from the walls, which are well defined, and in many places smooth and slick--."

Sizer also stated (T.A.I.M.E., Vol. 49, p. 281): "There were no cross veins intersecting the Empire and Whipperwill veins and no faulting of either of them, although the Smithville (the western extension of the Empire vein) had a strike of about N. 30 West, and there was a radical change in the character of the vein quartz on this west extension of the Empire." (Emphasis supplied.)

As a matter of fact, most of the gangue in the Smithville vein was lamellar calcite, while the gangue of the Empire was quartz with little to no calcite. Considerably greater amounts of base metals were contained in the ore from the Smithville.

A strong inference is provided that the Smithville vein is not the westward extension of the Empire, but is a separate, strong, distinct vein, striking N. 30 West.

Familiarity with fault problems created in Butte, when the east-west vein systems were faulted and offset by the northwest system of fault veins, and knowing that these problems were not resolved until 1905-10 or later, there is little wonder that a similar condition in the Empire would not have been recognized, nor its resolution understood in the early part of this century.

Attention is again called to Sizer's statement wherein he stated:

> ". . . There were no crossveins intersecting the Empire and Whipperwill veins and no faulting of either of them--."

3. Physical Description (Cont.)

This statement should be contrasted with that of Pardee and Schrader (U.S.G.S. Bull. 842) who, in discussing the Empire-M & L vein, stated,

> "In the drifts in the M & L mine that extend beneath the West Fork of Coon Gulch, the vein in place narrows or is pinched as if by a fold or fault, the position of which may be marked by the gulch. Similar constrictions, however, occur also in the Empire Mine, but beyond them the vein invariably widens out to its full strength."

There is a suspicion that Mr. Sizer did not recognize the probable existence of strike faulting in the vein itself, or, possibly, later faults crossing the vein at a low angle.

It is applicant's belief that the Empire vein (having a general strike of N. 60-70 West) was faulted by the Smithville vein, a Northwester; that the Empire vein was thrown to the left; and that the proposed drift east from the Smithville crosscut will be on the faulted extension of the Empire vein.

The first portion of the proposed drifting is on a strong, though barren structure, which, when fully explored should conclusively demonstrate this hypothesis.

In 1952, applicant went underground at the M & L shaft, and through the interconnecting workings, came out at the shaft in the Whipperwill crosscut. It was obvious that the lower underground workings were off structure and that the previous operators were hopelessly lost.

A winze, 200 feet deep, connected the Smithville tunnel level and the Empire workings. This winze was sunk vertically and work below the Whipporwill crosscut did not disclose structures that could be identified either with the Smithville vein or the Empire vein.

A vein the size, the strength, and structure of the Empire simply does not disappear in a short vertical distance of a hundred feet or so.

3. Physical Description (Cont.)

Applicant believes that the problem involved is simply a geological structural problem, capable of solution with modern geological techniques.

Project #1

Approximately 2,300 feet of the proposed project is involved in drifting and crosscutting to explore the two segments, at depth, of the Empire vein. The first approximately 700 feet of drifting will be on a structure now exposed in the Smithville crosscut and will lead to the area where applicant's predecessors were lost. Thereafter, 1,600 feet of drifting is proposed to the east on the downward extension of the Empire vein when located.

Project #2

The Whipperwill vein strikes N 60 W and is roughly parallel with but 1,000 north of the Empire vein. However, the Whipperwill dips steeply to the north. Otherwise, the general geologic setting is similar to the Empire.

Apparently the Whipperwill was developed and produced substantial ore for at least 350 feet below the outcrop. This production period was in the late '70's. Sizer drove the Whipperwill crosscut through the Empire vein and to the Whipperwill vein. Possible 500 feet of drifting on the Whipperwill was conducted. Sizer reported that the vein varied from 4 to 10 feet in width, but was so uniformly low grade as to preclude the possibility of working it at a profit. Only a small amount of gophering had been conducted in the mine since the late 70's. The crosscut to the Whipperwill is in excellent condition, but most of the drifting on the vein is inaccessible for examination at this time.

Eleven distinct quartz veins, mostly striking about N 60 W were cut by the Whipperwill crosscut between the Empire and Whipperwill veins. On only one of these veins has any drifting

3. Physical Description (Cont.)

been done, and that for a distance of about 50 feet. An occasional good assay was obtained in the work, but the face of the drift is accessible and barren of values.

On the surface and principally to the west of the Whipporwill crosscut, trenching, bulldozing and shallow excavations reveal many exposures, each of which might be considered worthy of additional exploration. As a matter of fact, most of the bedrock soil in this area will pan good to fair colors. Only the apathy for mining in the entire area can be the only possible explanation as to why more follow-up work has not been done. Applicant knows only that it has not been done.

The Whipporwill vein occupies the crest of a hill or ridge. The north slope is somewhat steeper than the Empire side of the ridge. Likewise, the north slope is covered with a heavy, coarse mantle of overburden; yet prospectors have delineated a third vein, called the Rainbow, which appears to be a strong structure parallel with, but about 500 feet north of the Whipporwill vein.

Project No. 2 has been designed to explore the veins between the Smithville vein, through the Whipporwill vein, and on to the Rainbow vein.

The crosscut proper will be about 1,100 feet long and provisions have been included in the estimate to provide for a reasonable amount of drifting on any of the more promising showing expected to be revealed in the crosscut. Insofar as two major veins, together with many smaller though potentially productive veins, are expected, a total of 1,000 feet of drifting is being requested.

Project #3

About 1,700 feet west of the Smithville tunnel, surface pitting and bulldozing has revealed a quartz vein differing

3. Physical Description (Cont.)

sharply in strike from most of the known veins of the Empire area. While the vein, known as the Mill vein, is enclosed in westerly dipping metamorphics of the Empire shale, the vein strikes north. There is little doubt of its persistence for 1,300 feet to the north of the proposed portal of this project. Insofar as drifting on this otherwise unexplored vein will also crosscut the area where the Empire vein might be found, (if it persists that far west) or, as an echelon extension of the Empire to the west. Stress analysis of the area suggests such a possibility.

Superficial prospecting has also indicated another vein of unusual strike in the Empire area. This vein, known as the Mill Vein #2, strikes northeasterly, and, within the range of the proposed Mill Drift, should intersect the proposed tunnel. The influence on mineralization, if any, is worthy of constructive conjecture.

Although this proposed project is considerably west and also north of any previously developed ore bodies, the mineralization in and about the area to be explored is of such nature that serious exploration is warranted. The successful culmination of the project would open up an entirely new and hitherto and undemonstrated mineral area.

The application requests that 900 feet of underground work be approved for this project.

(g) There are no geologic nor engineering reports available concerning the properties upon which any mature credence could be placed. The references made to published reports concerning the mines and surrounding areas are, in the main, out of print, but are available in any of the Government libraries.

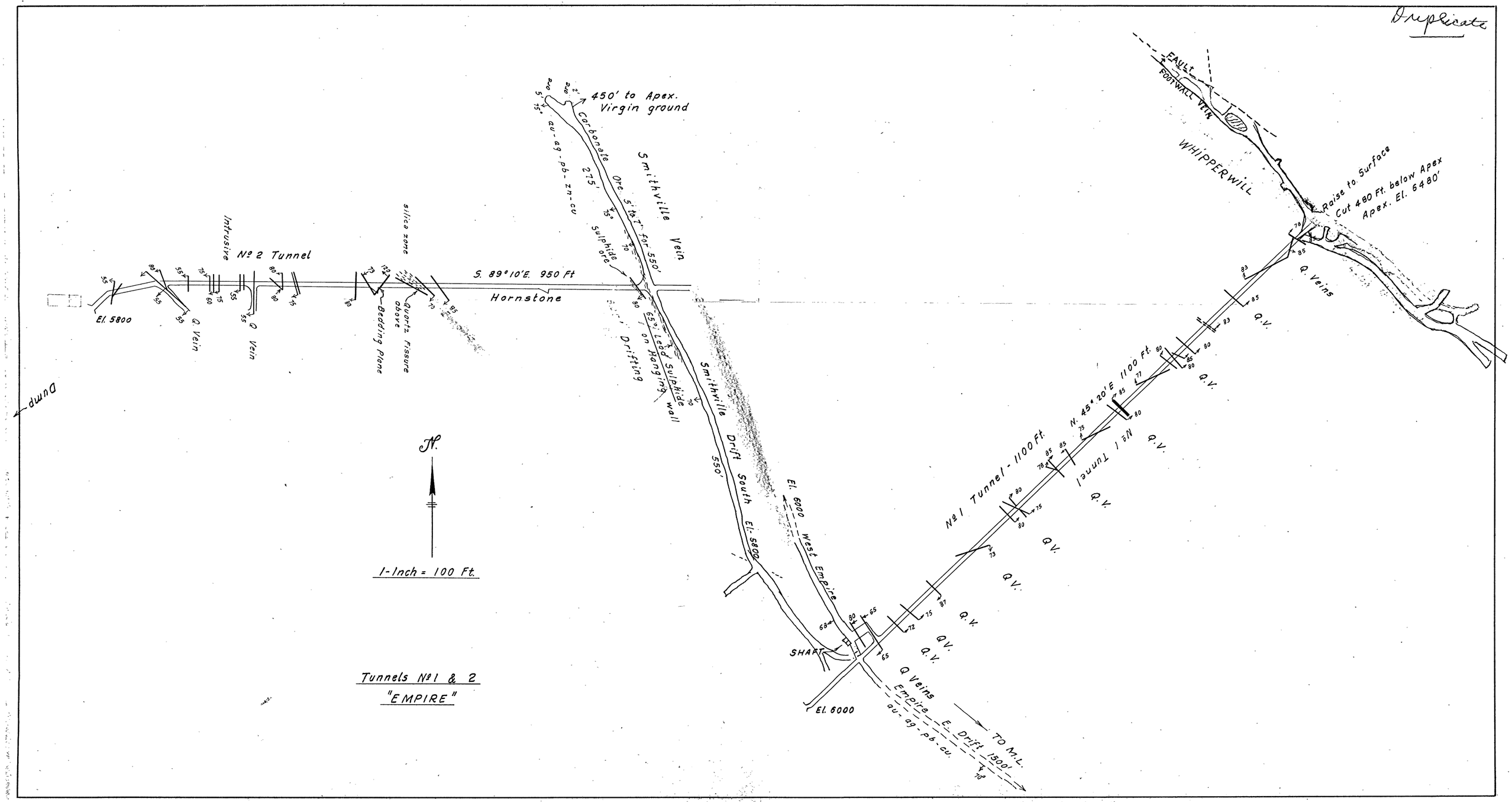
4. ACCESSIBILITY OF PROPERTY

(a) The O.M.E. representative, who may wish to examine the property, may make arrangements with applicant's representative:

H. W. Carver
802 - 5th Avenue
Helena, Montana
Phone: 1-406-442-5096

(b) Heavy freight may be consigned to Silver, Montana, but for all practical purposes, Helena, Montana is the most prominent shipping point. Silver, over good dirt road, is about 15 miles from the Empire. Except for occasional blocking of the road by snow, the road is kept open the year around.

Duplicate



Tunnels Nº 1 & 2
"EMPIRE"

OME-6130

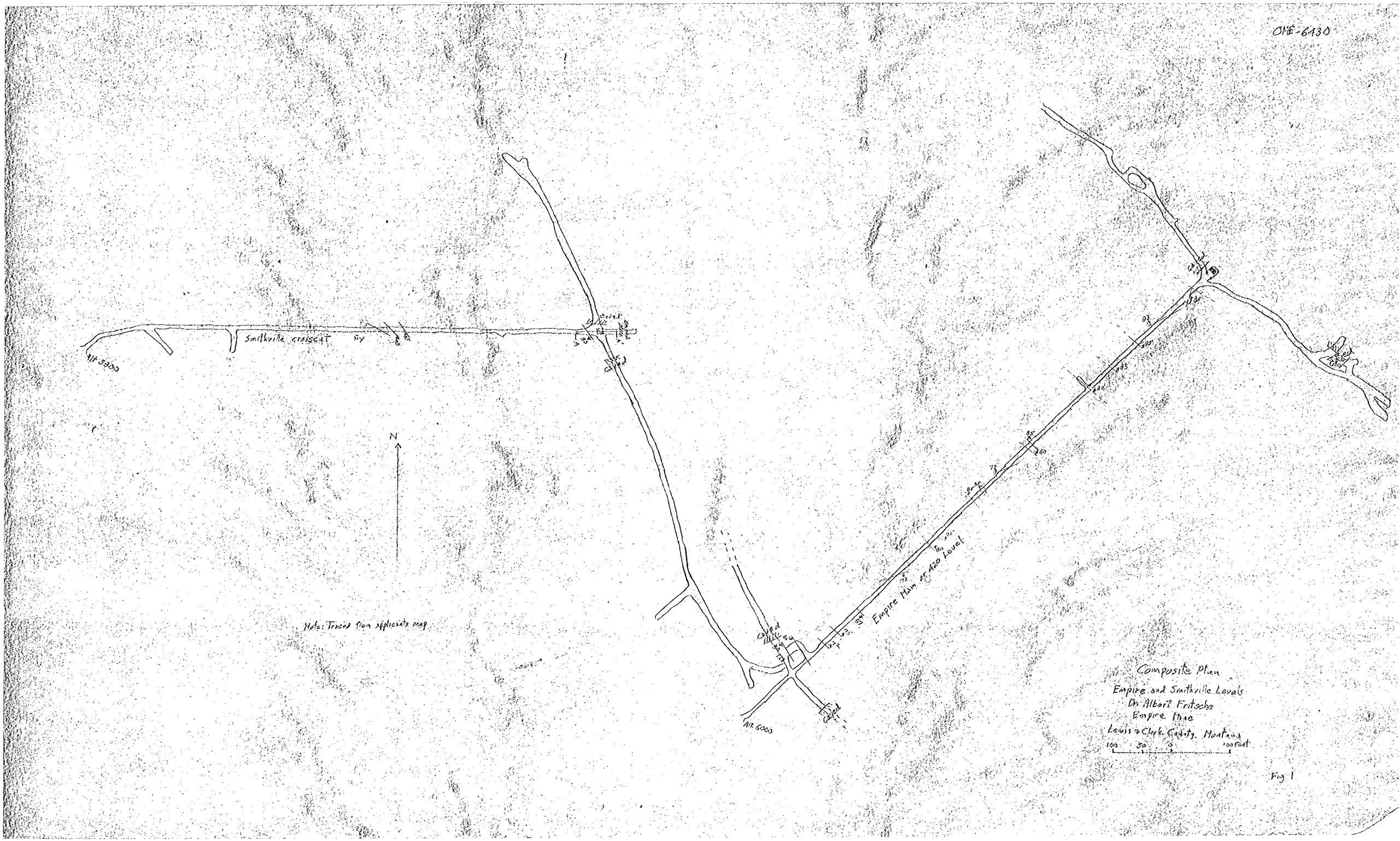
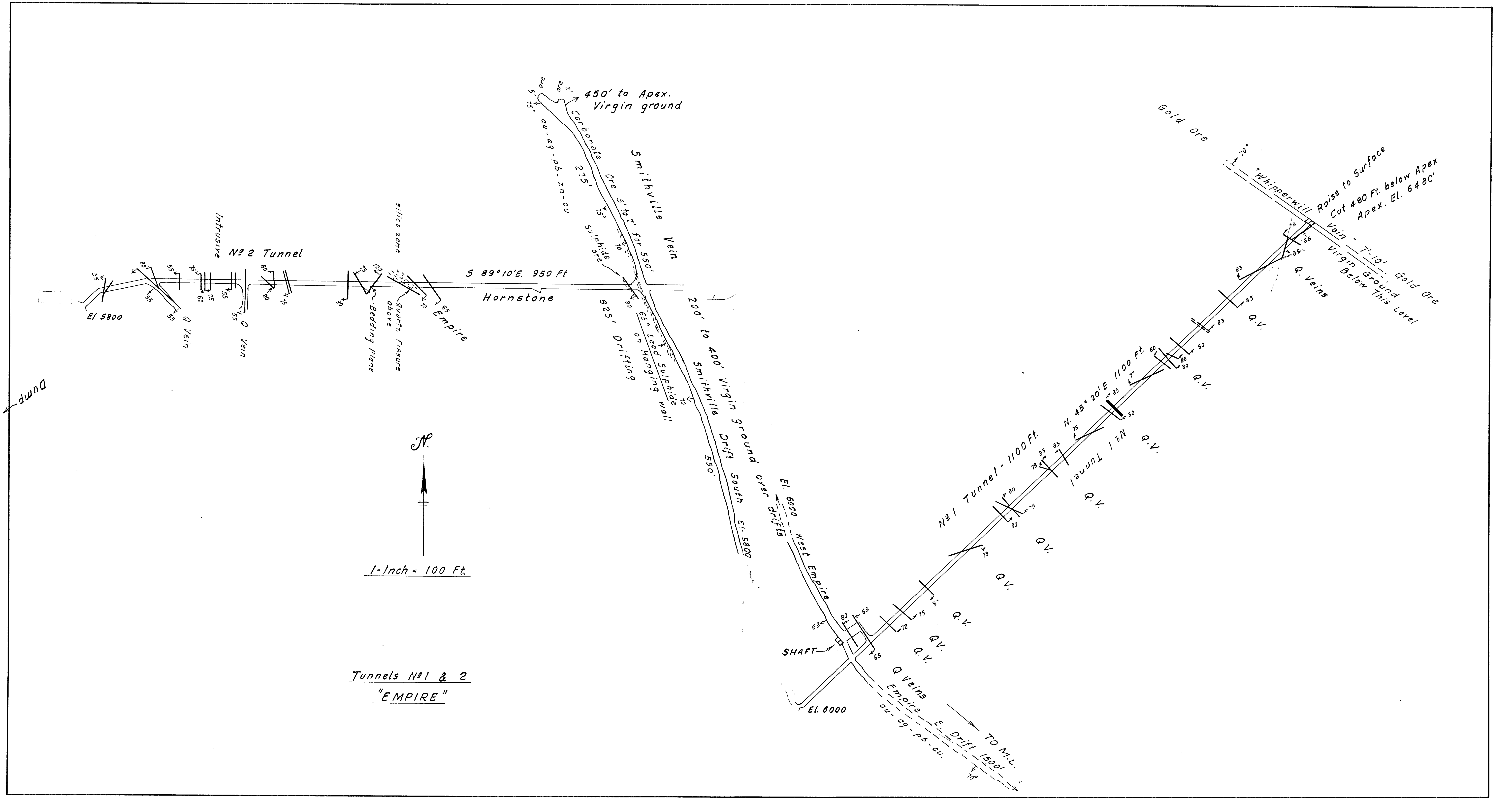


Fig 1



Tunnels Nº 1 & 2
"EMPIRE"